Micro Aperiomics

Aperiomics is a theory I began working on in 1989. It started with some highly unrelated insights that when put together make for an interesting theory, the idea is to outline a common mathematical system to explain such diverse elements as economics, sociology, criminology, history, politics, etc.

This has been tried many times of course, here however the idea was to create an empirically based system about what actually happens in these fields. Most theories have a purpose, to support a preconceived goal to benefit a group of people. However Aperiomics was not developed to benefit anyone, rather by creating a sufficiently accurate model of how the world works solutions

to many problems may become more apparent and obvious.

For example the theory gradually came into focus from reading books in many unrelated scientific fields, these books usually tried to a create a simple model to explain the information they had. Because this information was usually highly complex, much of it inaccurate, and often politically incorrect the temptation usually is to exclude some of it to make the model work better. There is nothing wrong with doing this, it follows the scientific method of creating a theory then modifying by comparing it to evidence found by experimentation.

However Aperiomics was created from a different approach, there was not any model created to simply the data. Instead I kept reading on all these subjects, not only mainstream books but also other books which seemed to contain a lot of truth but which did not fit in well with the mainstream models. Because of this problem these books were usually hard to find and not popular. Some were also in the fringe around this

mainstream science and often contained charlatans and so many errors as to be nearly useless, the mainstream often avoided this information because it was potentially damaging to a scientist's reputation to associate with it. Over time I discovered enough regular patterns in all this information, whether it be fringe or mainstream, fake or real, etc to see an overall system that contained all of it. I call this Aperiomics which means the science of open or revealing hidden information.

Most sciences and models are designed from a particular viewpoint to change the world in some way, but Aperiomics was not designed to change anything but to understand how the world actually works. Because of this it includes a lot of unusual information that is often inconvenient and tends to get buried, how just because it gets buried does not mean it fails to influence current events. Aperiomics then is an attempt to include this usually hidden information into a complete system to model more accurately what actually happens in the world. This system then has many disadvantages because there is always a tendency to bury information and Aperiomics cannot be

understood if that happens. It is likely then these Aperiomics books will not be popular, however they may interest people puzzled by the world and seeking to understand it even if it cannot necessarily be changed.

For example the theory of evolution and fields such as biology have no real purpose other than to understand nature, the result of this is when scientists examine ecosystems they do so not to intervene but to understand how the whole system works. They try to not take sides with one animal against another, for example when a lion attacks a gazelle people naturally feel more sympathy for one than the other but both are trying to survive to feed their families. Generally this neutral viewpoint is not carried over into studying human populations which is why we have so many economic and political theories favoring one class over another.

Economics and most other related fields then don’t take this neutral approach, instead they try to change society or an economy on behalf of a particular group. For example communism was

formed to take the side of the poor and workers, capitalism tends to take the side of those more wealthy. Most people tend to feel strongly drawn to the left or right wing politically but few can look at both sides as part of a whole political system.

For this reason many people may be disappointed with Aperiomics, they are used to an author offering a solution or an ad hoc opinion to baffling events rather than one trying to prove there may be no solution. Authors often pander to the political or economic beliefs of their audience, this allows them to sell more books and also gives those on the opposite side of the fence a convenient target to write a second book contradicting everything in the first.

The true understanding of Aperiomics is more like that of zen Buddhism or perhaps like biologists studying natural habitats. First it is to understand how things are without the desire to change anything, even when there is obvious pain and suffering going on. For example in studying predators and prey in the Serengeti it must be tempting to intervene on behalf of one animal or

another, however the ecosystem there has built up this diversity precisely because man does not intervene. It is possible to step outside of current events and not take sides for a while, to see how the whole system actually works. Then some may choose to step back onto one side of this system to try and change it with these principles or to stop wasting time on the things which cannot be changed.

Because of this presumption of noninterference in some sciences when there is a need to change something, like a natural disaster or war threatening some animals with extinction, the scientists have some understanding of how the system actually works and can sometimes do more good than harm. For example thinking that predators are more deserving than prey, leads someone to try to save them at the expense of the prey. Often ugly and apparently wasteful things happen in an ecosystem like this, the scientists risk being drawn into becoming part of that ecosystem the more they intervene even with these kinds of cases. Usually whenever predators or prey have been introduced into a new environment to try to fix something the

results have been disastrous, in the same way trying to fix the world economically or politically without understanding how it works often just creates more problems.

In the same way economists tend to get drawn into changing the economy as they perceive someone being more deserving of help than others, this can change an economy in ways they try to model by leaving out some information otherwise the models are too complex. Like the scientists in the Serengeti favoring one kind of animal over another this can have unintended consequences, helping a predator can condemn prey to death or vice versa.

The mistake here is to think of the scientists as being outside this ecosystem, as they get drawn into it by intervening they are part of the same rules that govern it. When scientists in the Serengeti decide to cull some prey they are becoming predators in that ecosystem themselves, Aperiomics try to describe not just the animals but also humans as they interact with them using the same model. In the same way

economists by trying to control the economic system end up being a tool of this system, Aperiomics applies not just to the economy but to the ecosystem of the universities, journals, conferences, how theories themselves evolve all using the one model. The goal of Aperiomics then is to understand this complete system first that the observers are included in, the goal is not necessarily intervention or maintaining a Buddhist like detachment, it is to see how things actually work and then the decisions made from there will be part of that understanding. To try to change the system or leave it alone will in both cases be choices that are part of the one Aperiomics model.

Aperiomics is a unification theory, this means that it attempts to include all other theories about animals, plants, and people in it. So all political and economic theories are found in its somewhere, instead of an attempt to determine which of capitalism or socialism, right or left wing politics, etc are right it shows how all of these are part of a larger ecosystem. When we decide that one is better than the other we become like the scientists favoring one animal over another, we in

effect become a part of that ecosystem rather than observing it.

As part of understanding this theory I have been privately testing it against world events since it was basically completed around 1993. Since then it has predicted most world events to a large degree, this however has been highly limited by being unable to process the large amount of statistical information that finer predictions would demand. Since then I have been accumulating more data of these events and showing how Aperiomics explains them, this book is another part of that intended series where current theories of microeconomics are explained in Aperiomics.

The initial idea for Aperiomics came from the idea in music composition that virtually any kind of emotional feeling or story can be evoked by the use of twelve music notes in an octave, also with twelve colors in paintings. Because I was studying musical composition at the time as well as reading about these various scientific fields I made an intuitive and somewhat indefensible leap in

retrospect into the system of Aperiomics. Sometimes there is an advantage in thinking privately an anonymously about world events, if a theory becomes untenable it can be given up on without anyone being the wiser. Eventually I reached the stage where this theory deserved a wider audience than just me so more flaws and advantages to it can be unearthed by others. Because of an overabundance of caution I took this long to publish it because of constant rechecking.

The idea is that there are twelve different principles that govern how animals, plants, and people interact giving rise to their history. From there the process was to define this mathematically as happens in music and painting, also to accumulate enough data to support the idea by classifying events into these twelve principles. In effect Aperiomics is like Art, it tries to evoke the feelings and story of historical events like listening to a symphony or looking at a tapestry. Like with music as you begin to understand Aperiomics it is like learning the music scale and appreciating its richness in describing human emotions. I don’t claim that this system is

the best to describe history, however it works surprisingly well so if incomplete I believe it is well on the right path.

Learning to understand Aperiomics is difficult because it is a very large and complicated system, however it is defined by these twelve principles that are the same everywhere as with musical notes and colors. So just as large musical pieces will seem unfamiliar to you because of their complexity you find the same twelve notes being used in all of them. Some paintings seem to have strange colors but the same twelve colors are used there too. In the most complex interactions of nature these twelve principles also occur unchanged. Sometimes these interactions will seem trivially obvious, but Aperiomics is about completeness rather than just contributing new ideas. Others will seem very new but they follow on logically from these twelve principles, they explain for example much of what is really going on after the Global Financial Crisis.

Just as a musical symphony owes its structure to the mathematical relationships between twelve

notes, Aperiomics builds from the simplest interaction between living things to the most complex economic and political issues and shows they all derive from these same principles. It is not necessary to change any of them for any different situation, this is strong evidence for the theory being basically correct. It is important then to understand what the Aperiomics books are doing, they are not about solutions to a particular problem but about explaining how all these issues break down into these twelve principles. Like with a musical symphony where musical theory is about how to write on rather than how that make you feel, Aperiomics is about how the world works not about how individual issues make people feel.

First principles of Aperiomics

This theory was worked out in a highly time consuming and inefficient way, basically thousands of books were read on all kinds of subjects looking for common patterns. A lot of this reading was done before I created Aperiomics, I always had a fascination with how society really worked rather than how many books pretended it

did. So once I devised the first approximate twelve principles I continued reading looking for examples of these principles in many more books, often then I understood more deeply what a principle was by reading about it and seeing it happen over and over again. This was immensely complicated by so much of what people do being hidden and deceptive, often books are written to distort history as much as to explain it. However it is important to realize even the tactics behind these distortions are similar throughout history in some ways, it was then necessary to read many fabrications in various issues to understand how they operate as well as to find the facts underlying them.

This was the hardest part of the theory, to establish these twelve principles it was not sufficient to read enough of history to identify the principles that people were honest about. It was also necessary to uncover enough deception to see how the principles of deception interact with honesty, then with some fine tuning the principles outlined here have changed little since about 1995. Deception is an important part of how nature works, for example many animals learn to

hide and use camouflage to escape from predators. In the same way people use secrecy and deception for their advantage, in Aperiomics then this deception is the hidden part of history that makes it much easier to follow.

Understanding history with Aperiomics is difficult because people have never seen all these principles outlined in their pure form, all they see are incredibly complex and often deceptive mixtures of them in various events and issues. For example with all the different red colors people might see in nature they might never see a pure red color, in the same way with modern music a listener will probably never hear a pure music note without various colorings and overtones. However by combining these pure notes and colors more complex sounds and tints can be created.

Introduction

Explanations on how this theory evolved can be found on my Aperiomics.org website or in the

book Aperiomics published by me on Amazon. I will then confine this book into explaining the mathematical theory behind it, however it should be understood that much remains to complete this task in future books. The book also focuses on Microeconomics, called Microaperiomics. The idea is to select various textbooks in scientific fields relating to animals, plants, and people and rewrite them according to Aperiomics. This makes it easier to be thorough as well as to provide references, it also helps to see if there are flaws in the theory so far.

Aperiomics has twelve mathematical principles that try to define all interactions between living things, whether animals, plants, or people. As part of this process it needs to be consistent with what we see with animals and plants according to evolution. This is the base of Aperiomics, it then continues to show that the interactions between people as well as these animals and plants are the same throughout and consistent with these principles. The economic theories in this book are then derived in effect from the interactions of animals and plants, when we have an economic recession it is directly related to how an

ecosystem can get out of balance in nature. It is a fundamental principle of Aperiomics that all of it has persuasive examples in the animal and plant kingdoms as well as human society. It also connected very strongly to Darwin's theory of evolution.

How these principles were derived is a long and somewhat serendipitous story told elsewhere, here I will attempt to explain the significance of twelve and how these principles interact. I designate these as colors to remember more easily, there is Red (R), Red-Orange (Ro), Orange (O), Orange-Yellow (Oy), Green (G), Green-Blue (Gb), Blue (B), Blue-Indigo (Bi), Indigo (I), Indigo-Violet (Iv), and Violet (V). In the book I refer to them by their initials shown in brackets. Musical tones including sharps and flats can also be used going from C as Red up to B as Violet.

First the two colors G and Gb refer to public and private property. G as green then is public property where no one actually owns something but the resources might be controlled by animals, plants, or people. They also might not be worth

enough for any of these to bother owning them. For example low grade Iron ore might exist on public land because no mining company can make money from it. Some parts of an ecosystem might be owned by predators as their territory while other areas don't have enough prey to be worth defending. Some plants own their patch of ground because no other plant can use that ground without that plant being uprooted.

Many social systems have been based on public property such as Communism which here is R and Ro and Nazism which here is Oy and Y. You can check back to the list of colors if you forget what the letters stand for, however each color has a unique letter it starts with so it is hard to mix them up. For example R is red because only one color starts with R. In this case the state is often presumed to own this public property and people interact with this concept of a state in using these resources, in many countries their Gb private property evolved as leases of land owned by the G Crown. The colors to the left of G refer to the five different principles that operate with public property, R, Ro, O, Oy, and Y.

The color Gb or Green Blue represents private property and is the basis of most modern societies, for example people can own their own house instead of using one that was abandoned or is leased from the state. In reality though most societies are a mixture of G and Gb as public and private property, for example the trains and airports of a modern economy might be G public property while the houses and cars of its citizens are Gb private property. There can be some exceptions to this, for example some Gb cars are owned by G government departments while Gb welfare agencies might own some G houses for the poor. Some railways can be privately owned and some airports have been privatized, Gb toll roads might connect to G public roads.

Looking at a map of the world the various economies can be seen, this map could be overlaid with G and Gb colors to denote which parts are G public property and which are Gb private property. Much of the world would be G such as the oceans not owned by anyone, also because many resources are not economical to own in modern society. However there is no simple system to define the two in terms of value,

for example a primitive tribe in Africa might privately own their Gb spears and kitchen utensils while much higher quality goods than these might end up as G trash in an advanced economy. This G-Gb map then would have many uses in Aperiomics, from this map each person or property in the world could be colored with their twelve color codes to show how they interact with each other according to these principles. Looking at this map ten of these colors would represent animals, plants, and people moving and changing over time according to these mathematical principles. This will be shown in an upcoming book.

To the right of Gb there are five colors namely B, Bi, I, Iv, and V. These represent five principles that interact in Gb private property. So there are five principles or colors in G public property and five in Gb public property. These are similar in many ways, I refer to this as being overtones, this is a term in music where one note can produce another related one of a higher frequency. The two notes together with other overtones give the unique sounds of various musical instruments. For example B is like R, Bi is like Ro, I is like O, Iv is like

Oy, and V is like Y in many ways. For example R people are like B people except R people interact in a G public property environment, also they need to minimize their costs to survive in an environment with scarce resources while B people maximize their profits in an abundant environment. So in the Soviet Union of the 1960s R people acted in a particular way in their society with a ban on Gb private property. In the US at the time B people had a similar situation in society except property was Gb privately owned, G public property was often privatized as Gb.

As these principles are explained some people might be used to looking at different terminology in economics or scientific fields related to animals and plants, the relevance of these will take some time to become apparent as some things glossed over in economics are very important in economics and vice versa.

For example it is more usual in economics to define how an economy works in terms of money, with exchange rates all goods and services might have some value in a currency when traded with

each other. However there is no money used by plants and animals, Aperiomics is based on the animal and plant kingdom and the interactions there correspond to those between people. By building this economic theory from the ground up money becomes important later in it but economic problems do always arise from money. For example money can act like the lifeblood of an economy an in Aperiomics it works like blood in an animal, it can have circulation problems or high blood pressure which cause it problems but not all can be fixed by changing the blood supply.

This theory is one of unification rather than exclusion, it attempts to incorporate all the different ideas from the scientific fields relating to living things into the Aperiomics framework. There are then to a large degree no wrong economic theories but only ones that work in limited areas of the Aperiomics framework. Problems can occur if those limited theories are used to manage the whole economy though.

For example if someone believes in the primacy of capitalism over socialism then Aperiomics is not

about the battle between the two, rather how this battle is related to the battles that occur all the time in nature. Because of this Aperiomics is a highly predictive theory, in effect any well-known theory in economics for example relates to the interactions between some animals and plants. As such it is unlikely to be wrong because anyone can go and watch these plants and animals doing as described here. Throughout this theory I try then to make connections with how animals and plants behave, this shows Aperiomics is about all living things and its claims about economics is only a part of it not the reason for its existence.

So far then there are twelve colors which represent twelve principles that occur between animals, plants, and people. They can also occur between organizations in society because these are just more complex and structured interactions between people and nature, for example a government is arguably a system in which people interact with each other in similar ways over time. Because it also manages animals and plants for food, as pets, to provide resources such as lumber, etc the system is more like the concept of Gaia where the whole ecosystem of the Earth is

seen as one system. Included then in Gaia Aperiomics adds all the systems man uses included theoretical ones such as political and economic theories.

Dependent and independent variables

The next step is to define two kinds of variables in these color interactions, some are dependent and some are dependent variables with an irreducible minimum uncertainty between the two. A dependent variable is where one thing affects another such as one domino knocking down another one, an independent variable is where one variable has no effect on another. This can be like two dominoes far apart, when one falls the other is not knocked over.

In Aperiomics I usually refer to this as chaos and randomness, these terms are used in mathematics extensively but it is not claimed that all these mathematical definitions are exactly the same as in Aperiomics though they may be. More accurately the word chaos here might be termed complex systems in mathematics, chaos however

is an accurate enough term because the systems described by it are not mathematically precise enough to define closely. For example chaos is related to fractals and there are some fractal patterns in Aperiomics, however in trying to define the movements of animals, plants, and people it can be misleading to try to make too exact a mathematical model as this usually ends up leaving out important aspects for the sake of simplifying the model. Chaos as described in Aperiomics is more like the traditional definition of it, often related to catastrophes and generally where one event causes another.

Chaos

Chaos in Aperiomics then is where one animal, plant, person, object, organization, etc affects another directly. For example one might impart momentum or acceleration to another, it might relate to a tipping point which is like knocking or tipping a vase over, etc. It can also refer to what I call a righting point where something can be restored to a stable state after being knocked over or having a chaotic crash, for example like a vase being picked up and restored to its previous

position on a table or even placed upright on the floor where it fell.

Also associated with chaos are the concepts of floors and ceilings, generally when something moving chaotically it hits either of these causing some damage or at least more chaotic effects. For example a ceiling might be where an excited crowd starts to trample some of its members when trying to get into a department store for a sale or thirsty buffalo rushing to get to a waterhole trample some of their herd. The ceiling is in effect the limits to acceleration or momentum, people can push so hard to get into or out of something that this force causes one thing to push on another as dependent variables. In the same way herds of buffalo or wildebeest might hit a ceiling when trying to cross a river, the animals still behind keep pushing so the ones in front might be drowned or forced into the path of a predator such as a crocodile or waiting lions.

A ceiling in a stock market can be the height of a boom where some people start to panic and sell while others are still clamoring to buy, they run

into each other so some sell easily and get out while others get stuck with a falling stock. A floor can be the depths of the bear market where the panic that caused the crash has reached such a low level that opportunities are begging, then there is a crash where those shorting the stock run into those who are starting to buy the stocks expecting them to go up. For example a herd of buffalo might have run from predators and be trying to organize itself, some are still trying to run while others are trying to stop so some can get trampled from this chaotic mix as with the buffalo at the river.

There can be many false floors and ceilings such as seen on a stock market chart, this is like a building falling where some of it might stay upright for a while like a false floor only to collapse completely as cracks continue to grow. Stocks can also reach a false ceiling where some start to sell while others are still buying, then it turns out the sellers were wrong. There might be a shout of fire in a theatre and people trying to get out while others unaware of this are trying to get in, people might be hurt in this chaos. It could also be a false ceiling where the fire is a false

alarm or easily contained, then the numbers in the theatre will slow their decline then grow.

Usually these chaotic processes move with momentum tempered with random movements, like people randomly wanting to sell stocks while others are panicking and rushing to dump their holdings. However with feedback between colors this momentum can rise exponentially causing an even greater crash at the floor or ceiling. In Aperiomics this occurs between at least two animals, plants, or people where one acting chaotically causes the other to act even more so. For example in poker one player's bluffs might cause another to raise them so the pot grows exponentially until its collapse. In a stock market a boom might rise exponentially where some people bluff about how good a market is, others hear this and repeat the story making it a self-fulfilling prophecy which makes the first people even more optimistic than when they started the rumor.

The advantages of describing chaos in this way is that it connects directly to nature, we see animals

behave this way and we also see people and markets doing this. Another factor in chaos is the idea of being a loner, chaotic animals, plants, and people tend to act as individuals instead of being members of teams, herds, packs, gangs, etc. With the buffalo herd mentioned earlier chaos makes them pushing each other instead of moving randomly with space between them like a team. This might be seen in football for example where if a team loses its cohesion then it can become chaotic with individuals working against each other.

Individuals when they are chaotic can also be competitive, secretive and deceptive. Because they owe no allegiance to any team herd, pack, etc they are free to make individual choices and because they don't need to put the team first they can compete with other animals, plants, people, etc. For example a herd of buffalo usually works as a team against predators, they stand together and resist the actions of lions to split one away from the herd to gang up on it. However gazelles might split up and hide when attacked by lions, they use secrecy and deception to counter the lion pride's ability to work as a team. In the same

way many people use this strategy, for example they might hide and run away from a criminal attack as individuals rather than face it like a team with others to protect themselves. They may even hope the criminals get someone else instead because they are more likely to escape themselves while a team tends to protect other members. The loners usually hide their valuables and camouflage them, the team is more open because the team protects each other's valuables and can gang up on any threat to them..

Animals, plants, and people like this can be hard to understand because they use so much secrecy and deception, Aperiomics includes their behavior in it to understand events that seem mysterious but are often caused by large amounts of self-interested deception as chaos.

Randomness

The other main principle is that of randomness, this is with independent variables so that the effects of one animal, plant, or person have little or no effect on the others. This is often associated

with gambling, for example on a Roulette wheel the number that comes up on one roll cannot affect what number comes up on subsequent rolls. Animals, plants, and people can then act chaotically or randomly, to act randomly is virtually the opposite of chaotic behavior. With randomness people tend to form teams, gangs, etc rather than competing against each other. For example people might join a church and agree to support each other with cooperation rather than deceiving and competing against each other chaotically.

In the animal kingdom then we see animals deciding on a chaotic or random strategy, when chaotic they are competitive, secretive and deceptive. When they act randomly they act as teams or herds with a cooperative or altruistic strategy and are more honest and transparent. The buffalo then work as a cooperative team to fend off predators, each supports the other preventing attempts for many predators to gang up on one. Because of this teamwork it is not possible to also be secretive and deceptive at the same time, a team requires openness and honesty or else the members cannot trust each other to

work cooperatively. However some animals change from using a random strategy to chaotic tactics or vice versa according to circumstances, for example a herd of ibex might stand together to fend off an attack from small predators such as African wild dogs but split up and hide when attacked by a pride of lions.

Mathematically randomness is well studied, here in Aperiomics it is similar to conventional statistics in the sense that many random activities fall on a normal curve. The idea then is to understand the chaotic and random elements of the economy so that the different behaviors of people in each can explain the whole. For example in a market boom and bust investors are not acting randomly, instead they chaotically follow each other's investments. A share investor might buy because he sees other people buying and prices going up, he might read articles about the boom and decide to invest because of that. With this chaotic element then the market is no longer completely random, this additional chaos causes its data to no longer conform to a normal curve and a normal price for shares but instead one progressively

distorted by chaos as the boom grows to a ceiling and then crashing.

Chaos and randomness interact

Chaos and randomness can then coexist and follow each other, for example people can be playing a completely random game of craps where each roll of the dice is independent of the next. When people start winning though this attracts others to see what is going on, they might start betting because they think the dice are hot. The number of betters then rises chaotically like a market bubble, then some bad rolls will break this euphoria and create some panic so many people will leave the table in a panic. Often in this case people bet more than they intended to and lost money as a result, even though the dice themselves were completely random. This can occur because people don't intuitively understand randomness, many would think in this situation there was a chaotic pattern and that the dice really were hot and then cooled off. In the same way a share market can be completely random until some stock appears to be going up an unusual amount, this causes chaotic investors to

think there is secret information behind it and so they buy more sending it even higher. This can rise to a chaotic ceiling and then crash if there is no truth to the rumors and after hitting a floor when investors oversell through panic the share might resume its random motion.

Uncertainty

In between chaos and random there is a minimum amount of uncertainty in Aperiomics. For example when dominoes can knock each other over they are chaotic and when they don't knock each other over they can fall randomly. Sometimes however it is impossible to predict whether they fall randomly or chaotically if they are almost close enough together to hit each other.

In the same way a stock market might have shares that move randomly, at other times they move chaotically in booms and busts as described because investors start following each other's movements. In between the two is an uncertainty where it is not quite chaotic or random. In Aperiomics this uncertainty has a minimum value

called h as in physics with the Heisenberg Uncertainty Principle, in practice however this would be difficult to define in a market.

Chaotic and random colors

As will be seen chaos and randomness can interact in different ways, in the process they define the other ten colors of Aperiomics other than G or green and Gb or green blue. This gives five colors when chaos and randomness interact in G public property and five colors when they interact in Gb private property. Of these colors as will be seen four are chaotic and four are random while two are the uncertainty between chaos and randomness. Aperiomics then can be seen as a progressive system of dualities until all alternatives are exhausted, first there was the duality of G public and Gb private property. Then there is a duality of chaos and randomness where variables can either be dependent or independent, where one animal, plant, person, or object might either affect another or not.

Next then there is an additional duality where two random colors oppose each other and two chaotic colors oppose each other, then there is the duality of an uncertain color in between chaos and randomness. In the animal kingdom the two random colors are often seen as opposing teams of predator and prey, for example Y or yellow is like lions, wolves, etc who work as a team and prey on an opposing team or herd of Ro or red-orange buffalo, zebras, etc. Then there are two chaotic colors of Oy or orange yellow as predators and R or red as prey. These are like the stereotype of the Oy cat and R mouse playing cat and mouse, both use secrecy and deception to survive where the Oy predator sneaks up on the R prey while the R prey tries to hide or run away. Another example is Oy foxes in the wild trying to catch small R birds or rodents.

These pairs give a reasonable description of the animal kingdom, teams of Y predators often hunt teams of Ro prey while single Oy predators often hunt single R prey. In between these however is another color that is not chaotic or random, but something in between. This color is O or orange and represents the middle of the food chain. It is

like an animal that is neither all predator nor prey, not chaotic or random, it instead sometimes uses both strategies according to circumstances. Such an animal like a wild dog in Africa might sometimes be predator and sometimes be preyed upon, it can hunt by itself like an Oy fox or when attacked by predators it can come together like a Ro herd of buffalo and defend itself by its numbers.

These five colors then are in order R or red as chaotic prey like the bottom of the food chain, they can be like gazelles or rodents that are mainly loners that use secrecy and deception to survive. When in a herd they are mainly using others to watch for signs of danger rather than to team up to face danger together.

The next is Ro as a random prey, these like buffalo work cooperatively together like a team and move openly rather than deceptively. O comes next which is like the wild dog example also like human shepherds being between Y and Oy predators after their R goats and Ro cattle, then there is Oy like the fox and finally Y like the teams of

predators such as lions and wolves. This then represents a complex mix of chaos and randomness used in nature as a strategy for survival, sometimes when faced by a team based predator more survive by banding together in teams like buffalo do while others survive more often by hiding as loners like gazelles do.

In Aperiomics then this same system is repeated with humans where people and organizations act according to these chaotic and random strategies in economics, in societies, politics, and so on. Our economic and social problems are then a consequence of this chaotic and random color system because that is how humans evolved, the color interactions always tends to reassert itself in a particular form.

One additional duality remains, that these five colors on G public property act in a similar pattern as overtones on Gb private property. They represent the last five colors of B or blue, Bi or blue-indigo, I or indigo, Iv or indigo-violet, and V or violet. The color scheme comes in handy to remember many relationships between colors,

they are also like the music scale where they correspond in many cases to overtones in harmony. For example if R is C, Ro is C#, O is D, Oy is D#, Y is E, G is F, Gb is F#, B is G, Bi is G#, I is A, Iv is A#, and V is B we have a music octave.

So these notes can be used interchangeably as a system in Aperiomics, however colors might be easier for many to use as they allow color coding of graphs and maps. In music the relationships between the notes are like memory hooks where they are similar to the twelve principles, for example G as the color B or blue is an overtone or fifth above C which is R or red in colors. It may be helpful to remember these overtone relationships but Aperiomics does not follow the same harmony patterns as music does.

The first five colors represent the animal kingdom, they are referred to as Roy as an acronym for red orange yellow which contains five colors including red-orange and orange-yellow. The next five colors represent the plant kingdom and is called Biv as an acronym for blue indigo violet also including blue-indigo and indigo-violet. This is

then the base of Aperiomics, that the twelve colors represent interactions between plants and animals according to a chaotic and random system that has evolved with us and which defines all our ecosystems and societies.

Its predictive power and evidence for its validity then rests on how this system comes up over and over through nature and in societies throughout history. It also means that there are two kinds of societies of humans, those that act like animals and those that act like plants in the way they organize themselves. In Roy societies G public property is most common because resources are too low a quality to be worth owning privately, the state or government controls it as a kind of territory like some animals control a territory as predators or prey. Some people act as Y-Oy predators, this means that they can either be chaotic Oy or Y random predators by nature, they can act Oy secretly and deceptively or in Y gangs like a mafia. Sometimes these are separated by a dash to indicate they are interacting, also that some animals or people in one can change to the other.

Such human predators are common throughout history, for example a warring Y tribe preying on others or an Oy single thief committing a crime. People have then sometimes evolved as predators because of natural evolution, they can prey on animals as hunters but they can also prey on other humans as criminals, dictators, warring armies, and so on. One reason that they do this is they have more chance of having children when they take from others, evolution then sometimes selects this behavior while those that are preyed on have fewer children.

Just as some have evolved to become predators other have become prey as Ro-R, these people can act as R loners to survive animal predators as well as humans, they can also create teams as Ro to use their numbers and cooperation to fend up Y teams of predators. Some people tend to evolve between the two and become O people. These color interactions need not be all genetic, in a Roy society some people might become predatory because opportunities favor it and it need not imply they have a genetic history of criminality. This is just an overview of the theory for those unfamiliar with it, more on this has been written

in previous works on Aperiomics which can be downloaded from Aperiomics.org.

The five Biv colors

B then as an overtone of R is also chaotic, it represents the roots of plants. In Aperiomics then plants are an evolution of the concept of Gb private property, in effect a plant takes over a piece of ground that it owns and derives its nutrients from like a farmer or miner might do with his own patch of ground. Animals though have no real sense of private property, they move around in a territory which is usually held by their strength or cunning. For example Y lions might control an area through the strength of their pride but they are free to move elsewhere if they want. Oy predators like foxes might stake out another territory even inside the lion's domain by being secretive and deceptive so the lions don't see them often. O animals in the middle of the food chain have some territory by being both predator and prey. Ro buffalo stake out an approximate territory by the strength of their team or herd while R prey such as gazelles can hide well enough

from predators to live in a territory but also move elsewhere if there is a drought for example.

So nature has evolved to either move around for nutrients in the case of animals or to stay in one place if there are enough nutrients there in the case of plants. Some animals appear to straddle the G-Gb fence of being like plants and animals, for example ants might move in similar paths like the roots of a tree and also move like Ro-R prey as herds or lone ants. For plants to survive then there needs to be enough nutrients in that patch of soil they own, if not they die off. If animals are in a particularly fertile area then it's likely plants will choke off their movement like in a tropical rainforest. In the same way a society dominated by Gb private property might be hard to move around in without enough G public roads and parks.

The B or blue roots of a tree then have many similarities to R prey such as gazelles, the roots grow while hidden in the ground so animals cannot easily find them to eat while R prey hide to survive as well. They each grow as individuals and

compete with each other to find nutrients rather than cooperate with each other, for example each B root grows to look for nutrients but does not work as a team with other roots. They have a chaotic appearance like a string of dependent variables, they are like a line of dominoes for example where each part of a root depends on the parts above and below it. If any part of the root dies then the rest might die chaotically as well if it reaches a tipping point, the root above a cut might be too short to reach any nutrients and the part below would be separated from the rest of the plant and die off.

This is similar to how ants grow their paths like roots and branches, if this path made of scent is disturbed many ants might not find their way back to the nest except by moving randomly. Also a predator might find this path and eat all the ants that come upon it. This can also happen with R prey such as gazelles, for example an Oy lone hyena might find where gazelles frequent a waterhole and by hiding nearby catch them as they come for a drink. Finding one waterhole or place where they breed then might doom a large number in a row.

Next is Bi or blue-indigo which is the upper roots system of a plant, where the roots join together. This gives a random nature to how the plant survives, if some roots chaotically die or are eaten then the upper roots connections usually have many other roots to draw nutrients from. This is like the Ro buffalo herd that lives on even if some of the herd are lost to predators or sickness. More has been written on the structure of plants in my other works, rather than repeat myself the current section is just to show the mathematical relationships of the colors as an introduction to microeconomics. Consequently it is enough here to show how each part of a plant corresponds to the Gb equivalent of Roy animals on G public lands, it will become apparent later how these patterns repeat in economics, sociology, politics, etc.

The next color of I or indigo is like the middle of a plant just as O or orange is like the middle of the food chain. So just as O animals move around on public lands I trunks of plants stay in one place as part of the control of Gb private property belonging to the plant. If this ownership of the Gb

land is disputed the plant has not evolved to move elsewhere, it must be removed or killed.

Iv or indigo-violet is like the branches of a tree, they grow chaotically like the B roots. There are then two opposing chaotic colors in Biv or blue-indigo-violet, B as the blue roots and Iv as the indigo-violet branches. They are overtones of the R red prey and Oy orange-yellow predators.

Finally the leaves of the tree are V or violet, they work as a team like the Y teams of predators. They also act like alpha predators in cutting off light to plants below them, they often grow together in partnership with other trees to create a canopy which stops other trees from growing and threatening them. In the same way Y prides of lions might control interlocking territories cooperatively like an overall team.

The colors in society

Once these colors with the chaos and randomness they represent are understood it can be

appreciated how these patterns dominate human societies. Most people might understand the Roy colors because they have seen so many examples of predatory criminals, however advanced economies are mainly based on emulating the Biv plant kingdom. We use Gb private property like plants do, most people have a fixed address. Biv farmers have Gb private property instead of farming on public lands, just as cattle ranchers own their own Gb properties rather than graze nomadically on G land often referred to as the commons.

Much of the advanced economies is laid in patterns like roots and branches such as with roads, power lines, phone cables, assembly lines for manufacturing, also the structure of companies usually have branch offices. Again this has all been covered in previous works, the main point so far is that Aperiomics is a system based on dualities to cover all alternatives. Because it covers both G public and Gb private property as well as the various color interactions with chaos and randomness it can be used to describe a system in economics.

If our societies are indeed replicating a pattern that evolved from plants and animals then this gives us a predictive tool, we can see what is likely to happen in many cases because similar things happen to plants and animals. Recessions for example can be compared to similar events that happen spontaneously in nature to imply that they are part of the mathematical system of evolution itself. They are then as difficult to control as for animals and plants to control their own recessions, for example when an ecosystem changes too much there can be a mass die off of plants and animals. Consequently life has evolved to reduce these problems, however it often fails to do so and in the same way societies can fail to handle fluctuations in resources that lead to the human equivalent of these die offs.

Directions in Aperiomics

So far the works of Aperiomics have concentrated on providing a broad outline of the theory, how it relates to all interactions between living things. This book represents a first step at filling in more details so it will focus on microeconomics, called Microaperiomics here. Because this framework is

still largely incomplete many readers will have questions not answered here, however the intention is to follow the various textbooks on economics and related fields and show how Aperiomics is consistent with their ideas. It will also show that the ideas in these textbooks fit into the Aperiomics model of complex mixtures of chaos and randomness. This will be also extended time permitting into other fields such as sociology, biology, criminology and law, political science, futurology, and so on.

An example of an economy

Because Aperiomics is built in effect from the interactions of simple plants and animals the next step will be to construct a basic economy to illustrate these principles. This allows the chaos and randomness to be more clearly seen, in the complexity of a modern economic society there is so much information these principles can become hard to illustrate even though they are still the same today. This society has basic farming and mining along with refining of the minerals and produce.

It is harder to illustrate these principles with modern technology since we don't know their future. There is no intention to date this society exactly, perhaps the Roman Empire has a good mix of Roy predatory warring as well as Biv commerce for this theory.

Graphing Aperiomics

This system as seen so far has twelve color interactions representing chaos and randomness, this requires a more complex way to graph economic variables than the standard two dimensional chart. I have found the best way for this is in using four Pascal's Triangles set as four triangular quadrants of a square and a ratio of two lines for G and Gb. The reason for this is that the normal curve and hence much of modern statistics is derived from Pascal's Triangle, a horizontal line in the triangle approaches the normal curve shape as the triangle become larger.

This allows a straight line to represent a set of random variables, for this reason Ro or red-orange, Y or yellow, Bi or blue-indigo, and V or violet can be horizontal lines in these four triangles giving normal curves. Vertically the values in Pascal's triangle grow chaotically, this varies between the integers on the sides like a constant velocity of 1,2,3,4,5,… to different columns growing at different rates. The rows of the triangle grow exponentially, for example the nth row of Pascal's Triangle is 2^n.

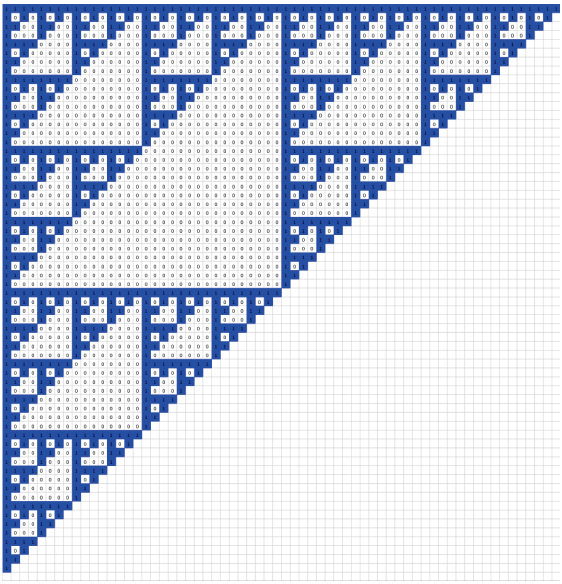
I am not aware of Pascal's Triangle having been used this way before, however it seems mathematically viable as most of statistics and probability was derived from it. Also the data could be moved into a standard two dimensional graph if necessary, this however loses some of the intuitive flow of chaos and randomness as will be seen. The four Pascal Triangles also allow for color coding of the data, for example a line of chaotic B data such as the wages of B workers can be represented by a blue line. A line of random V data can be represented by a violet line, and so on. Plotting data is not difficult with this system, an Excel spreadsheet can be preloaded with four

Pascal Triangles in the right shape and is used throughout this book.

A series of values such as changing supply and demand of goods and services can then be added into this spreadsheet according to the corresponding number on Pascal's Triangle to give the required line shape. When the cells containing these values are colored with the correct color code, for example Iv or indigo-violet, then it works efficiently to visualize the data and also to show whether it is chaotic or random. Only basic data will be graphed in this book but more complex examples will be shown as I progress through other economics textbooks.

Pascal's Triangle gives a root and branch shape in its number system, this is useful for illustrating Iv-B relationships. This is where people have business relationships in B roots and Iv branches and trade with each other. The triangle below shows this root system by its numbers represented as modulus 2, this is where odd numbers are shown as 1 because they are 1 more

than even numbers and the even numbers are shown as 0.



Spreadsheet templates will be available for other interested to input data on. Using the spreadsheet has many advantages, for example plotting supply and demand curves in each quadrant will give cells that can be colored according to which color code they represent. For example to draw a chaotic Blue line representing competitive workers I will color in cells to form an approximate line in the Bi-B quadrant. These cells already have values according to their positions in

the triangles, taking a line then this will give a list of values which can be used in an economic example.

As the Pascal's Triangles are increased in size each cell can be divided by a number to give an increased density of cells. For example if the triangle is continued the cell numbers would get into the billions and trillions as they add together. These numbers could be used to graph the GDP of the world economy as they are so large. However for a smaller business numbers in the millions might be sufficient so each cell can be divided by 1000 to make a billion into a million. This is useful because it gives a denser number of cells between integer values, for example a small company might be graphing sales in the hundreds of dollars and there might not be cells with that exact amount of money. By making Pascal's Triangle with smaller cells this allows more accurate values to be in each cell.

The same principle is used to create the smooth normal curve in mathematics, Pascal's Triangle is extended in size towards infinity and as this

occurs the bottom horizontal line becomes smoother and approaches the normal curve as defined by a formula. As this process continues then not only does the normal curve itself become smoother throughout the Triangle but any curve approaches a smoother shape with more cells for different values.

This could be continued to the point where the cells disappear completely as too small to see and it becomes like a typical graph with X and Y axes where any value is assumed to have a location on it. Any curve then would tend to have an equation to describe it just as the normal curve does, these equations could be found by increasing the Triangle size as described so the values of any curve become smoother. This however is a more difficult mathematical problem and beyond the scope of this book, I will give some more results of this in a future book. Unfortunately this process is difficult to describe except in words, the next two diagrams may help to make this clear.

1	2	3	4	**5**	6	7	8	9	10
1	3	6	**10**	15	21	28	36	45	
1	4	**10**	20	35	56	84	120		
1	**5**	15	35	70	126	210			
1	6	21	56	126	252				
1	7	28	84	210					
1	8	36	120						
1	9	45							
1	10								
1									

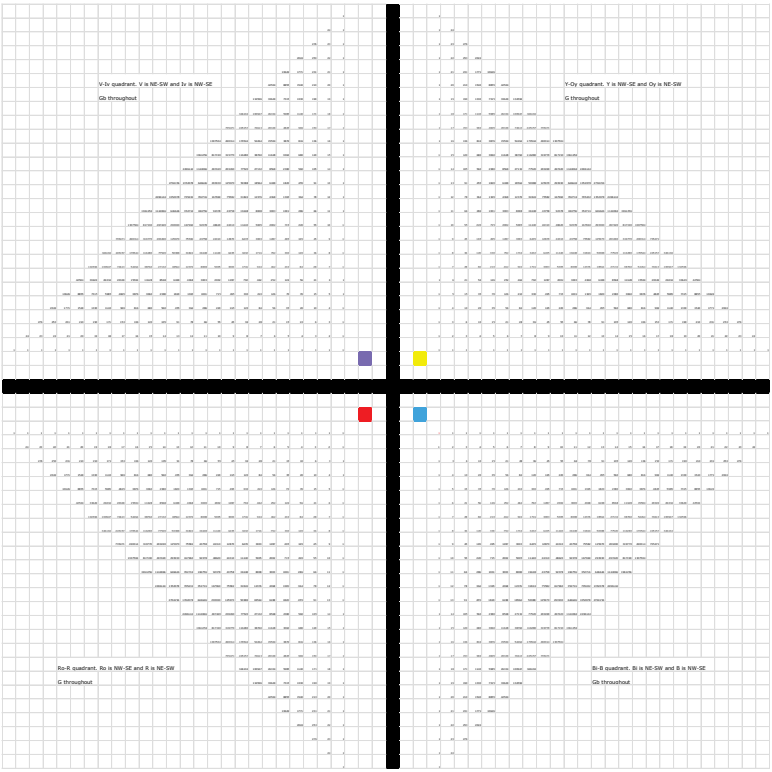
The two triangles, one diagram above and another below, are shown as the same size but the one below is more dense. It would be easier to plot more relative values or ratios between two values because there are more numbers there. The red numbers above don't resemble a normal curve but the line 1,10,45,120, 210,… is much close to the normal curve shape. The bottom line of the diagram below is even closer to the normal curve shape, any curve drawn on the diagram below can

be smoother because there are more cells, for example drawing a parabola on this would be easier than on the diagram above. If the diagram below is continued to grow the cells become smaller until they would eventually be like points, then virtually any curve could be drawn on it and any line 45 degrees clockwise from vertical would be approaching a perfect normal curve shape.

In later books then I will be using a standard graph with X and Y axes, the assumption will be that these Pascal's Triangle cells would be in that graph but too small to see. In this book however it is more important to illustrate how the mathematics here is derived and so larger cells are used, the curves however are more blocky and some values cannot be added to the graph because there is no cell with exactly that value.

1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24		
1	3	6	10	15	21	28	36	45	55	66	78	91	105	120	136	153	171	190	210	231	253	276			
1	4	10	20	35	56	84	120	165	220	286	364	455	560	680	816	969	1140	1330	1540	1771	2024				
1	5	15	35	70	126	210	330	495	715	1001	1365	1820	2380	3060	3876	4845	5985	7315	8855	10626					
1	6	21	56	126	252	462	792	1287	2002	3003	4368	6188	8568	11628	15504	20349	26334	33649	42504						
1	7	28	84	210	462	924	1716	3003	5005	8008	12376	18564	27132	38760	54264	74613	100947	134596							
1	8	36	120	330	792	1716	3432	6435	11440	19448	31824	50388	77520	116280	170544	245157	346104								
1	9	45	165	495	1287	3003	6435	12870	24310	43758	75582	125970	203490	319770	490314	735471									
1	10	55	220	715	2002	5005	11440	24310	48620	92378	167960	293930	497420	817190	1307504										
1	11	66	286	1001	3003	8008	19448	43758	92378	184756	352716	646646	1144066	1961256											
1	12	78	364	1365	4368	12376	31824	75582	167960	352716	705432	1352078	2496144												
1	13	91	455	1820	6188	18564	50388	125970	293930	646646	1352078	2704156													
1	14	105	560	2380	8568	27132	77520	203490	497420	1144066	2496144														
1	15	120	680	3060	11628	38760	116280	319770	817190	1961256															
1	16	136	816	3876	15504	54264	170544	490314	1307504																
1	17	153	969	4845	20349	74613	245157	735471																	
1	18	171	1140	5985	26334	100947	346104					Bi-B quadrant. Bi is NE-SW and B is NW-SE													
1	19	190	1330	7315	33649	134596						Gb throughout													
1	20	210	1540	8855	42504																				
1	21	231	1771	10626																					
1	22	253	2024																						
1	23	276																							
1	24																								1
1																									

The four blank quadrants are shown below, the colored dots are to remember which quadrants are which. The blue dot means that quadrant is Bi-B or blue and blue-indigo, the violet dot represents V-Iv, the yellow dot Y-Oy, and the red dot Ro-R. G and Gb are not marked here, usually a horizontal line is in the center with a ratio of one part G to another part Gb, this indicates approximately how much G public property and Gb private property there is in the economy or ecosystem being represented.



Above there are four Pascal's triangles arranged in a diamond shape, each has its X and Y axis so the slope of a graph at any point can still be calculated. To use this graph colored lines would be drawn in each quadrant according to its color code, for example the bottom right quadrant is Bi-B and so B or blue and Bi or blue-indigo lines would be drawn there. The top right quadrant would contain V or violet and Iv or indigo-violet

lines. The bottom left quadrant would contain R or red and Ro or red-orange lines and the top right quadrant would have Y or yellow and Oy or orange-yellow lines.

This might represent an ecosystem without people, the Biv are might have graphs of how some plants grow and decline in numbers. The Roy section would represent different animals, perhaps one line for each species. By using this all the interaction between plants and animals can be graphed. The diamond graph can also be used for an economy or any part of it, also humans, plants, and animals can all be represented on the one diamond graph.

If each X axis was Quantity and each Y axis was Price then each quadrant could show supply and demand in different parts of an economy and how they affect each other. In the center is I-O or indigo-orange which is where the two moderating colors connect. I is civil law and the free market, O is criminal law and the police. The center then is like a policed marketplace in an advanced economy, the wealthier it is the more goods and

services are privatized as Gb so there would be fewer transaction in the Ro-R and Y-Oy quadrants. If the economy is very poor it is more G public property and so there would be fewer transactions in the Bi-B and V-Iv quadrants.

Iv-B

For example a number of B farmers might harvest a chaotically increasing amount of wheat to sell in the market, the cells can then give a table of increasing values over time. Ten B farmers would then be represented by ten lines going approximately in the North West-South East direction, a line however might change into any direction such as where the B farmers start to work together as a Bi team going north east south west, lines can also move at different velocities.

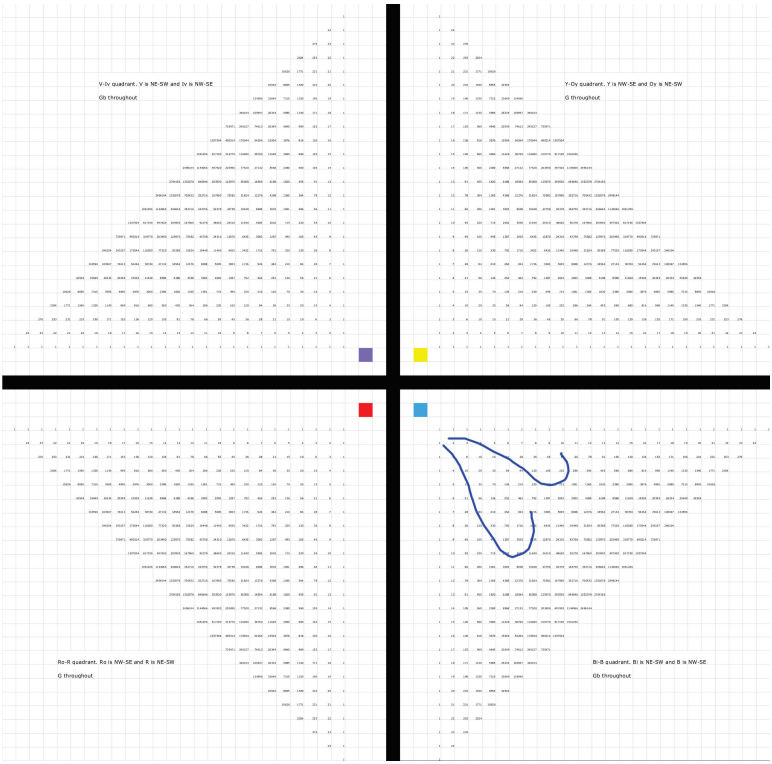
For example if a line was composed of daily prices of wheat then with few changes in this price the curves of supply and demand might become more concentrated in one area of the graph and this can be imagined as the line slowing to a near stop. So if the price of wheat grew steadily then the line

might move approximate SE in direction but if the price slowed to a stop then the values updated each day would be in one cell representing that price and so the line would have stopped growing.

These lines might be plotted as growing faster and further away from the center of the diamond graph as the amount of wheat is increasing from each farm. Eventually this will cause a glut on the market and some of these lines would fall back towards the origin with diminishing amounts of wheat harvested. This is shown in the diagram below, for space reasons only two B lines are shown.

The first diagram shows individual cells being plotted and the second how these lines might look in the quadrants as the cells become much smaller giving smoother graph lines.

1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	2	3	4	5	6	7	8	9	10	11	12	13	14	
1	3	6	10	15	21	28	36	45	55	66	78	91	105	
1	4	10	20	35	56	84	120	165	220	286	364	455	560	
1	5	15	35	70	126	210	330	495	715	1001	1365	1820	2380	
1	6	21	56	126	252	462	792	1287	2002	3003	4368	6188	8568	
1	7	28	84	210	462	924	1716	3003	5005	8008	12376	18564	27132	
1	8	36	120	330	792	1716	3432	6435	11440	19448	31824	50388	77520	
1	9	45	165	495	1287	3003	6435	12870	24310	43758	75582	125970	203490	

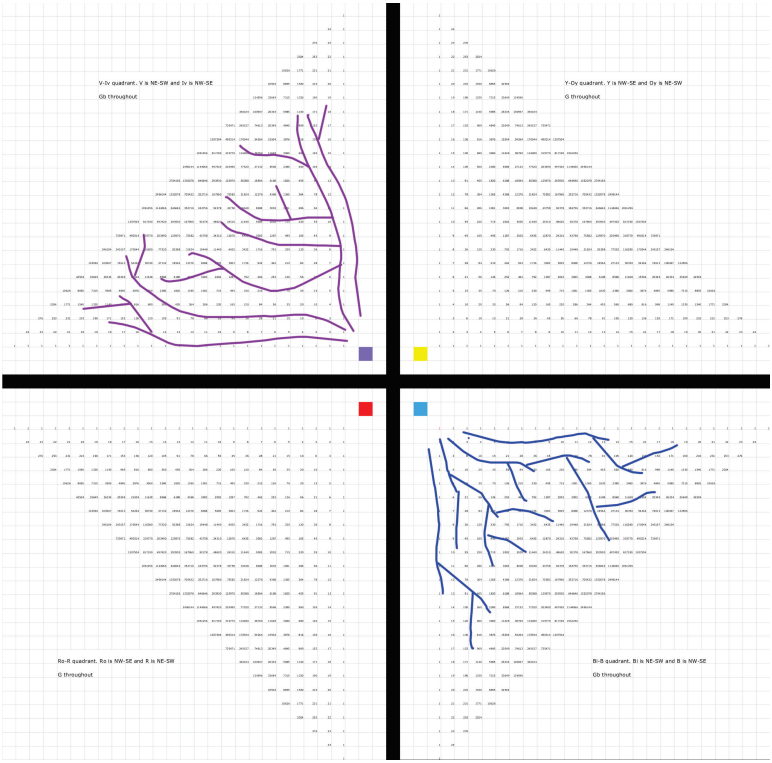


For example in the two diagrams above the two B lines grow indicating the amount of wheat being grown is expanding rapidly, this is like a booming market where B farmers have found fertile Gb soil and are having record harvests. The values in the cells then might be each year per hectare giving in kilos 1,3,4,15, 35,56,126,252,462,792,330. The momentum then increases rapidly for the B farmer but then begins to crash after reaching 792 kilos per year as a ceiling. Without using Pascal's triangle there would be no way to represent the growth of these crop yields. As the line turns in various directions different growth rates can be illustrated because the cells grow less quickly to the side than at 45 degrees from the X and Y axes.

This growth rates are chaotic and imply that this is occurring because of dependent variables not just random changes in demand for wheat, for example an R line like this in the lower left Ro-R quadrant might represent how R animals are exploding in numbers when there is plenty of food. They can do this by variations in how fast they can mate, this might be affected by when they meet and whether they are being chased or

eaten by predators, each number in the sequence 1,3,4,15, 35,56,126,252,462,792,330 might represent the number of offspring from R gazelles each year. The drop from 792 to 330 might be because of grass being harder to find in a drought or Oy predators eating more R gazelles.

The growth rate also represents an increasing momentum reaching a ceiling at 792 and then crashing, it is then like changes in speed or acceleration. In using these graphs it is not necessary to use variables such as price and quantity, instead the emphasis is on actual production here. For example the two B farmers are represented by the two B lines, their yields of wheat are shown by the cells along the B lines. They might sell this wheat to Iv agents, they will be represented by the branch like lines in the upper left quadrant. The shape is then looking like a tree, these quadrants also refer to the plant kingdom.



The bifurcation points on the B roots are like the term as used in complexity or chaos theory, they might represent increasing competition as more farms are started up or existing farms fragment as parts of them are sold off. When a B root splits into two then this can now be two farms so each roots has a separate farm's production. They can also be innovations in wheat production, for example different strains of wheat might appear as each farm tries to mutate the wheat to increase yields.

With the Iv branches in the upper left quadrant a similar process is occurring, they might be making bread and as these branches split up they becomes different kinds of loaves, scones, bagels, biscuits, etc and each cell represents the production of these in kilos.

Iv then can represent increasing specialization as the branches split just as the B roots do. With innovations of different varieties of wheat leading to different counter innovations of wheat products the economy here is growing chaotically and some roots and branches are likely to hit a ceiling and collapse. For example a root might have a kind of wheat that sells well at first and then sales plummet as another better wheat is grown by another farmer, this is like B roots competing in the ground for nutrients. An Iv branch might make biscuits that sell well at first and then go out of fashion, this can be like a short lived plant growing quickly and then collapsing.

The prices that Iv and B pay each other are not shown here, instead of prices driving sales these

graphs show chaotic and random growth and barter can determine price. For example initially a kilo of wheat might be worth a kilo of wheat products in barter, prices then change according to growth of these roots and branches. The price then would be partly determined by a ratio between the two, for example a cell in Iv compared to a cell in B gives a ratio, this could then be how many kilos of a wheat variation would buy a kilo of wheat product.

The roots and branches then move dependently or chaotically compared to each other, a better B variation of wheat might lead to a faster growing Iv branch of biscuits. So far money as a medium of exchange is not necessary to describe this basic economy just as a medium of exchange is not needed in a plant for its roots and branches to grow. However a plant has to swap nutrients inside itself, for example the leaves refine the minerals the roots collect from the soil by using the energy of the sun and then send these refined nutrients back to the roots. So there is a kind of market in a plant, if the V leaves and Iv branches get too much then their extra growth makes the plant top heavy and prone to collapse, if the B

roots and Bi upper root system get too much then the plant gets stunted.

Generally then this price of nutrients inside a plant is determined by many factors, for example if B roots are finding plenty of minerals and water then they send these up the tree in effect getting less for them because of their supply. The upper part of the tree demands them less because it is harder to use them all, this is like a price being set in the plant where the B roots get these nutrients while it can rather than holding out for more refined nutrients in return.

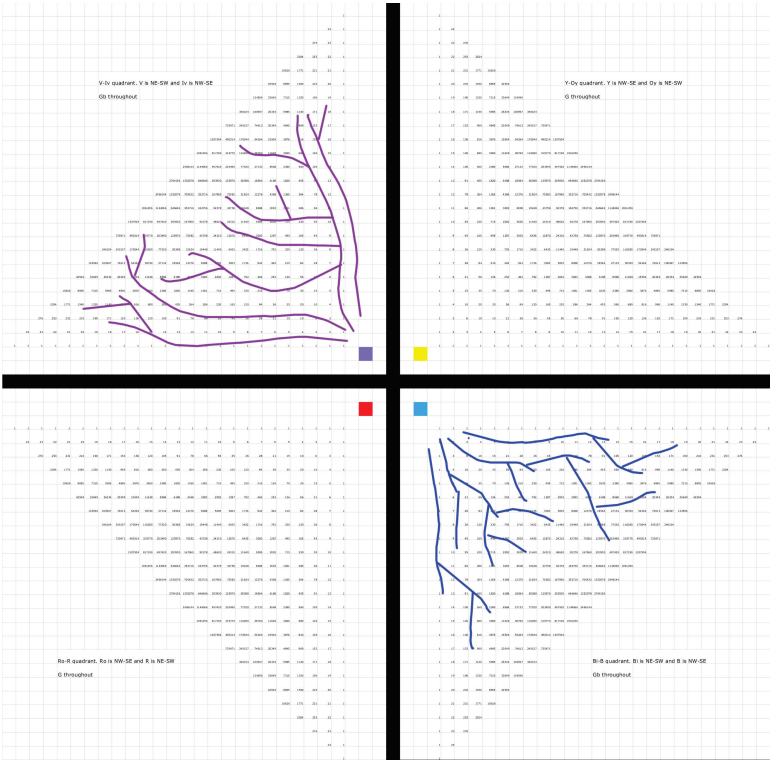
In the same way the B farmers increase production as the roots grow in the Bi-B quadrant, they do this because the yields are high and so they might be able to barter this wheat for a lesser amount of Iv wheat products as this economy grows. Generally then if a B root is longer than a corresponding Iv branch buying that wheat then the barter price between them will be the ratio of the cells at the end of the roots and branches. For example the end of a root might be 2000 representing 2000 kilos of wheat harvested

that year, that wheat goes to an Iv agent that makes 4000 kilos of bagels from it.

With supply and demand the barter price might be that the Iv agent gives 2 kilos of bagels for a kilo of wheat, more likely though Iv makes a profit by giving say .5 kilos of bagels in exchange for a kilo of wheat. The B farmer maximizes his profit because he gets bagels he couldn't make himself from wheat worth much less to him. The Iv agent maximizes profit because he ends up with free bagels as profit after paying for the wheat with some of the bagels. The B farmer might sell some wheat to a porridge maker and gets back say .5 kilos of porridge for each kilo of wheat he sells them. In this way the V-Iv quadrant refines and improves the Bi-B produce like the V-Iv part of a tree refines the minerals from the roots by using photosynthesis.

However this price can be volatile if the B root and Iv branch are growing at different rates, if the production of wheat doubles the next year while the Iv agent only makes the same amount of bagels then the price might decline to .25 kilos of

bagels for a kilo of wheat. It might also deviate from this if in comparing the momentum of production of the Iv agent and B farmer it seems this disparity in production will accelerate, the price then might be less than .1 kilo of bagels for a kilo of wheat because the B farmer might produce even more wheat the next year causing a glut. On these graphs then the price is worked out last rather than first as in conventional economics. By understanding all the factors in the Iv-B economy, and later the V-Bi economy, the prices can be worked out. Because so much of Iv-B is deceptive the model then starts with an accurate template and then adjusts this by taking into account this deception. By doing it the opposite way often the results are confusing because there is no certainty as in poker whether the data is accurate or partly bluff.



In the diagram above this might be a more complex economy where the roots are wheat, strawberries, eggs, and milk. These are splitting into more variations, the berries might become strawberries and blueberries, the eggs into duck and chicken eggs, and the milk into cow and goat’s milk. The Iv branches can represent more refined products based on these, one Iv agent might make bagels with eggs, milk, and wheat. Another Iv agent might make muffin with strawberries and wheat while a second Iv agent

makes muffins with blueberries and wheat. Each root and branch is then growing chaotically creating more bifurcation points where produce and products split into more variations.

Prices are then negotiated between Iv and B, this again might be generally according to the amount they have to cell so having too many blueberries for example might tend to drop the price compared to more scarce bagels. However Iv and B are chaotic colors that compete and don't cooperate, because of this they often bluff and deceive each other so the prices can deviate from these ratios. For example a B wheat farmer might claim he had a poor harvest to push up his prices, the Iv-B market then can be more like a game of poker where each player can bluff about how his business is going to change the price. This is like in poker where the best hand often does not win, instead they might be bluffed into dropping and losing the pot.

When an Iv-B market becomes deceptive like this then barter prices can become inefficient compared to the real value of the produce and

products, this can cause a boom and bust in their values. A medium of exchange such as money could be introduced here for convenience however generally the ratios of the produce and products can give their prices.

This Iv-B economy can also have additional costs that affect the overall barter prices, for example a B farmer might harvest tea tree leaves and an Iv agent gets tea tree oil from them, he then sells this to B wheat farmers to spray on their crops for pest control. This increases his production of wheat but he also has increased costs with the tea tree oil. More roots might be an iron miner, a coal miner, a lumberjack, a salt miner, a sand and gravel miner, and a gold miner. These minerals are then refined by Iv agents creating more branches to match these extra roots, the economy then can have salt bread, steel cookware, glass bottles made from the sand, the berries are fermented to make wine and sold in glass wine bottles, the B lumber is refined by Iv agents to make furniture, the B coal is used by Iv agents to make steel, the gold is refined by Iv agents to make coins as money, and so on.

The Iv-B economy then grows like an actual tree with prices now set not just with barter but where people can trade gold as a medium of exchange, its value would change according to how much gold is produced as well as all these other goods.

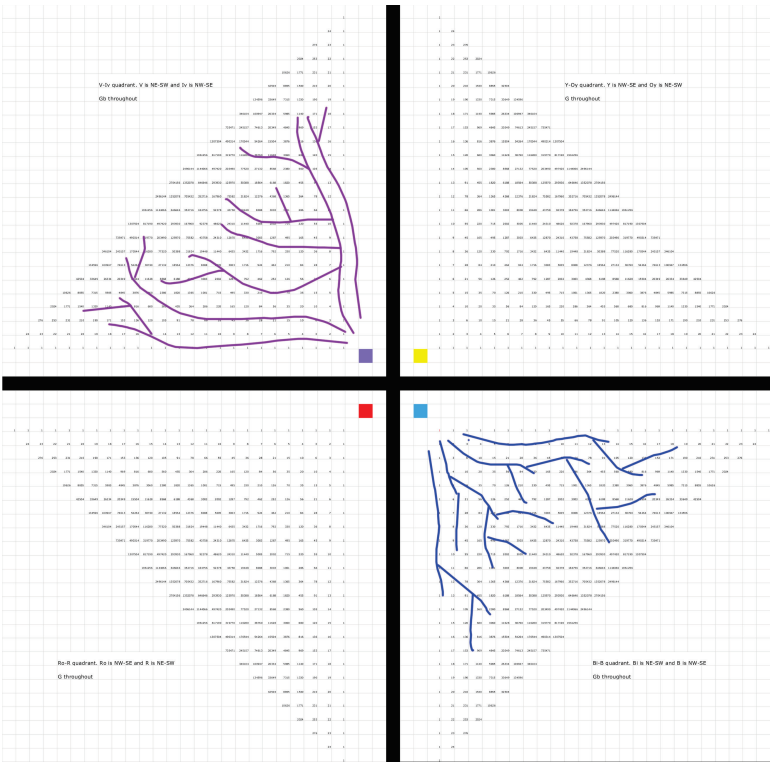
So far all these goods have been made in the Biv economy, this is called Abundia here meaning that resources are abundant. Because of this property is usually Gb and privately owned and everyone is trying to maximize profits. Often they do this by innovating, B comes with new ideas to win in his competition against other B people as well as the Iv agents, Iv often comes up with counter innovations in response to B innovations. This is because Iv refines B products and so cannot innovate until B produces something to refine, hence he counter innovates.

It may seem strange that the prices of goods are uncertain so far in this model, the same uncertainty can occur where the values in the cells are dollars that the goods are sold for without knowing the quantity. The reason is an Iv-B economy sets prices in many ways and many of

these are secretive and deceptive, to try to graph Iv-B according to price and quantity then would only produce mysterious and likely wrong graphs. This is because secret deals are going on and many of these would never get to the statistician, any attempt to base a theory on these prices and quantity then must give deceptive results.

For example in a game of poker we might equate price and quantity to the hands people get and the bids they make, we can then try to work out from these an accurate strategy for poker. However this would never be correct because the bluffing is often more important than what people's hands are, in fact by recording the bluffs and the one at the end who shows his hand it might be impossible to work out what strategies people are following at all. That of course is the objective of poker, to not be predictable as that is a sure path to losing. In the same way the Iv-B economy is also based on not being predictable and so if the statistics of price and quantity really reflected the situations of the traders then they could be taken advantage of.

It might seem that this limits the ability of this theory to predict economic events, however by skirting where a model would deviate from reality the actual uncertainty in the model can be more accurately defined over time. As the GFC showed presuming economic statisticians have accurate data has not been a successful strategy either.



This kind of Iv-B economy grows like a weed in nature to get profits quickly and businesses often

aim to collapse at the right time in the process. For example companies might be competing in a boom with very high leverage so that they can draw profits from the business but walk away keeping these profits if the boom crashes. In the same way plants can grow quickly when the weather is favorable only to seed and die when the resources are consumed, the ones that get these resources before the others win the race and grow next time. The Iv-B economy described then is not only shaped like plants but also grows and crashes like one, when the economy is unstable it is more like weeds or desert plants that spring up quickly when there are Gb resources but has evolved to quickly seed and wither when they run out. This is a very successful strategy in nature so it is no surprise companies use it, however it is not so good when a balanced and stable economy is needed.

An Iv-B weed like economy can then be selected by evolution to grow in this way if the weather or other resources are chaotic, for example there might be droughts and then a large wet period caused by dependent variables such as with El Nino and La Nina. B farmers with this kind of

rainfall might have to rush to grow their crops and get them to market, those that take too long to harvest them might be bankrupted and their farms bought up by the faster ones. The system then selects farmers who are faster, more deceptive, and more secretive. For example the faster farmers might start harvesting without alerting the others and grab the best workers and then the best prices at the market.

In Aperiomics B is a revolutionary color because these B farmers try to innovate to win this race, for example they might try to breed a faster growing strain of wheat to get to market first or one that survives better in a chaotic drought. The Iv agents might try to counter innovate to make flour faster or bake bread in bigger ovens to get the most profit when bread prices are higher.

Iv agents are counter revolutionaries because they try to counter innovate in response to B innovation, for example faster growing wheat can upset the Iv bread business by making wheat available faster than they can bake bread, this could cause wheat prices and then bread prices to

crash. Iv bread makers then might not be able to pay off their equipment with cheaper bread prices in a glut so they can then go broke as well. They might then counter innovate with faster ovens to counter this problem, those that do get more of their bread to market before the price crashes and so have more chance to survive the wheat glut.

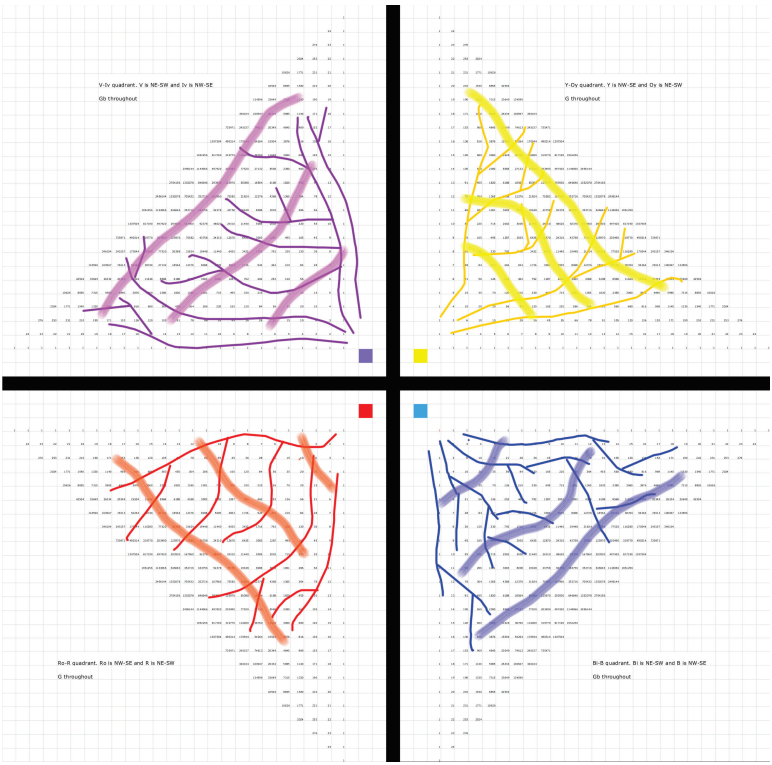
Those who do not counter innovate can go broke and be bought out by the others, for example when the glut of wheat happens those with slow ovens cannot bake biscuits to get to market as fast as those with the bigger ovens. By the time they get their biscuits to market the prices have crashed from a glut with the faster Iv biscuit makers. This is like the faster weeds surviving better because they get the Gb resources before the others, then as the slow plants wither the weeds use them as humus to keep growing.

Sometimes a B revolution or Iv counter revolution can fail, for example the faster growing wheat might not be resistant to R insects or the B farmer goes broke because the wheat rots before the Iv bakers are ready to use it. The new Iv ovens to

bake faster might cost so much that a glut of bread crashes prices before they can pay for the new ovens, they might then be sold off cheaply at auctions and be bought by those who were slower but took fewer counter revolutionary risks.

Weeds running into this evolutionary dilemma would be represented by B roots and Iv branches growing too quickly so that some break by being too fragile even though the B roots reach the Gb resources first. Other plants might have fewer resources but have stronger branches, a storm then might wreck the weed that went for the Gb resources with its roots without evolving stronger branches as well. The Iv branches that grow fastest without breaking from being too fragile then might get to the sun first rather than being overshadowed by other Iv branches, however if they don't also grow fast roots then they might run out of nutrients before they can fully grow and then other plants end up overshadowing it. This is like an Iv bread maker building faster ovens and then not being able to get enough wheat to pay for them.

In Roy, consisting of the Ro-R bottom left and Y-Oy upper right quadrants with O where they intersect, there is also a root and branches pattern but here Oy and R have a negative sum game. This is shown in the diagram below, I have also added the other color interactions of V-Bi and Y-Ro which will be explained later.



They try to minimize losses instead of increasing profits because in G resources are so scarce that

survival is their first priority. For example R farmers and miners work on G public property because resources are too scarce to be worthwhile owning, they just use them up as they find them and move on nomadically. In this they are like R prey animals such as gazelles that might find patches of grass amongst bare ground in a drought. The values in Roy are then not abundant enough to form a Biv society like the other quadrants, instead people try to find areas with enough resources to make Biv communities. This Roy economy is called Scarcia because it has scarce resources like Abundia had abundant resources.

In an Iv-B economy exponential growth is most important, people are looking to maximize their profits so they look for fast growth. For example they might look for booms in the stock market or real estate to get rich quick. In the Oy-R economy they need to minimize the other side of chaos, that of collapse, cracks in the economy widening and causing it to break apart, the flexing of prices causing cracks like metal fatigue, tipping points, and so on. To survive then they need to watch these danger of chaos, however this does not

allow them to avoid chaos because they need the growth of it to survive the downturns.

For example Oy predators might often face starvation if they eat too many R prey, instead of moderating this feast or famine cycle however they use the chaos of good times to have more offspring and eat more food. In the same way an Oy-R economy can have even more frantic booms as people grab what they can expecting bad times to be coming again. This happened in the lead up to the GFC, poor R-B people used liar loans for their once in a lifetime chance to get out of poverty. If they had not needed to minimize their future losses then they might have used the subprime loan opportunity more wisely.

Roy and Biv interconnections

There is also a tendency for Y-Oy areas to concentrate resources and in effect become wealthier, for example Y-Oy predators eat Ro-R prey and take their accumulated flesh to become larger animals. In the same way a Y-Oy authoritarian dictatorship or mafia might take

goods and services from Ro-R poor people and become wealthy, they can then send some of these assets into the Biv economy or move there if they become wealthy enough. This also happens in the Biv economy where the V-Iv quadrant is usually more wealthy and the Bi-B quadrant of workers sometimes has only enough to live on and keep working. This can be seen in nature with most trees where the branches and leaves contain much more organic material than the roots do.

For example dictators and corrupt officials from third world Roy economies might live as well as if they were an advanced economy because this pillage, they can also send this money abroad and live well there as well. So G resources tend to concentrate from being sparse where R prey or workers are and further up the food chain they are more abundant but not enough to make a Biv society. However this is also how a Biv economy can evolve, for example in the Industrial Revolution Y-Oy imperialists exploited Ro-R workers.

At this stage there was less Gb private property and much more was controlled as G public property by the aristocracy and crown like territories, for example in a feudal system the serfs usually did not own their land and nor did the aristocracy as they soon found out in a war or if they displeased the king. At any stage then either the serfs or the aristocracy could lose their G land in Roy wars and this was the history of Europe in countless wars like this, as Europe and England became wealthier after the Middle Ages however it became more efficient to call the assets Gb private property. Then instead of countries warring to take from each other Biv trade started to become more important, often this entangled them in a web of commerce that made war too unprofitable because it destroyed this international trade.

With enough pillage then a Y-Oy Empire might develop a large Biv society around it such as with most colonial Empires enriching themselves at the expense of poorer Ro-R nations, then Biv trade developed between these empires though up until the First World War these empires could still profit more from war. This is like nutrients being

concentrated higher up in the food chain from the soil, these Y-Oy animals then when they defecate or die they in turn can enrich the soil in areas so much that Biv plants can grow profusely around them. Y-Oy predators then concentrate the energy and mass they get from the Ro-R prey into themselves, when they die they can create different and perhaps larger pockets of Biv vegetation than if there were no predators. For example if Africa had no predators then the Ro-R prey would produce different vegetation because they would overeat and destroy some plants more often in droughts with no brake on their numbers. In the same way without predatory Y-Oy empires and aristocracies international trade would have been much different in history.

For example Y lions might control a waterhole and slaughter so much prey there that more Biv trees grow there from the fertilized soil, otherwise those Ro-R prey would be much less likely to die near the water. Eventually this Biv forest might become self-sustaining like trees evolving to grow around waterholes, this is like where Empires such as the British still remain wealthy even after losing all their colonies. Acting as colonial imperialists or

Y-Oy predators created a different patter of trade in the world than if there had never been empires, when this empire loses influence then this V-Iv trade based on imperial power can also decline. For example the US has much of its economy based on being a superpower, as they are losing influence in South America then some trade that was assisted by the Monroe Doctrine is being lost.

Nutrients then flow in a cycle between the Roy animal kingdom and the Biv plant kingdom, plants get nutrients from the soil as well as energy from the sun and then the plants are eaten by Ro-R prey like R gazelles and Ro buffalo. Then Y-Oy predators eat them and take these nutrients and energy, they die and defecate which returns the nutrients and some energy back to the soil for Biv plants to reuse. The ratio between plants and animals is then approximately Gb to B, this ratio depends on how fertile different parts of the world area. For example the Amazon might be more Gb and so is mostly plants with few animals by comparison, deserts are more G and so have more animals and just enough Gb plants to support them.

This also happens in societies according to Aperiomics, everything that happens in the Roy animal and Biv plant kingdoms is an evolving system that replicates with any living things. So a Roy society might have R loners and Ro gangs making a bleak living with nomadic farming and grazing of animals, sometimes they also fossick for some minerals such as gold. Then they are progressively robbed by people higher up in Y-Oy, these can be predatory tribes, criminals, an Empire, an authoritarian government, an army living off the people, warlords, etc. These Y-Oy people accumulate wealth and buy goods and services from the advanced Biv economies which transfers some assets to them. Sometimes these Y-Oy people die, their assets sent to banks in the Biv advanced economies are then forfeit just like Y-Oy predators dying in a Biv forest. Then the Biv societies often giving food and other aid to these Ro-R poor people like the Ro-R prey eating V leaves from Biv plants and the cycle continues.

The same occurs with an advanced economy because some resources are still scarce enough to be G public property. For example electricity is usually publically generated because the land

available to carry power lines is scarce, they cannot be strung up by many companies as there is no room. Roads also solve the problem of scarce land available for their use by being G public property. Welfare handles scarce resources for the Ro-R poor by governments expropriating money and goods from the Biv economy, this is like the Roy animals taking resources from a Biv forest by eating their leaves without hurting the plants.

In return much of these resources flow back to the Biv economy, for example Ro-R people use their welfare to buy Biv goods and services. Usually these Ro-R people do some work which is often the best that can be done with the scarce resources available to them. For example an Ro-R ghetto in the US might be seen by some as leeches on the Biv economy but they naturally evolve to be Ro-R like some desert areas have different kinds of plants and animals than a nearby Biv rainforest. The problem is not that the desert is leeching off the rainforest though often plant matter might blow away into the desert like this welfare. Rather the problem is there is little attempt to resolve the problem of scarce

resources in these ghetto areas, for example farmers might try to reclaim Roy desert land to turn it into Biv farmland with careful conservation.

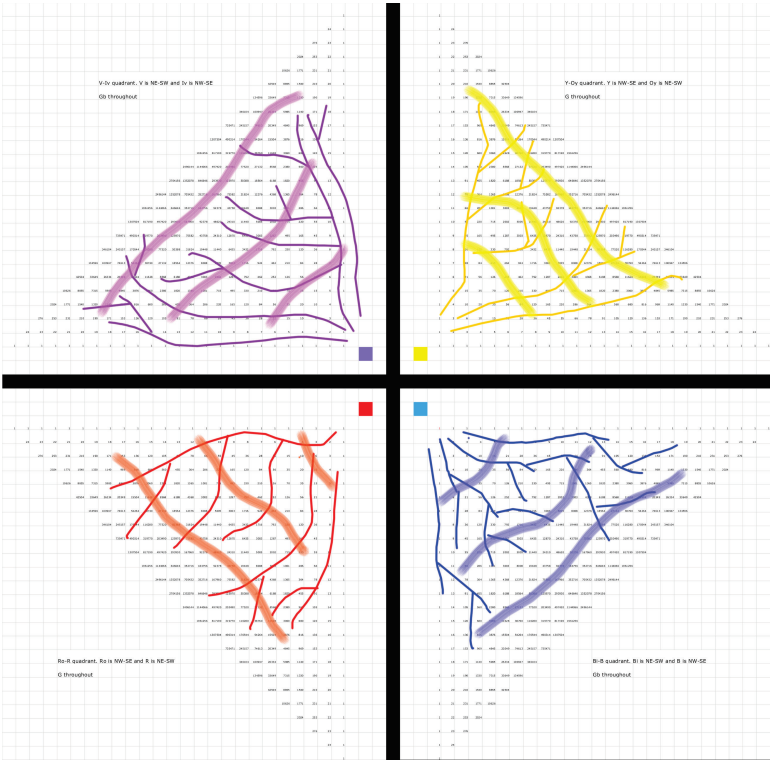
In Aperiomics scarce resources work more efficiently in G public property and with abundant resources Gb private property works best. So roads being scarce work best as G while cars being abundant work best by being privately owned. When customers for buses and train are scarce and they have little money they usually work best as G publically owned. The four quadrants allow all these interactions to be mapped out, for example the kinds of farms and mines in Biv Abundia can be shown as supply and demand lines according to their colors in the Biv quadrants.

There might be the same kinds of farms and mines in Roy Scarcia where G public property dominates, however Abundia and Scarcia can still trade with each other and occasionally go to war. In effect then Scarcia is like a desert ecosystem in a rain shadow near Abundia which could be a rainforest because mountains direct much more rain to

them. Animals and plants will evolve between these two, sometimes one will encroach on the other as the resources change. For example the Biv forest will be losing humus that is blown into the Roy desert, many Roy animals will go to the forest to eat and sometime die there fertilizing it. This is like Y-Oy cronies of dictators getting rich from Biv aid to their countries and then transferring it back to Biv bank accounts in tax havens.

V-Bi

There is also a cooperative element in Aperiomics based on random teams of people, they tend to form a normal curve as they act. These are represented by four more colors in the quadrants as Ro or red-orange, Y or yellow, Bi or blue-indigo, and V or violet. Generally they are drawn at right angles to the chaotic colors of R, Oy, B, and Iv.



These additional colors are drawn here as wavy lines to represent that any team sometimes has chaotic competition in it, however to be completely random they might be straight lines at 45 degrees to the X and Y axes. In the same way the chaotic Iv-B and Oy-R lines are way here because sometimes they veer towards cooperative behavior.

The lines so far are then deliberately drawn in a nonlinear way because most animals, plants, and people act with some mix of chaos and randomness, sometimes as loners and at other times as part of a team. For example R prey such as gazelles might still form a herd to protect themselves against small predators. Oy hyena can still work as a pack while a Y pride of lions can still hunt as loners particularly with lone females. However generally evolution causes predators to favor either team or lone predatory behavior over time. In the same way most Ro-R prey select to be in herds or to be more solitary, for example a Ro herd of buffalo is unlikely to break up so individual buffalo try to hide and run like gazelles to survive.

The Biv quadrants of Bi-B in the lower right and V-Iv in the upper left are plant like by nature though many Roy animals can live amongst them. These plants can have an ecosystem with a combination of Iv-B weeds that grow and collapse quickly and more stable V-Bi growth such as with grass. In between there can be plants that can grow quickly like weeds and also be stable like grass, they usually have strong I trunks such as bushes and trees. Soon after they sprout they can grow as fast

as weeds to compete in the race to get to the canopy and overshadow the other trees, then they can mature to survive for a long time like grass by conserving resources rather than collapse like weeds do.

With people there is often a mix of these two strategies, in Scarcia some R people might fossick for food as loners and then team up with others in a Ro gang to look for wood or water. Oy people might act as petty criminals, they try to find lone R people to rob or to sneak into a Ro gang's neighborhood but sometimes they can team up as Y like organized crime to rob a Ro business like a bank. A Y mafia might work as a team but sometimes their members can work as Oy hit men using secrecy and deception.

In Biv the B workers might have farms and mines that compete against each other, some might join a Bi union to demand higher wages or form a cartel where wheat farms for example cooperate to force prices higher and to keep them more stable like OPEC does. Iv agents might have highly specialized business like baking bread, scone,

bagel, biscuits, etc as mentioned earlier, however when faced by the Bi wheat cartel they might band together as a V team to buy wheat in bulk and force the prices down this way. People as well as plants and animals can choose to mix chaos and randomness, often though they prefer one or the other and tend to evolve with this preference by marrying other people like them. For example Bi union workers might rarely compete with each other, they can often also cooperate with V cartels. B workers and Iv agents might rarely cooperate with each other even when faced with these Bi unions and V cartels. However there is also some color migration, a Bi union family for example might sometimes have a child that wants to be an Iv agent instead of joining the union.

In the Bi-B quadrant the Bi thick wavy lines then can represent cooperatives, unions, and cartels with their farms and mines. V-Bi and Y-Ro people tend to form teams and work in a normal curve distribution that these thick lines approximate. For example a Bi union might have an average worker and some which are much better or worse, there is a pressure though to conform to this normal center. The B workers shown as thin

lines like roots work separately so the best workers are free to profit more if they can, the worst workers might starve or collapse to form Scarcia like Roy areas called ghettoes.

So just as some successful people like animals and plants in a desert might form a small Biv forest some unsuccessful people in a wealthy area might form Roy ghettoes. Often the reason is just the natural variation of people in intelligence, strength, talent, or sometimes people can be unlucky. For example with bad things randomly happening in a Biv economy some people will experience more than others which might drive them into a Roy ghetto. Other might experience chaotic crashes in the life and end up in a ghetto, for example they might become partially disabled and not be able to afford to live anywhere else.

Areas of Gb abundance can then collapse into G scarcity if the economy is inefficient enough, resources are wasted, or there is a change in resources such as with a drought. In the same way a Roy area might become Biv if they use resources wisely and avoid waste like a desert area being

reclaimed by carefully conserving water and the humus from plants, they might also get more resources from the weather improving. In the GFC for example many Biv areas of the global economy became Roy as the banks often had to be nationalized and bailed out because money was so scarce, G public property then became more efficient until these parts of the economy recovered.

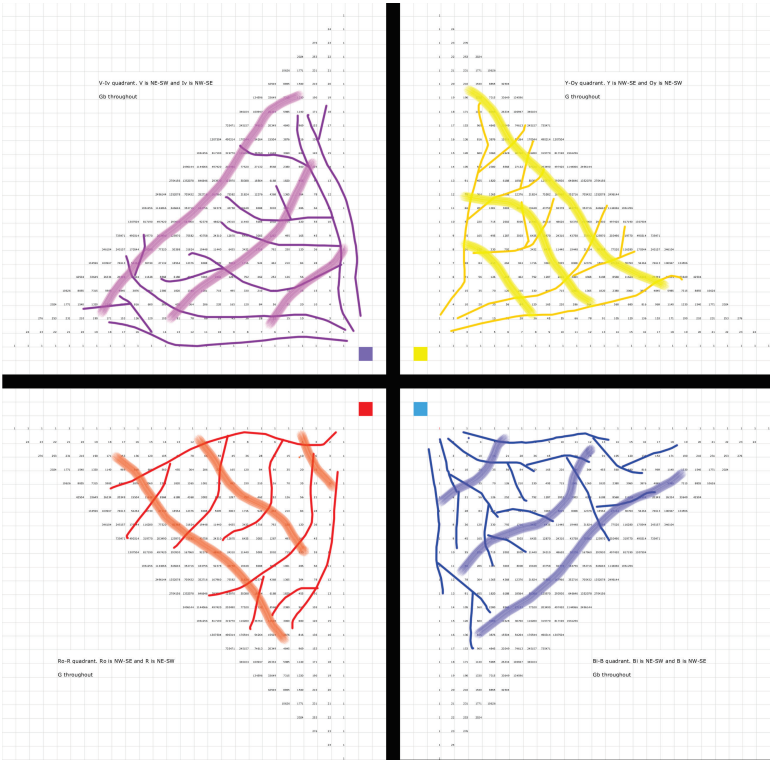
As will be seen these V-Bi and Y-Ro lines would also usually represent cells on Pascal's Triangle, these cell values can also represent production of various goods and services like in the Iv-B economy earlier. Just as before these values need not be directly related to price, for example the cell values are higher towards the middle of the lines which means that the teams tend to have a normal amount of production rather than accelerating chaotically as the roots and branches of the Iv-B economy did.

1	2	3	4	**5**	6	7	8	9	10
1	3	6	**10**	15	21	28	36	45	
1	4	**10**	20	35	56	84	120		
1	**5**	15	35	70	126	210			
1	6	21	56	126	252				
1	7	28	84	210					
1	8	36	120						
1	9	45							
1	10								
1									

In the diagram above Pascal's triangle grows so the diagonal values are larger in the center, here the largest is 252. A Bi farm then might produce an average of 252 kilos of wheat per hectare in a year, some years however are better or worse than this and might be 10, 45, 10, 120, and so on. However if these yields are random then they will tend towards the normal average of 252 kilos.

These V-Bi and Y-Ro lines in Pascal's Triangle can then represent production without calculating price at this point just as in the Iv-B economy except that V-Bi is generally more transparent and honest. Bi farmers then might have a normal output of 252 kilos of wheat per hectare and they sell this wheat to V cartel bagel makers, they usually pay for each kilo of wheat with .5 kilos of bagels. Like in V-Bi V makes .5 kilos of bagels as clear profit while the Bi farmers also get bagels worth more to them than their wheat.

The normal price then might be .5 kilos of bagel per kilo of weight, if money was being used then this might work out at $1 a kilo for wheat and $2 a kilo for bagels. However the price in the V-Bi economy is determined by the rival normal curves of V and Bi.



For example in the diagram above various B farmers and miners provided raw materials to Iv refiners so both tried to maximize their profits. One of the Bi lines in the lower right quadrant pointing approximately North east and a V line in the upper left quadrant pointing the same way can represent the Bi wheat farmers and V bread makers. Filling in this graph there might be hundreds of these Bi lines representing teams growing and mining all kinds of things, they sell these to the hundreds of V teams represented by

lines like those above refining them. Then V sells these refined goods back to Bi at a profit like the .5 kilos of bagels for a kilo of wheat.

However this is going on with hundreds of products, for example a Bi team mines coal and another Bi team mines iron, they sell this by barter to a V cartel that makes steel and sells this back to Bi also for .5 kilos of steel for 1 kilo of coal and iron. Of course the same thing is also happening in the Iv-B economy of B roots and Iv branches as described earlier, however ignoring this for the moment there might be only Bi teams and V teams doing business in Biv Abundia. Because each has their production on a normal curve represented by a line in Pascal's triangle then all these Bi and V have their production varying randomly, also as with Iv-B some are buying goods that factor in their costs. For example as before a Bi team grows tea tree leaves, a V cartel makes tea tree oil as a pesticide and then sells it to other Bi farmers.

With each V and Bi team varying randomly around this normal center then the V-Bi economy will

have its prices change randomly but also tend to come to normal prices. So .5 kilos of bagels for a kilo of wheat might be a normal price but this might also move downwards to .25 kilos on a normal curve according to whether the Bi farms had a higher than average yield of wheat in a year. It might also move to .25 kilos of bagels if the yield of bagels from the wheat drops because of a shortage of yeast or salt provided by other Bi teams. Also at times prices will change to a new normal because of innovations or changes in resources, for example a new kind of steel from V might be stronger and so people want more V steel ploughs and cookware, they now sell these for .25 kilos of steel for a kilo of coal and iron.

This higher barter price for steel ploughs and cookware moves through the whole V-Bi economy creating more new normal prices, for example it might also cost a kilo of wheat to get .25 kilos of steel products while V bagels now slip to .1 kilos per kilo of wheat or coal and iron because people are making their own bagels at home with the cookware. So in this V-Bi random economy there can be normal barter prices for all Bi raw materials produced by teams and all V refined goods, these

normal prices can however drift to new normal over time. Adding money to the equation doesn't change the random nature of V-Bi, for example a Bi team of gold miners might have a normal price for gold and this is used sometimes as a substitute for barter. However the price of gold would also change randomly in V-Bi around a normal price, it could also sometimes drift to a new normal price for any of the hundreds of V or Bi goods. As will be seen the V-Bi and Iv-B economies can combine together to give mixtures of chaos and random barter prices as well as prices denominated in this gold. Also the same kind of market will be explained in the Roy sectors of Scarcia, Ro-R in the bottom left quadrant and Y-Oy in the upper right quadrant.

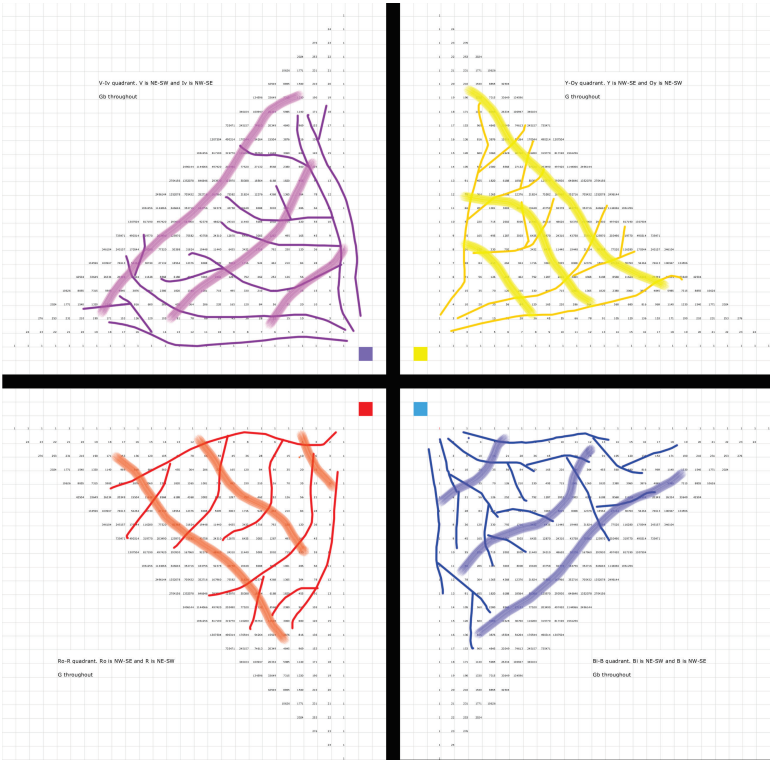
In Biv Abundia the Bi wavy lines might have a war of attrition against the V wavy lines, this can be for example a Bi union in iron mines striking for higher pay and withholding iron from V steel companies. Both then try to wait each other out by relying on their savings until one has to give in. This can be calculated more precisely according to the width of the V-Bi lines and the total amount of assets in the cells these lines represent. For

example if the Bi line represents much more iron ore that can be sold than the V company has steel for sale in their line then V will run out of money before Bi and will likely have to pay the Bi union more money. This can further be calculated by each representing normal curves, because one is bigger than the other it means that one curve is more likely to succeed by random chance than the other. In effect then because each normal curve represents a range of probabilities in the V-Bi economy these can be used to determine the probability of either V or Bi winning in this war of attrition.

Y-Ro

In the Roy quadrants people act to minimize their costs and losses rather than maximize their profits, this is because losses can cause starvation more easily when resources are very scarce. The Y-Ro economy can then be very similar to the V-Bi quadrants just explained except for this loss minimization and that the economy generally works more efficiently on G public property. It can also be run on Gb private property but this is less efficient, more of this is explained in my recent

book Crisis Aperiomics. In advanced economies Y-Ro and Oy-R tend to be criminal behavior as well as governments working in the G public sector. There can of course be economies run mainly on G public property such as formerly with communism.



In the diagram above the Roy economy of Scarcia might be next to Abundia as mentioned earlier, it is much less fertile and with fewer mineral

deposits. Because of this it has adopted a system that tends to alternate between Ro-R communism and Y-Oy authoritarianism often accompanied by the violent overthrow of one by the other. By contrast Biv Abundia nearby is generally democratic where a Bi-B left wing government tends to alternate with a V-Iv right wing government.

The Y lines in the upper right quadrant point North West as do the Ro lines in the lower left quadrant. Y can be like the V cartels except they operate as state owned businesses, they can also be mafia like organizations or crony businesses around a Y right wing dictator like an alpha predator such as Pinochet in Chile. These Y industries tend to refine the products from Ro, they can also prey on them like Y lions on Ro buffalo. The Ro lines can represent collective industries such as in the former Soviet Union producing raw materials like with farming and mining. There might be hundreds of these Y and Ro lines in a G based economy, also with other lines of Y mafias and Ro gangs also controlling some G resources. However there is little Gb private property here, instead people tend to

plunder from each other according to their strength rather than trying to best each other in deals like in Biv.

In this Y-Ro economy randomness and normal prices are most common just like as previously mentioned the Oy-R economy of Scarcia was dominated by chaos with booms and busts. So just as in Abundia there might be similar products except Scarcia is generally much poorer and so the goods are often of inferior quality and harder to get. Because the V-Bi economy is dominated by rival teams of Y and Ro these prices change randomly around a normal center though as in Abundia innovations and changes in resources can move some to a new normal. Often a G based economy has no need for money, it can work on barter in many areas. For example if there are Ro collective wheat farms and large Y factories making bread that is rationed then there might be little point in denominating these in a currency. However in between these teams the exchange rate might change, for example the Ro team might get increased rations of bread if the Y factories innovate with more efficient ways to make it.

Like the soviet union a Y-Ro economy tends to stagnate and be inefficient because innovation is discouraged, it causes trouble by affecting the normal barter prices throughout the country. Just as in Abundia then the prices of goods does not have to be a starting point in their economics, instead in Aperiomics chaotic and random interactions are examined first and then prices naturally follow from them. Because of this problems such as inflation are examined according to these color interactions rather than starting from the change in prices in inflation.

In the Roy quadrants of the lower left and upper right the Ro lines can also be where gangs might rule a neighborhood, they can also be R people banding together as demonstrators against the Y authoritarian government or a posse to chase away Oy criminals. The Y lines can represent an authoritarian army that plunders the Ro-R poor until they form a resistance army as Ro and then there is a war of attrition against them. Sometimes the Y army loses and the Ro army might form a left wing or communist government. The Y lines can also be mafia teams that engage in wars of attrition against the Ro neighborhood

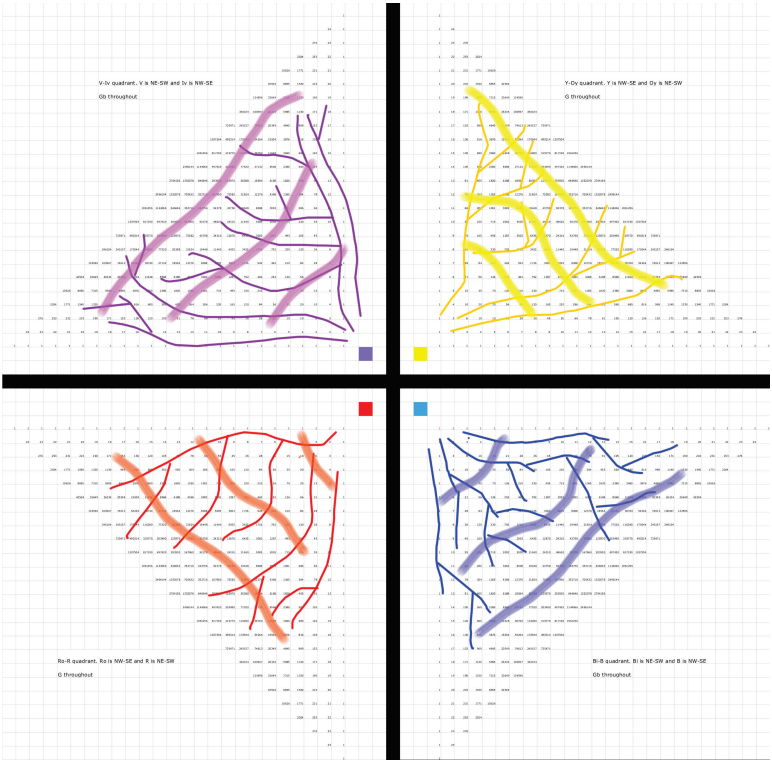
gangs, this can also become political where each is associated with ideologies. For example the Y Nazis started out as street gangs fighting Ro communist street gangs backed by Russia trying to take over Germany. Much of the rise of Y Nazism was then as a reaction to these Ro gangs as well as Ro communists in the government that had been democratically elected.

Roy economies can have more criminal and violent political battles in them, this is because with limited G resources there is often no option between fighting and starving. However Biv economies are also highly political except that elections are more usually about which party will maximize the profits of the electorate. In Biv people own a vote as Gb private property, in Roy their ability to influence their government more often occurs on G public property with demonstrations or wars.

Iv-B and V-Bi interacting

In Abundia as mentioned there is an Iv-B and a V-Bi economy, the first works chaotically and

deceptively while the second works randomly and honestly. These two economies generally work together so in the diagram below the Iv-B branches and roots represent B farmers and Iv agent and the V-Bi lines represent teams making similar products.



Of course Iv-B and V-Bi could just ignore each other and just deal inside their own color interactions, this can happen as shown later when

the I civil justice system breaks down. However when they do business with each other the result is a mixture of chaos and randomness. Each cell in Pascal's Triangle can still represent production values, now however they can be selling to any other color in Biv so the prices that are set by this also change with a mixture of chaos and randomness. So for example a Bi team might grow wheat and expect a normal price while Iv agents expect wheat prices and their bagel prices to change chaotically from booms to busts. More will be explained on this later but this illustrates some of the mathematics of Aperiomics, to calculate this mix of chaos and randomness between the colors.

Oy-R and Y-Ro interacting

In the same way the Oy-R and Y-Ro economies can ignore each other or interact giving a mix of chaos and randomness. However here people are trying to minimize costs and losses so this can be more violent and even criminal, for example with people stealing from each other as deceptive Oy or R individuals or as Y and Ro mafia and gangs. In war there can also be mixes of chaos and

randomness with Y-Ro trench warfare and Oy-R rival spy agencies using misinformation on each other. In Scarcia the economy is based on G public property and so some state owned industries are team based like Y and Ro while others as mentioned earlier in Oy-R are more competitive and often deceptive. Again, this is just an overview from previous Aperiomics books but this book will focus more on mathematical modeling of this chaos and randomness as well as explaining microeconomics concepts in terms of Aperiomics.

I-O

The most stable societies are where O in Roy and I in Biv are strongest and most neutral between the quadrants. For example in a Roy dictatorship if the O criminal police are neutral and fair they will prevent most crimes happening and most wars needing to be fought. This is because scarce G resources are distributed in the most efficient way and so the majority have fewer reasons to steal or fight. In the same way a Biv advanced economy might minimize crime when the I civil police are neutral and strong, they do this with the civil justice system where people are generally fined

rather than jailed as criminals. Because in Biv people are trying to maximize profits fines can reduce these profits and so adjust their behavior. In Roy people need to minimize their costs and so fines work less well when someone is facing starvation, often then the O criminal police must use the threat of jail to dispense justice.

In Biv when I is strong and neutral the market is fair and the civil laws are strongly enforced, this usually prevents disputes from escalating into tit for tat violence if they are arbitrated fairly. In Aperiomics then all economic and political problems can be traced to disturbances in the balances of these color codes, just as all problems in the Roy animal and Biv plant kingdom can be traced back to disturbances in the ratios of different kinds of plants and animals.

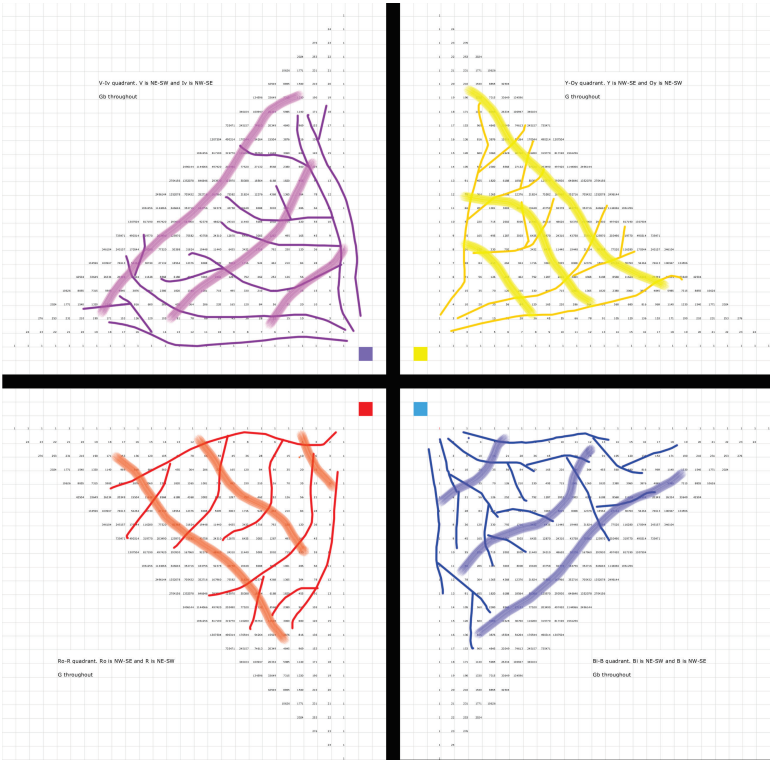
The need for strong I civil police can often be seen in a real market, B farmers competing with each other might hide how much they are growing and deceive each other about this. The idea is if one B farmer intends to grow a lot of wheat and dissuades the others from growing much wheat

because of a fear of a glut then he makes a bigger profit by cornering more of the market. Like a poker game then each farmer would try to maximize his profits by growing more wheat, if he succeeds he might sell his wheat for more and use the money to buy out his rivals. Deception like this might be considered fraud in the Biv economy so the I civil police would fine the B farmer to moderate this behavior which maximizes overall profits.

In Roy Scarcia R farmers might also be deceptive like this, however the O criminal police would moderate this with the threat of jail as people would not make enough money to pay fines anyway.

Other mathematical curves

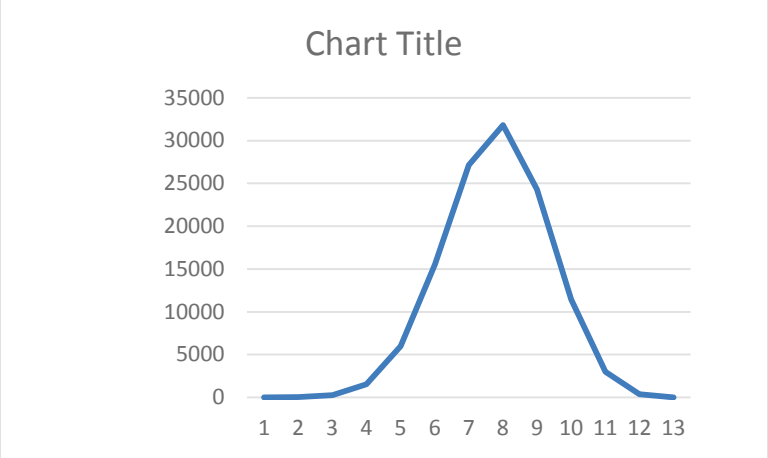
Other farmers might use a different strategy, for example a team of ten Bi farms might work cooperatively helping each other out and they would tend to form a Bi line in the diagram below.



This line goes NW-SE and if it stays on this line it traces out a normal curve as mentioned earlier, this is because a horizontal line in Pascal's Triangle approaches a normal curve the further down the horizontal line is. A vertical line tends to grow exponentially so the two give a way for exponential and random or normal distributions to be shown on one quadrant. Because Bi people tend to work in teams and form normal distributions then the Bi colored line can be drawn NW-SE in this way. In real life no team is

completely random, this line might then deviate from being straight just as the B chaotic lines might deviate to the side to some degree which gives some randomness to their actions.

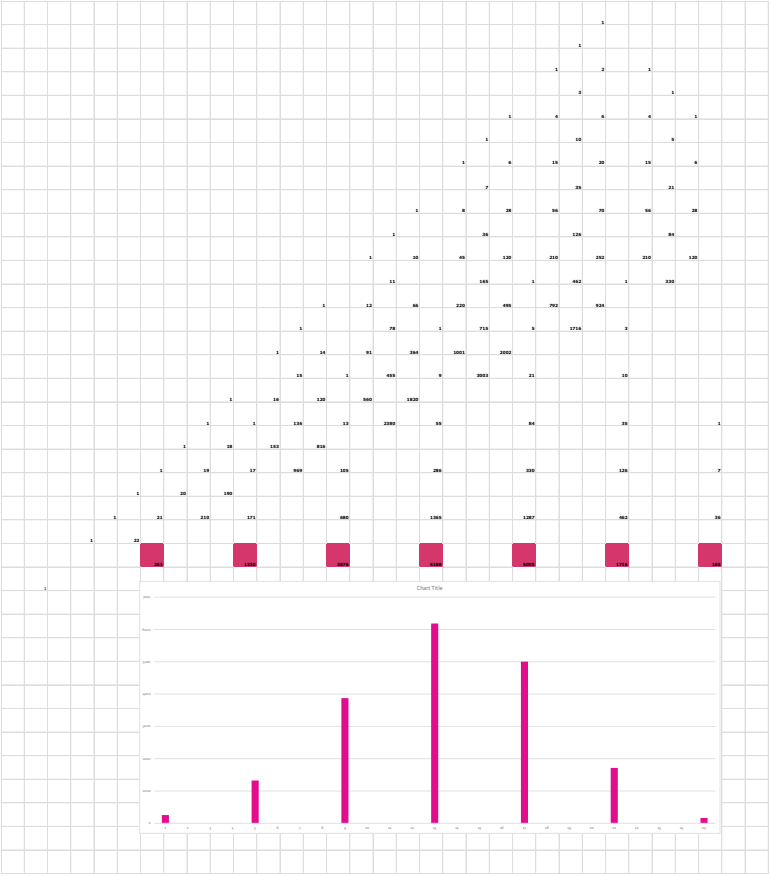
Sometimes this normal curve line is slanted to one side, this can mean that there is an exponential growth affecting a random population. In the quadrants a normal curve line is at 45 degrees to the X or Y axis, with the Bi-B quadrant the normal curve values would be NE-SW. If instead this was at a different angle such as 30 degrees from the vertical then this gives an asymmetric distribution as a mix of exponential growth and randomness. For example the heights of people might fall roughly on a normal curve, however if people from the last century until now were included this would bias the sample with more short people. The reason is that over time people have been becoming taller. This would then give a graph like in the diagram below.



If the X axis represented the heights of people and the Y axis numbers of people then there would be a bias towards more tall people in the sample.

I call this an oblique normal curve because it represents an oblique slice through Pascal's Triangle.

Below is an oblique SON curve, this is formed by taking a sum of all the parallel slices above the one selected.



This would occur for example in taking the heights of different races over say a thousand years. Some such as Italians might have as much variation in their heights as the English for example so their heights together would be two slices of Pascal's Triangle added together, when these different racial groups are then added together it can

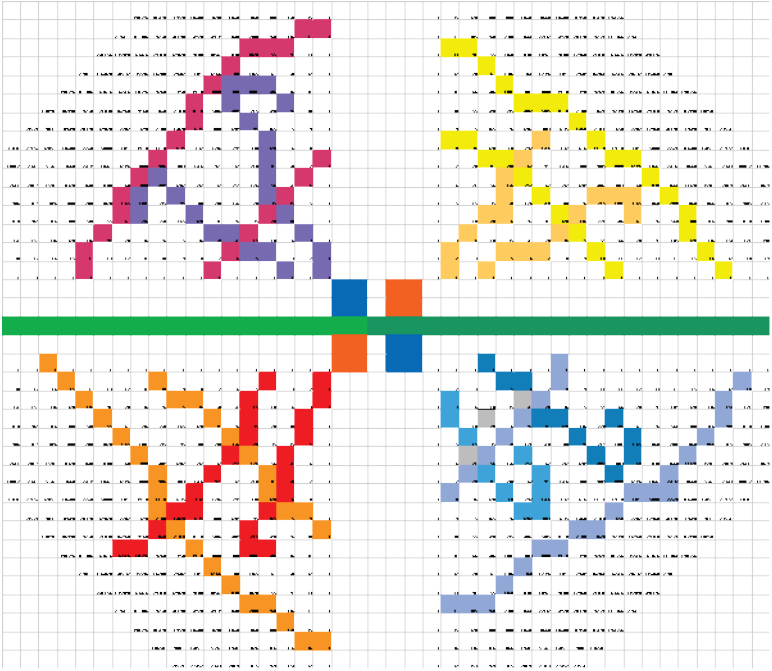
represent an overall growth in height of the different races together.

This can also occur in the economy, for example in a booming stock market the share prices might tend to grow over a month but still move randomly from side to side. This would give a skewed normal curve as the oblique normal curve drawn above. It represents then a constant growth of stocks of the month with some randomness. The oblique SON curve could represent different sized groups of investors, some might cause small random changes in stocks because they invest little money but others such as hedge funds might invest large amounts and being both long and short at times with arbitrage move the prices randomly up and down a larger amount. Adding these different groups up then gives the overall growth in the stocks as well as a normal curve with a higher peak and fatter tails skewed to one side. In an upcoming book I will be analyzing some stock market distributions to see if these curves can explain some of the fat tails seen there.

This can also be extended to 3D and higher dimensions in Hilbert Space where there are many variables. There are two ways to do this, each might be useful with different kinds of data. The first way is to construct a 3D Pascal's Triangle with two of them at right angles to each other forming an X shape then filling in the other cells to form a Pascal's Pyramid. Then a level in this period approaches a kind of 3D normal curve while an oblique slice through it would be a normal curve with varying rates of growth.

The second way is to rotate a Pascal's Triangle 360 degrees so it forms a cone shape so a horizontal slice through it approaches a 3D symmetrical normal curve. If the Triangle is very large the cell values also become very large, the ratios between them approach more mathematically exact values and so the normal curve shape becomes smoother. For example if a circular horizontal cross section of the Pascal's Cone is taken this is the same as a Gaussian Copula. The diamond graph below could then be seen as four Pascal's Pyramids or perhaps better is four Pascal's Cones. The diagram below then would then represent four cones, for example the Bi lines in the Bi-B

quadrant in the lower right corner would then be a circular conic section.



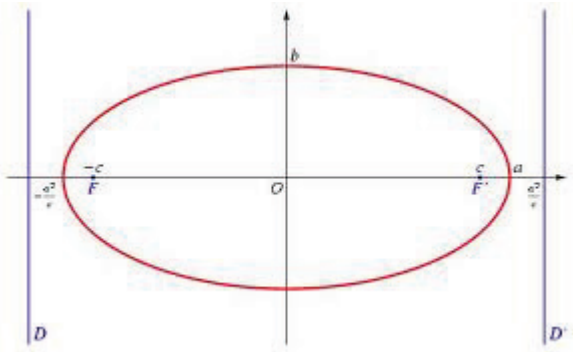
This is more like data found in society, for example a Bi union or cooperative might approximate this conic section with more people of a certain skill or type in the center and with more deviant people further out giving a 2D distribution of people in a crowd with the height of the Copula representing the density of people in it. It is also like a Ro herd of buffalo represented

by the Ro lines in the Ro-R quadrant in the lower left section. This Ro herd would tend to spread out more on the edges and be more bunched up in the center like this circular conic section.

Inside this Pascal's Cone there would be Iv-B and Oy-R cells, in Iv-B these can be in the shape of B roots and Iv branches. Because roots and branches of trees are conical in shape then the Pascal's Cones may be the most useful mathematically. This can represent three dimensional aspects of a Biv society, for example as B farmers and miners grow they would tend to spread out from a city in the shape of roots growing outwards exponentially. The Iv agents such as businesses competing with each other would also tend to grow exponentially and when they interact primarily with B farmers and miners the result is an explosively growing Iv-B economy leaving the V-Bi areas behind while eventually hitting a ceiling and collapsing.

Data can also be represented by oblique cuts through the cone, these are like a three dimensional representation of chaos and

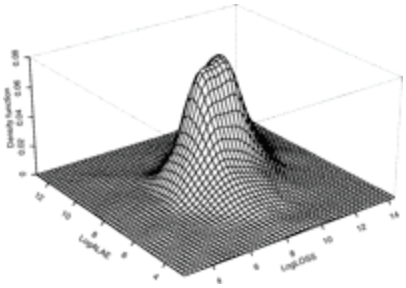
randomness together. For example taking the height of people over a thousand years might show random variations between them along with a growth in their average heights over time as chaos. This can be shown on a two dimensional graph but it might also include other elements that did not grow over a thousand years such as the proportion of head size to the torso. So the oblique cut would look like an ellipse, if aligned along the A axis then this can show both some chaotic growth along this axis as well as random variations along the B axis.



In the diagram above the B axis would represent a normal curve where for example this with higher B values might have larger heads compared to their torso while those with higher negative

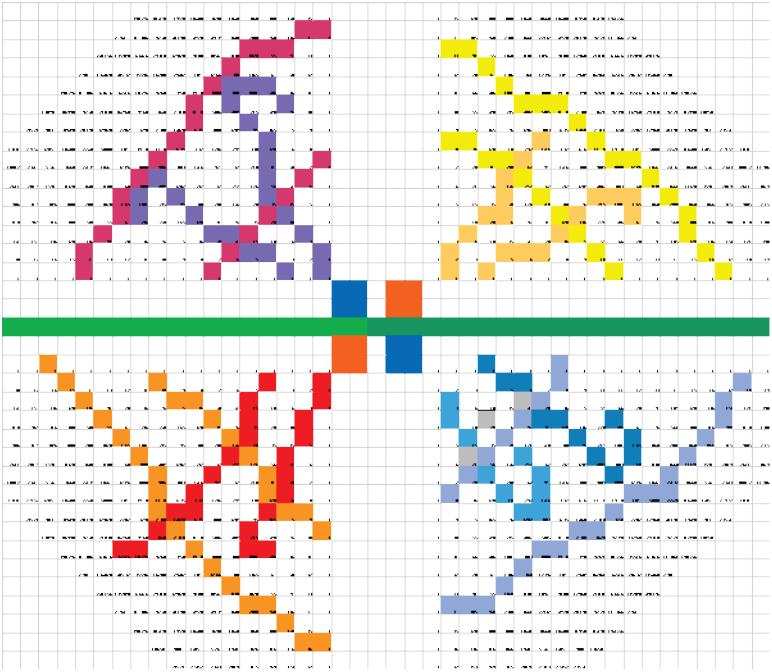
values would represent those with smaller heads relative to their torso. The oblique slice through the Pascal's Cone would point upwards towards the right of the growth giving larger values on the right than the left along the A axis. Along the B axis those with higher negative B values would represent further backwards in time and be shorter than those with higher positive B values.

The lines in a two dimensional quadrant can be defined according to the X and Y coordinates of the diamond graph, shown below, the X axis is horizontal and the Y axis is vertical as with conventional economics graphs. At 45 degrees to these axes are the A and B axes shown in the ellipse above, the A and B axis then would be lines parallel to the V-Bi and Y-Ro lines as a normal curve. So if a horizontal slice through a Pascal's Cone is a Gaussian Copula then this can have coordinate lines of A and B so any point on the Copula can be defined with them.



The diagram would then have A and B as axes, the height of the copula is represented by the increased values in the horizontal slice of the Pascal's Cone, it is however a flat slice in Pascal's Cone. The height of the Pascal's Cones are represented by an axis A, so any cell or value in Pascal's Cone can be defined by the coordinates A,B,C.

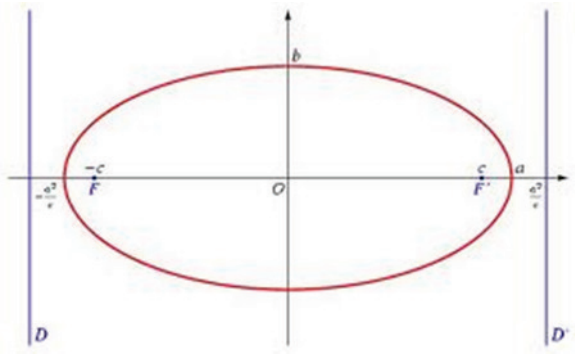
In the diamond graph the a axis would be Iv-B and Oy-R lines radiating out from the center, the B or C axis would be the V-Bi or Y-Ro lines. Using compass bearings to illustrate this the Y-Oy quadrant in the upper left corner of the diagram below would have it's A coordinates as the Y line pointing North East to South West. The B or C coordinates would point North West to South East.



Depending on whether two or three dimensional graphs are used either the ABC or XY coordinate system would apply.

Usually however the lines and surfaces in the Pascal's Triangles or Cones would not be straight as the data would have many variations, the Bi colored line in the lower right Bi-B quadrant in the diagram above might be curved or wavy with a more complex mix of exponential growth and

randomness just as a conic section from Pascal's Cone could be, for example there might have been spurts of growth with people's heights over time while ignoring their head to torso ratio. So in the diagram below this appear to be an irregular ellipse from above if parts of it are not completely horizontal.



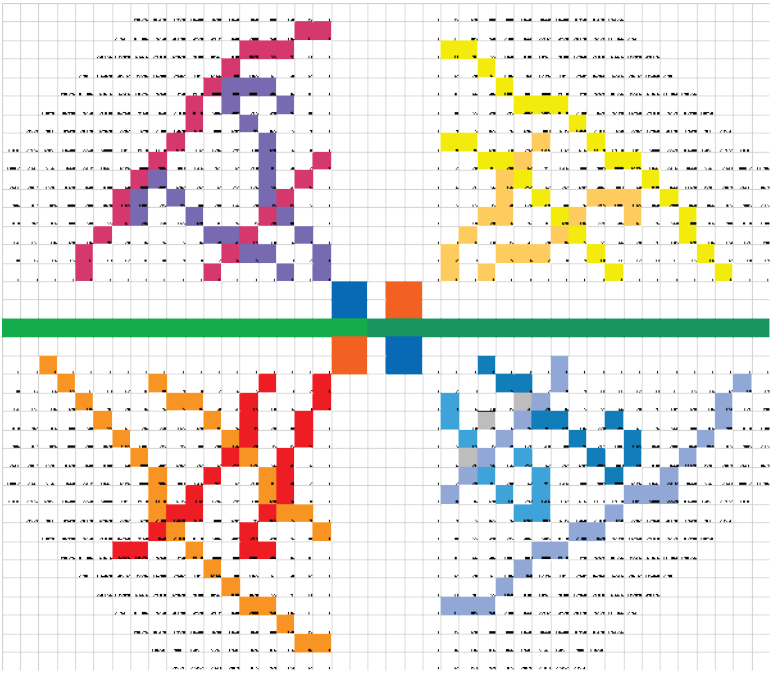
The oblique section from Pascal's Cone shown above then would appear as a 2D oblique line on Pascal's Triangle in the diamond graph. This then gives new tools to show a kurtosis or skew in a 2D or 3D normal curve, any deviation from the standard normal curve shape can be represented in this way. Also exponential growth might slow or decline in two or three dimensions, this can also be shown in the quadrants by curving these lines

to one side or to move back at towards the point of origin.

For example a city might have B farmers and miners spreading out in a complex but uneven pattern of growth as they follow different concentration of minerals as well as different soil quality for farming. This can be represent as an uneven surface in the Pascal's Cone and as the city grows a number of surfaces or conic sections can be sliced further down the cone showing the town growing with each slice representing a year. In this case then the top of Pascal's Cone would represent an earlier time, as the city grows it expands like the area of a slice through the cone further down. Pascal's Cone is just introduced in this book but will be more completely explained in a later book, from here on just the two dimensional diamond graph will be used.

The diamond graph also allows other economic data to be represented, for example game theory cells can be shown according to whether they represent competitive or cooperative behavior. A section of the book is devoted to this later. So B

lines being competitive can be like two competitors in a prisoners dilemma, initially they might be side by side as a Bi team while the I police represented by Indigo try to break them up. This dilemma is then like the temptation any member of a Bi team faces, to become a competitive B farmer rather than cooperating with others. With the Prisoner's Dilemma a member of a Bi team growing wheat might be tempted to break ranks with the other wheat farmers and sell his own wheat separately. This is like the O police trying to break up the team cooperation of a Ro gang into separate R criminals that will then compete to get the best deal at each other's expense. This will be explained more clearly later in the book, a future book will go through more of the various game theory situations and plot them in the quadrants.



It can also show other economic ideas such as comparative advantage. The B lines can be thought of as people picking different kinds of fruit. The horizontal X axis of the Bi-B quadrant above might represent someone better at picking strawberries while the vertical Y axis shows someone better at picking blueberries. B farmers might then move to either the horizontal or vertical line according to which fruit they are better at picking, the Bi line however represents where people instead choose to work as a team picking both kinds of fruit. While the Bi team

might pick less fruit they are less prone to chaotic collapses, for example someone might specialize in blueberries and a fungus wipes their crop out sending them broke.

The Bi team would not have specialized as much in blueberries and so would have more workers still picking strawberries to offset against the blueberry losses. Because they are a team the blueberry pickers might receive compensation from the others and help in planting something else such as blackberries. While this reduces the exponential growth if there are no problems when there are tipping points and collapses in a crop then this system is more resilient, this is how insurance companies spread chaotic risk by using a normal curve. More will be explained on this later, the main point to remember is that a quadrant can represent any kind of graph currently used in economics.

A primitive economy

This economic analysis starts with Bi-B and Ro-R settlements, it then extends economic activity up

to the V-Iv and Ro-R quadrants as these settlements evolve into more advanced economies. This is intended to follow the evolution of plants and animals in nature, in Aperiomics this is the same way societies evolve. More has been written on this in previous books, animals have tended to evolve as R and Ro prey and the predators came later to take advantage of their weaknesses. In the same way early plants evolved as being mainly Bi-B root complexes such as with lichen and over time developed larger trunks and branches with leaves. It is difficult for this process to go the other way, a Y-Oy predator needs to have prey to feed on before it can evolve and a plant needs to get nutrients from the soil before it can make something with them using photosynthesis.

Consequently in Aperiomics a society might start with R people in environments where resources are scarce, here this is called a G area where resources are public property and not owned by anyone. Someone might claim a territory but this is more from their strength than any concept of ownership, it is like Y lions claiming a territory because of their ferocity. Where resources are

more abundant these R people might settle down in one area as B, they begin to think in terms of Gb private property because with so many resources it is more efficient to trade together than to steal or rob each other. Also when there abundant Gb resources in an area there is little point is remaining nomadic and going into areas that are G infertile. For example B people might tend to be loners and highly deceptive, however with abundant resources there would be little point in warring with each other and destroying resources rather than just gathering them and trading. In a scarce G environment the few resources available might be a matter of life and death for some and so warring over them is a better strategy.

Over time R people can become Ro teams or tribes where they work together collectively and cooperatively, this is like how R prey can evolve into Ro herd animals. In the same way plants evolved from simple single roots to more complex root systems where the roots need to work cooperatively to provide a balance of nutrients for a plant. In a Gb area then abundant resources can mean that some people still do better as B loners

just like R prey still exist today and many plants have a single or major root. Others however find it easier to work collectively as a team, for example they might build farms and lend labor to each other for more difficult jobs such as moving large rocks and stumps. Here the B people have a disadvantage because they tend to exploit the difficulties of others for gain, if one was in trouble with a large rock on their land then the others would be more likely to overcharge for their labor or hope he will give up so they can take over his land.

Over time then Ro-R societies develop the next stage of an O police force and justice system, this might be where Ro tribes settle their differences with other tribes and R loners with some form of agreed upon set of criminal laws. For example injuring another person might have a penalty of a similar injury like an eye for an eye or tit for tat. This is like Ro-R animals evolving a higher food chain where O animals sometimes feed on them but also start to act as shepherds protecting them. For example early predators would have safeguarded their prey from other more dangerous predators and in exchange had a more

reliable food supply, they are acting to some degree like shepherds and police.

The Ro-R prey would have evolved to accept occasional predation in exchange for not being decimated by more dangerous predators. In the plant kingdom Bi-B root systems would have been little more than lichen, over time they evolved a trunk or stem so they could get more sun and sometimes overshadow other plants. The trunk then acts like the O animals, it helps the Bi-B root system to avoid more danger by hiding and covering it from foraging animals and in return it receives nutrients from the roots. In plants then different parts evolve so they are useful enough to receive nutrients as a kind of payment for their services.

In Bi-B societies they eventually develop an I civil law system where stronger penalties such as the O police might hand out are usually unnecessary. Because resources are abundant fines and ostracism work better to prevent bad behavior, this then evolves civil justice which dominates the marketplace. In Aperiomics this is how the

concept of the free market evolves in societies, when resources are G scarce a criminal justice system coerces people with threats of confinement or injury, when resources are Gb abundant a civil justice system evolves where people can sue each other over property. In both cases justice needs to be neutral to work best, when it is biased to one side it is often evaded or resisted leading to it weakening.

In the animal kingdom the evolution of O animals causes Oy predators to evolve, these are secretive and deceptive loners much like R prey. They try to get around the O animals by sneaking past them into their territories, they act like Oy foxes for example trying to sneak past a human O shepherd to get to their Ro-R sheep and cattle. The O animals allow some of this and can develop a dual nature where they are themselves like Oy predators but also like Ro herd animals themselves. For example an O human shepherd might use Oy wolves to domesticate as dogs to help protect his Ro-R animals. These wolves then evolve to be part predator because they get fed from the flock but also part Ro herd animals

because they can fight alongside the shepherd to protect the herd from more dangerous predators.

In the plant kingdom after evolving a trunk this splits more and more into Iv branches which then compete against each other to grow higher and spread leaves and other greenery over each other. More successful branches get more nutrients from their leaves and also from the B roots so they are in effect acting as Iv agents for the V leaves. These V leaves evolve according to how well they cooperate together instead of trying to overshadow each other to the detriment of the whole plant, they also cooperate with other plants to form a canopy. They also then receive payment in nutrients from the rest of the plant for their production of organic compounds through photosynthesis. Each part of the plant then must pay its way, if a plant allows too many free riding parts then it loses against other plants that are more efficient.

Like a shepherd the I trunk looks after its Bi-B root system, it then evolves these branches which are domesticated to help grow the plant in exchange

for nutrients from the Bi-B roots. The O middle of the food chain represents animals that are both predator and prey, the I trunk of a tree is partly a branch and partly how roots and branches connect together. For example nutrients go up and down it like a branch and it grows like one, it also combines branches and roots together to share nutrients.

In G human societies the O police and justice system develops Oy petty criminals who try to get around these police, however the police start recruiting them like shepherds do with wolves to domesticate them into watchdogs against more dangerous criminals. This is like in a modern society where O police use snitches to break up more dangerous criminals in exchange for tolerating some crime or reduced sentencing. In the Gb abundant areas they develop Iv agents who are like petty criminals but occasionally break I civil not O criminal laws. For example they might be dishonest traders and salesmen who take an occasional dishonest profit from an unsuspecting customer just like the Oy dogs might still take an R sheep when the shepherd is not watching.

Finally the animal kingdom becomes Roy, it has R, Ro, O, Oy, and Y animals. The Oy predators have some success from deceiving the shepherds but they also form Y teams like the R prey when they evolve to form Ro herds. For example Oy lions might hunt as loners or form together into a pride and hunt in teams. The O shepherd has to contend with these Y teams, such as wolves in a pack as well. He combats the wolves by using his domesticated Oy predators who warn the shepherd when the Y packs are around, in effect the Oy dogs snitch on the Y pack just like Oy thieves snitch on Y organized crime in exchange for allowing them to plunder Ro-R to some degree. Sometimes though the Oy dogs like Oy petty thieves can turn on the O shepherd and join in attacking the Ro-R flocks and herds.

In the plant kingdom the addition of V leaves makes it Biv, as B, Bi, I, Iv, and V. The leaves tend to work as a team, for example this part of a tree might form a canopy to overshadow other trees and establish its own territory like Gb private property.

In the Roy human society then the O police have to contend with the formation of Y gangs and mafias, they try to use Oy petty criminals as snitches like with the dogs but sometimes these Oy criminals join forces with the Y gangs in a crime wave. In the Biv human society the formation of a V elite or aristocracy is like the wealthy in most modern societies, they team together to exert more pressure on the I markets to make more profits.

Much more on how these color codes interact has been written elsewhere, most recently in Crisis Aperiomics on the Global Financial Crisis. In this book I will concentrate on showing how Aperiomics is consistent with the mathematical side of economics as well as how it gives some answers to problems in this field. To do this each kind of interaction in economics that is typically illustrated in a graph can be explained in the four quadrants of Pascal's Triangles mentioned earlier. Two of these, the bottom right and upper left triangles represent Biv society with Gb private property and are shaped roughly like the V-Iv branch and Bi-B root system of a tree. The other two represent the animal kingdom but also those

parts of society using G public property, for example government agencies, dictatorships, public parks and roads, O policing of criminals, national defense, and so on.

A movement in one color code tends to reverberate up and down these triangles, these can then illustrate booms and busts or stagnation in an economy. A color code can also wax and wane in strength causing effects throughout the quadrants, for example if the I-O colors weaken this can cause a crime wave. If B weakens then there are fewer competitive workers and more in Bi unions which can cause lower productivity and stagnation just like a weaker root system in a plant can stunt its growth. The subject is enormously complex, to begin this economic series I will go through the various principles of economics such as comparative advantage or elasticity for example and show how they work in Aperiomics.

Aperiomics is a different kind of economic theory because it is built from interactions of animals and plants, the idea is these same interactions occur

between people and our societies evolve just as animals and plants have evolved over time. To understand how economics works in Aperiomics then it is necessary to build a primitive economy that grows and develops the problems larger economies face.

Most economic models leave out many details to make them simple enough to describe, in Aperiomics nothing is intended to be left out. This makes it much more complex to describe but it often gives predictions more in line with actually happens in an economy. It also cannot be separated from other scientific fields such as criminology, sociology, biology, etc but to make this book focused on economics many of these associations are not explored here. For example there is much crime involved in this economic theory which would usually lead to an explanation of the justice system and problems with habitual criminals, etc. Many of these issues have been covered in other Aperiomics books and will not be repeated here

To illustrate various economic theories in this model I will build up a model economy with simple farming and mining, then they will evolve to more complex technologies. It will at first show how Bi-B and Ro-R interact in a primitive economy much like the third world, how these interact and how such economic problems as inflation and unemployment occur. Then I-O policing and markets will be added to this like they evolve naturally as described earlier, like a Bi-B economy evolving a dedicated market with civil laws and an Ro-R economy evolving a police and criminal court. After this V-Iv refining of farming and mining goods and Y-Oy criminal mafias and dictatorships will be added for a complete economy. Eventually all current economic theories and issues will be analyzed in reference to the Aperiomics model.

Initially there can be five different kinds of minerals and five different kinds of farms, these would initially be R-B people working as loners competing with each other. The minerals mined would be iron ore, coal, gold, salt, and copper. The produce farmed is wheat, timber for building and burned as fuel, milk with cattle also eaten as beef,

eggs with chickens also eaten, and fruit. In this early stage there is no actual money, as the societies evolve they can begin to use the gold mined as a currency but any of the five minerals and produce can be used as a currency. For example salt might be used to exchange a kilo of iron ore for a kilo of wheat, prices then can be calculated in salt as a medium of exchange but a farmer or miner might just work out what he can get of the other nine minerals and produce for his own goods.

This can change over time, for example iron might be worth more initially and then fall in price as people accumulate enough pots and pans. Timber and coal might be worth more in winter as they are burned for fuel, when one gets too expensive people might switch to the other so competition would tend to keep these prices down. By starting with a barter economy many of the issues about a money supply are shown to arise from this underlying bartering, as this primitive economy evolves into a gold based monetary system then it can suffer the same problems as with barter. For example the price of gold might fluctuate as more discoveries are made, suddenly people might find

their gold money is inflating with a glut of new gold on the market. However this can also happen with barter goods, someone might be using kilo bags of iron or wheat as a currency and find its value is also inflated by new discoveries. In the same way money might experience inflation as more is printed.

To illustrate this primitive economy there might be ten of each kind of mine and ten of each kind of farm, generally each has ten workers associated with it including owners though some might move to different jobs over time. They are located in a fictional economy called Onia, eventually they will start trading with a neighboring economy called Twoia which has the same kinds of farms and mines. Both Onia and Twoia have a fertile area called Abundia which is Gb in Aperiomics, people who mine and farm there form a Bi-B society initially. They also have an area called Scarcia which has few resources, people living there form a Ro-R society.

Originally people might have come from elsewhere and moved into Onia, some found

Abundia and created a Gb based private property settlement while others found Scarcia and developed their society based on G public property.

Scarcia evolves like a Roy animal based economy, people evolve a criminal law system over time because with so much poverty it is often more profitable to steal someone else's goods unless there are criminal penalties for this. In Abundia they evolve a Biv civil law system because people are wealthy enough to pay fines to stop them breaking the law, there is little need for actual criminal penalties such as jail when people are afraid of losing their property with fines.

One mining business is called First Iron Mining, these are just the simplest names to be easiest to remember, they have ten B miners who work competitively on commissions and contracts according to the amounts of iron they find and extract. They may later form a union and work cooperatively as a Bi team, the mine might also have some B workers and some as Bi. This Gb iron ore deposit is abundant but its distribution in the

ground is unknown. It might be distributed randomly in which case a Bi team working randomly might find the most iron. It might be distributed chaotically in veins which are shaped like the roots of a plant, in this case B workers might individually follow veins and find more iron than the Bi team randomly digging.

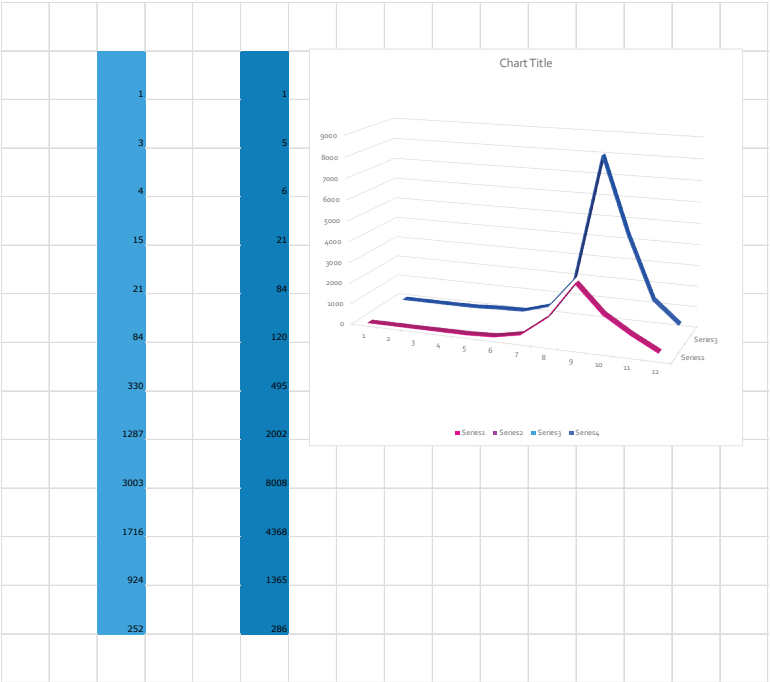
The next diagram shows three B miners as they forage competitively for iron, at times they find a vein and their production rises exponentially only to crash as they lose the vein or it runs out.

	1	1	1	1	1	1	1	1	1	1	1	1	1
	1	2	3	4	5	6	7	8	9	10	11	12	13
	1	3	6	10	15	21	28	36	45	55	66	78	91
	1	4	10	20	35	56	84	120	165	220	286	364	455
	1	5	15	35	70	126	210	330	495	715	1001	1365	1820
	1	6	21	56	126	252	462	792	1287	2002	3003	4368	6188
	1	7	28	84	210	462	924	1716	3003	5005	8008	12376	18564
	1	8	36	120	330	792	1716	3432	6435	11440	19448	31824	50388
	1	9	45	165	495	1287	3003	6435	12870	24310	43758	75582	125970
	1	10	55	220	715	2002	5005	11440	24310	48620	92378	167960	293930
	1	11	66	286	1001	3003	8008	19448	43758	92378	184756	352716	646646

Each cell has an associated value in Pascal's Triangle, the graph then forms a shape by connecting these values. It also allows a selection of values according to whether the growth is becoming more chaotic or random, for example it might turn more horizontal or towards the edge of the quadrant if the B workers are working more as a team. It can also turn more towards the center to connect to the same value if the workers are becoming more chaotic and competitive, this is because Pascal's Triangle is symmetrical around

its axis so there are always two values in different position a line can go towards.

As mentioned earlier there is no need to put prices on the minerals and produce in this primitive economy, the cells can then refer to production or quantities of these and prices are in effect determined by bartering. When gold is also bartered it might become a de facto currency if it is made into coins.



The values of the cells show that one workers does better than another in the boom but both have a bust when overproduction causes a glut.

A division of First Mining works in Scarcia, here there is no Gb private property because the ore is too poor a grade to be worth taking out mining leases. Instead another ten workers forage there for iron, some work as R loners competing against each other and others work as a Ro gang. They face the same problems as in Abundia, a random approach works best with random ore concentrations and a chaotic approach with veins of ore. In Abundia the workers have a positive sum game, they try to maximize their profits. In Scarcia however they have a negative sum game where the idea is to minimize their losses, they are in effect scrounging for iron to stave off starvation or financial disaster.

In Gb then there are plenty of resources so losses are rare, the usual strategy is how to maximize profits. In G however the scarcity of resources makes disaster much more of a problem than in

Abundia, people there like Roy animals have to plan to stay alive as a first priority. In both cases the workers can steal from each other, for example the Ro gang might beat up individual R workers to avoid starvation while R workers might sneak into the Ro camp. In Scarcia the O police dispense criminal justice rather than trying to get restitution for those robbed which is I civil justice, R thieves might be jailed or in extreme cases executed or exiled. In Abundia B workers can also steal from other B or a Bi team, however if caught this is usually dealt with in an I civil court. For example a B worker might defraud another one with false advertising about the quality of his wheat, the aggrieved party would then sue him for damages in the I civil court. If this happened in G Scarcia the O police might imprison the R fraudster.

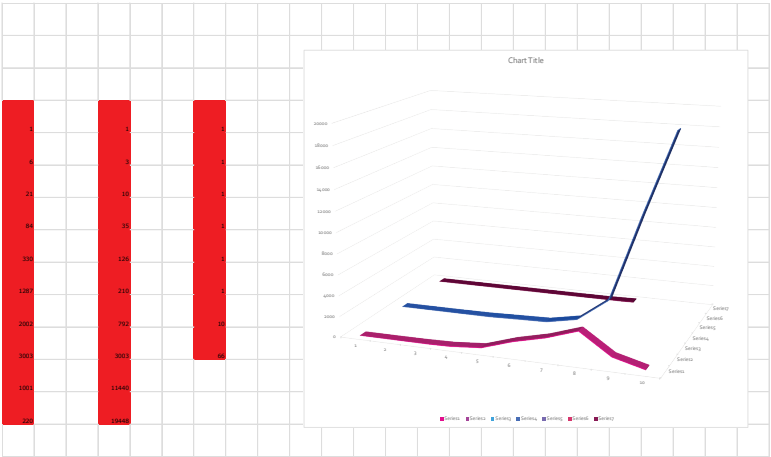
Ro-R prey in Africa have to survive predators in a negative sum game, this is their main goal but at the same time Ro-R predators have to kill enough prey to survive so they also need to have this as their main goal. Any animal that tries to profit from a Roy situation risks disaster, for example when Ro-R male prey fight for mates which is a

positive sum game they risk being attacked by Y-Oy predators when distracted. The Y-Oy predators might try to raise their young as a positive sum game but this might distract them so they end up becoming weak and starving when they can no longer catch Ro-R prey.

Graphing how the R miners survive then looks similar to Figure 2 with the B miners, they find patches of iron which often run out leaving them on the edge of disaster over and over.

1	1	1	1	1	1	1	1	1	1	1	1	1	1
14	13	12	11	10	9	8	7	6	5	4	3	2	1
105	91	78	66	55	45	36	28	21	15	10	6	3	1
560	455	364	286	220	165	120	84	56	35	20	10	4	1
2380	1820	1365	1001	715	495	330	210	126	70	35	15	5	1
8568	6188	4368	3003	2002	1287	792	462	252	126	56	21	6	1
27132	18564	12376	8008	5005	3003	1716	924	462	210	84	28	7	1
77520	50388	31824	19448	11440	6435	3432	1716	792	330	120	36	8	1
203490	125970	75582	43758	24310	12870	6435	3003	1287	495	165	45	9	1
497420	293930	167960	92378	48620	24310	11440	5005	2002	715	220	55	10	1
1144066	646646	352716	184756	92378	43758	19448	8008	3003	1001	286	66	11	1
2496144	1352078	705432	352716	167960	75582	31824	12376	4368	1365	364	78	12	1
	2704156	1352078	646646	293930	125970	50388	18564	6188	1820	455	91	13	1

Here again the numbers can represent finding more iron in kilos, the price is set by what they can barter the iron for. If other workers find gold then this can become a Roy de facto currency as well. These R lines could also be like R prey in the animal kingdom where the numbers in the cells represent the numbers of R in an area, for example R gazelles might be breeding with higher numbers as the lines grow down the quadrant, they can also turn and lessen as some die from starvation or are eaten by Ro-R predators. Because there is no Gb private property here the R miners might try and defend their territory from others trying to rob them, they might also be nomadic like R prey and look for iron much like gazelles might look for patches of grass.



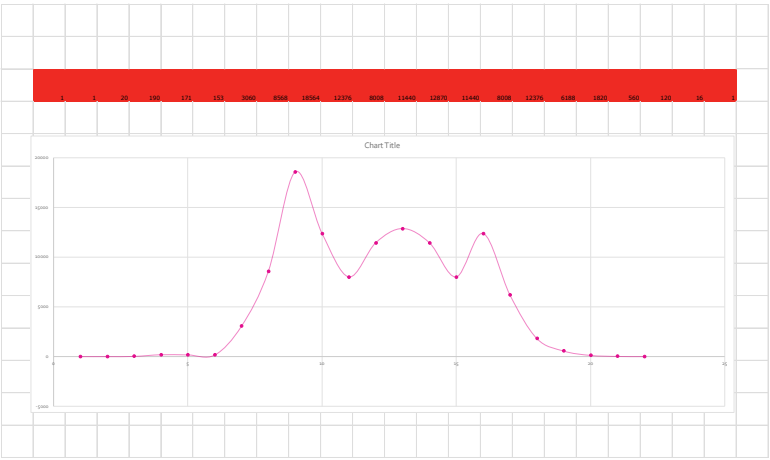
Here are the mining results for the three R miners competing with each other, the closest one finds some iron so his production booms then busts, the middle line finds more iron and keeps growing chaotically, the farthest line hardly grows except at the end. In G the farthest line might represent an R miner that fails to stave off financial disaster in his negative sum game and might starve. These results can also include deception, for example the middle line might be an R miner who stole most of the iron from the farthest line and became successful this way. There can also be bluffing and lying involved, the successful miner might have persuaded the others that he is stronger and so they left him with the best ore vein.

Some of these R miners form Ro gangs and tribes, they then act as teams to look for iron more methodically such as with a random walk. They can also use their numbers to rob single R miners and in turn the R miners might secretly rob the Ro team by being very quiet and fast like prey stealing each other's food, in effect the Ro team can openly attack R while R uses secrecy and deception to attack Ro. Because both are playing a negative sum game they are trying to survive and must weigh up committing crimes and having the O police chase them or starve. Because both alternatives are bad their negative sum game involves finding the lesser of two evils rather than finding a greater good as Bi-B people do in Gb Abundia.

1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
253	231	210	190	171	153	136	120	105	91	78	66	55	45	36	28	21	15	10	6	3	1
2024	1771	1540	1330	1140	969	816	680	560	455	364	286	220	165	120	84	56	35	20	10	4	1
	10626	8855	7315	5985	4845	3876	3060	2380	1820	1365	1001	715	495	330	210	126	70	35	15	5	1
		42504	33649	26334	20349	15504	11628	8568	6188	4368	3003	2002	1287	792	462	252	126	56	21	6	1
			134596	100947	74613	54264	38760	27132	18564	12376	8008	5005	3003	1716	924	462	210	84	28	7	1
				346104	245157	170544	116280	77520	50388	31824	19448	11440	6435	3432	1716	792	330	120	36	8	1
					735471	490314	319770	203490	125970	75582	43758	24310	12870	6435	3003	1287	495	165	45	9	1
						1307504	817190	497420	293930	167960	92378	48620	24310	11440	5005	2002	715	220	55	10	1
							1961256	1144066	646646	352716	184756	92378	43758	19448	8008	3003	1001	286	66	11	1
								2496144	1352078	705432	352716	167960	75582	31824	12376	4368	1365	364	78	12	1
									2704156	1352078	646646	293930	125970	50388	18564	6188	1820	455	91	13	1
										2496144	1144066	497420	203490	77520	27132	8568	2380	560	105	14	1
											1961256	817190	319770	116280	38760	11628	3060	680	120	15	1
												1307504	490314	170544	54264	15504	3876	816	136	16	1
													735471	245157	74613	20349	4845	969	153	17	1

The diagram above represents the Ro team finding different amounts of iron per day, some workers might do better randomly on a given day and some worse but the normal production in the center will be more consistent. Because they use a random walk when searching for iron to cover the ground more carefully this gives close to a normal curve distribution because any iron found by a random pattern must be random in values. However in the real world the curve has some distortions because their search is not completely random, for example they might find a patch of iron and follow a vein rather than randomly move

away from it. At any given point some Ro team members might decide to leave and become R because they believe they can see some pattern better than random searches. At other times R workers might want to join the team because their searching for patterns to give quick gains leads to dangerous booms and busts in their incomes.



In the diagram above the distribution is similar to a normal curve but with some R chaotic variations of booms and busts. This could also be color coded to represent these differences, for example when the line moved away from a normal or SON curve shape it might become R as light red and

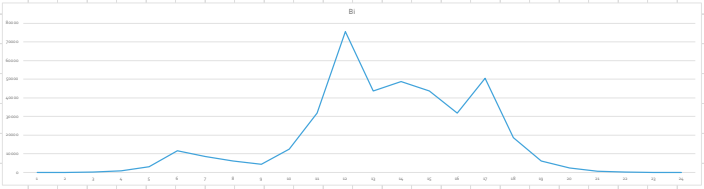
lower as dark red, when it is closer to the normal curve it would be red-orange or Ro. The color coding then allows variations to be visualized in colors as well as with numbers.

By comparing the results of the R and Ro miners it might be determined which strategy was best. If the Ro miners followed a completely random walk then they might fail to follow a vein of ore and so they would have found far less iron. If the R miners had followed only a chaotic strategy they might not have struck out occasionally in random directions trying to pick up the ore vein again and followed a line of ore until it faded away and left them destitute. The results of the Ro team might also have included occasionally robbing R miners, for example in their random walks they might sometimes find R miners hidden and take their iron, because this comes from a random walk it fits on a normal curve like finding random concentrations of iron.

If the R miners are robbing each other then they might try to follow each other's trails, they might then rob another miner over and over and so the

robber’s iron profits will rise exponentially and then drop chaotically if they lose the victim’s trail. If they are robbing the Ro team then this will randomize their iron profits because the Ro team is finding or stealing ore randomly themselves. So far this assumes there is no O criminal police force to report thefts to, or they are too isolated to find police there.

In Abundia some of the B miners also form Bi teams to look for iron with random search patterns, also to cooperatively adjust their sales of iron to reduce booms and busts in what they can barter it for. This gives a pattern similar to the Ro line in Scarcia, here though the Bi team is looking to maximize profits as there is enough iron to make the chances of starvation remote.



1	17	153	816	3060	11628	8568	6188	4368	12376	31824	75582	43758	48620	43758	31824	50388	18564	6188	2380	680	136	16	1

Here the Bi normal curve also has some chaotic deviations from its ideal shape, this indicates booms and busts in the amount of iron found or the price it is bartered for. The miners are less likely to rob each other in a criminal way, the prospect of jail is a sufficient deterrent here because they are not trying to minimize losses in a negative sum game. Instead they might try to trick each other in ways that might incur an I civil liability. Bi teams might also manipulate the market that could lead to charges of price fixing and being sued, this is an overtone of the O police charging a Ro gang with strong arming clients or charging protection money.

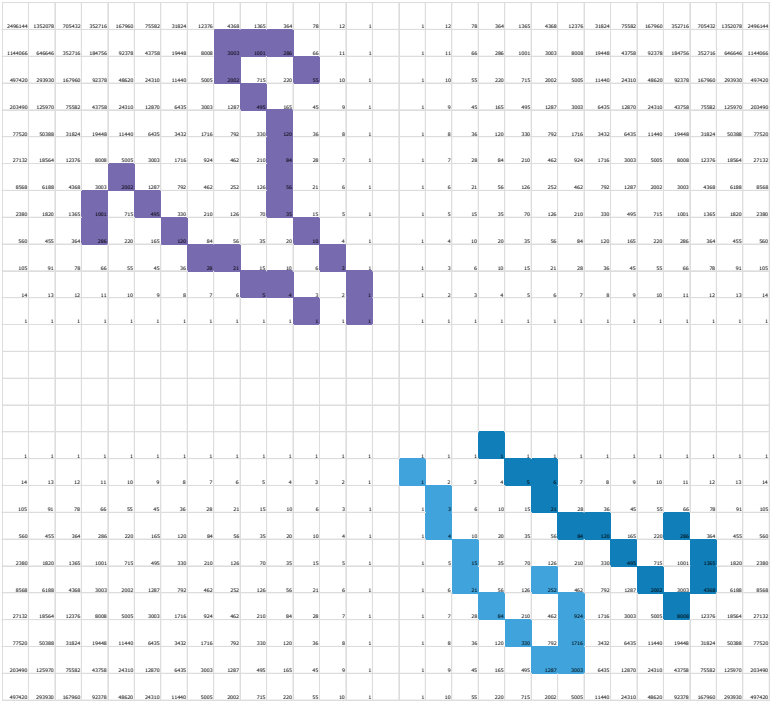
For example a Bi team might form a union and charge higher wages or force companies into bankruptcy causing the union them to be sued for damages. A V team of management might fix prices in a similar way to a union, this might caused them to be sued civilly or fined by the I police. In Roy the same actions might incur criminal penalties because resources are so rare that it might cause someone to starve. Since the GFC for example few V people in management have incurred O criminal penalties because the

advanced economies have gotten used to I civil penalties being a sufficient deterrent.

The Iv lines on the Aperiomics graph also grow chaotically, a similar shape to R and B. As the B farmers and miners develop their Gb private property a need builds for other people to improve and refine these goods, for example to make steel from iron ore and coal, bread from wheat and eggs, and so on. The knowledge of how to improve Gb raw materials increases by counter innovations or counter revolutions from the new ideas R-B farmers and miners create.

For example the R-B egg and milk farmers might work out ways to increase production and threaten a glut, Iv and Oy innovators then see there is a profit to be made by preserving these goods longer. They might then work out that drying out eggs and milk into a powder can last longer, they might also respond to a glut in meat by working out that salting it can preserve it. Generally a counter innovation comes in response to an R-B innovation, this is because they don’t

have anything to innovate off until something is developed as a raw material.



In the diagram there can be a two B farmers competing to sell more eggs than each other creating a glut, the two Iv agents in the upper left quadrant make different profits in this boom and bust. When one develops a way to make powdered eggs the other might get a sample of the powdered eggs and copy it, there might then be some issues with this in the I civil court

between the two quadrants if the invention is considered to be Gb private property. If this happened in Roy Scarcia it might be considered an O criminal case rather than an I civil action in Abundia. Assuming no patent laws there then develops a competition between the two Iv agents to powder the eggs more efficiently, they then extend this counter innovation to powdering milk and over time salting beef, making butter, keeping stored wheat dry and free from R rodents, etc.

The R-B miners also innovate by finding more minerals, the Iv agents respond to this by branching out more and forming a thicker and more varied tree shape in Biv. The R farmers and miners of Scarcia, if they get enough G produce and minerals to be worth owning as Gb, can sell these in Abundia as well. The Biv economy is then growing chaotically because each of Iv and B is still secretive and deceptive with each other, they need to do this because whoever is fastest to market or protects their innovations more makes more profit and can buy out the others or drop their prices forcing competitors into bankruptcy.

Also they must be deceptive to the point where it is more profitable to do so than the penalties in the I civil court, for example they might steal each other's counter innovations as long as they can deny this plausibly or the fines are less than the profits. If they don't then like with Gresham's law the bad Iv people will drive out the good by making more profits and buying them out or bankrupting them. In modern economies this can be prevented to some degree by a plaintiff claiming triple damages or all the profits from using their intellectual property.

So initially the Iv counter innovations might stave off a glut of eggs and milk but this allows more to be stored and does not stop the R-B farmers continuing to overproduce when they can make profits. This can be a marginal profit, they need to make any profit they can because if they don't someone else will and they risk their competitors getting stronger. This interaction is called Iv-B because Iv agents interact with B workers, it also suffers from a boom and bust effect because those with the highest speed and momentum make the most profit.

For example if the R-B farmers and miners need to innovate and produce faster to beat their competitors then speeding up will improve their chances. If the Iv counter innovators also need to produce faster then speeding up also increases their marginal profits. However because this momentum must eventually be unsustainable it is like a car speeding up and heading towards a brick wall. Even as disaster looms it becomes a bluffing game of chicken where Iv-B people try to grab the maximum profits before trying to save themselves, it is also like a game of poker where the pot might grow bigger with bluffs as people try to get the most profit from the impending disaster of having to show their hands.

In Aperiomics this is called the floor and ceiling effect, when the Iv-B chaos is growing at both ends then it must reach a ceiling where either supply or demand cannot keep up. For example an Iv agent might have to build a factory to make powdered eggs and milk and expand his production, eventually the R-B farmers might not be able to supply enough eggs and milk and so the expenses of the factory send him broke. However because the farmers are deceptive he cannot

know when this will happen except perhaps trying to spy on them, they might even have an arrangement with another Iv agent to send him broke with misinformation so the other buys up the factory cheap giving B a share of the profits.

In the same way the R-B farmers don't know if the market for eggs and milk will suddenly reach a glut, people might not want any more or get sick of eating egg and milk products and change to something else for a while. The Iv agents complicate this because they buy eggs and milk and might be storing unknown quantities to flood the market with and create a glut themselves. They might even use these stores to bankrupt an R-B farmer so his farm is taken over by a competitor paying off the Iv agents. So they too have little choice but to accelerate production and hope they maximize profits to survive the sudden glut and hard times.

In Scarcia a similar process happens but it is more prone to disaster because of the negative sum game and looming starvation. The Oy predatory businessmen might also rob the R farmers of their

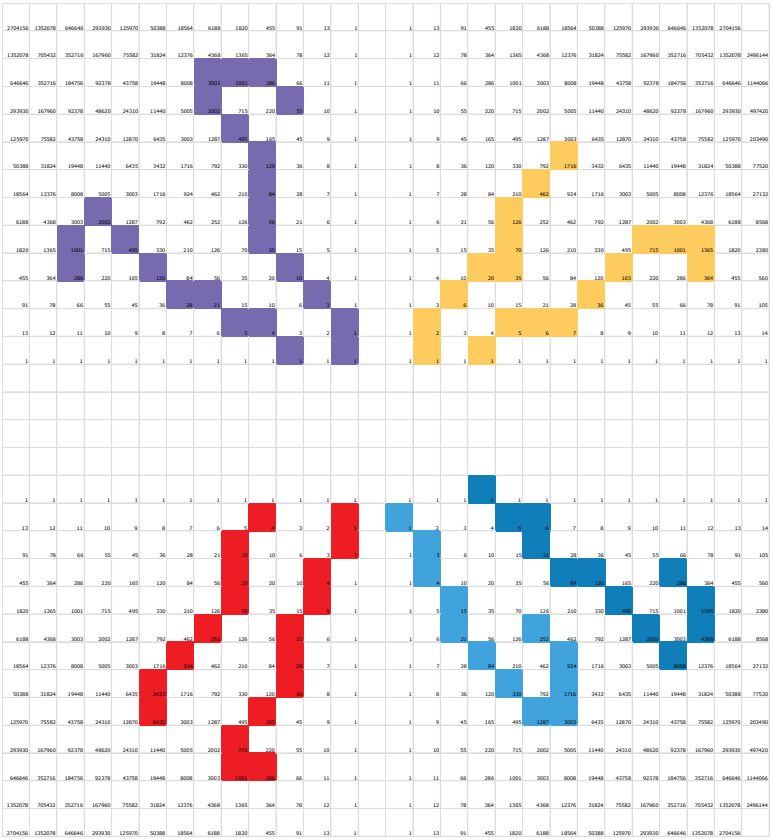
egg and milk if not well hidden enough without strong O police, R then must be secretive and deceptive enough so Oy people don't know for sure what they have. The Iv-B interaction then is an overtone of Oy-R, just as R farmers need to be secretive and deceptive like R gazelles to survive from Oy predators the B farmers need to be secretive and deceptive to maximize profits from the Iv agents.

The Iv agents then are also overtones of the Oy predators, Oy businessmen need to be secretive and deceptive or they might be robbed by other Oy predators just as an Oy predator like a hyena might be attacked and its food stolen if found by a rival hyena. They also need to hide the profits they are making because R might ask for too much if they know how much he is making from buying their eggs and milk.

Both Oy-R and Iv-B then are chaotic and accelerate towards ceiling where they crash as supply runs out, this is also like in the animal kingdom where Oy hyena might have to keep eating gazelles even though they will run out of

prey soon. Those that eat the most before the gazelles are nearly wiped out have the best chance of surviving starvation as the gazelles rebound in numbers. Sometimes an R species can disappear in this way if they are preferred eating or easier to catch, however when they are gone the Oy predators might still have other R prey to eat.

This is like in Abundia where some B farmers might be easy targets for Iv agents to get cheap produce, they then grow much slower than the other B farmers and either get bought out or don’t survive a downturn in the market.



In the diagram above Oy and R people do business restrained by the O criminal police in the center between them. The Iv and B people do business restrained by the I civil police between them. I and O then tend to combined to form a justice system where O criminal and I civil justice is dispensed, if this is neutral and midway between the colors then the system prospers because both sides know they will not be discriminated against.

However these police have a difficult job because all the other colors are being secretive and deceptive, often then they miss something and an O criminal or I civil crime wave occurs. This then tends to boom and bust as the I-O police work out these new innovations and counter innovations in deception, often though they are not told accurate information by either side. For example Oy predatory businessmen are not going to tell the police how they run their scams and the R victims don't give accurate information because it might help their R competitors to avoid getting hurt too. For example an R egg farmer gets robbed by being lured away from his farm by a fake distress call, if he tells the O police about this then he is broke but his competitors are saved making his chances of recovery lower.

If an Oy predatory businessmen is tricked with eggs that are too old to eat then complaining to the police might save some of his competitors from the same trick, he then is likely to misinform the police and try to rebuild his business as they get caught too. Deception in Oy-R and Iv-B then tends to grow chaotically as well, it would grow in

momentum if the I-O police cannot slow it until it hits a ceiling and causes a general collapse. For example there might be so many old eggs sold that the market for eggs in general suddenly collapses until someone in Oy-R counter innovates a way to tell fresh from stale eggs. Then he has an incentive to hide this innovation and make profits by only buying the fresh eggs, the others then need to find this out by spying.

The Iv-B quadrants, the lower right and upper left, appear like a plant in shape with roots and branches. With a B innovation ,like a plant mutating to have more efficient roots, the B roots grow quickly and then the Iv branches also grow quickly to use all the resources the B roots are providing. With V leaves these Iv branches then send back to the roots the equivalent of refined goods as nutrients creating with the sun's energy.

Like weeds or desert plants many of these Iv-B plants grow quickly grabbing what nutrients they can before a competitor gets them, then they collapse creating seeds to regrow when more nutrients are found such as more rain. In the same

way Iv-B business tends to boom and bust, they grow to hit the ceiling of sing up the available Gb resources and then try to create seeds or nest eggs so they can rebuild their businesses after the collapse when they find more Gb resources.

Plants like this are unstable because like with Gresham's law the bad drives out the good, those that grow more slowly get overshadowed by the faster growing ones. They also miss out on more nutrients so their seeds are fewer and often not formed at all as they die before seeding. In the same way Iv-B business that do not grow to the ceiling with increasing momentum trying to seed while collapsing lose the competition to those that do.

In the Roy animal kingdom the Oy predators and R prey go through the same cycle, the R prey must breed quickly because with so many eaten those that breed slowly get eaten into extinction. With the Oy predators those that cannot breed quickly before the famine starts, just like seeding in Biv, die out compared to those that have enough offspring so some survive. Also those predators

that don’t eat as quickly as possible to produce those offspring miss out on food the others get to eat, they then die out and the faster eating ones prosper. So this is like Biv businesses that when they sense the ceiling is approaching grab all the profits they can get away with and then seed, the businesses from this seed capital then have the best chance like the Oy predators of some surviving and prospering.

The R prey that don’t eat everything available, even if risking overgrazing, lose to those that eat more. This is because they are stronger to run from Oy predators and to have more offspring as well as survive where food is more scarce. This is like the B roots that need to grab all the nutrients they can before the other plants do, this sustains them in dry times and allows them to survive more uprooting by R prey foraging as the collapse from the famine intensifies. In nature with Iv-B and Oy-R there are no I-O police to prevent criminal and civil injustice, these plants and animals then need to get anything available before another gets it first. Because of nothing moderating this acceleration to the ceiling then booms and busts will happen over and over.

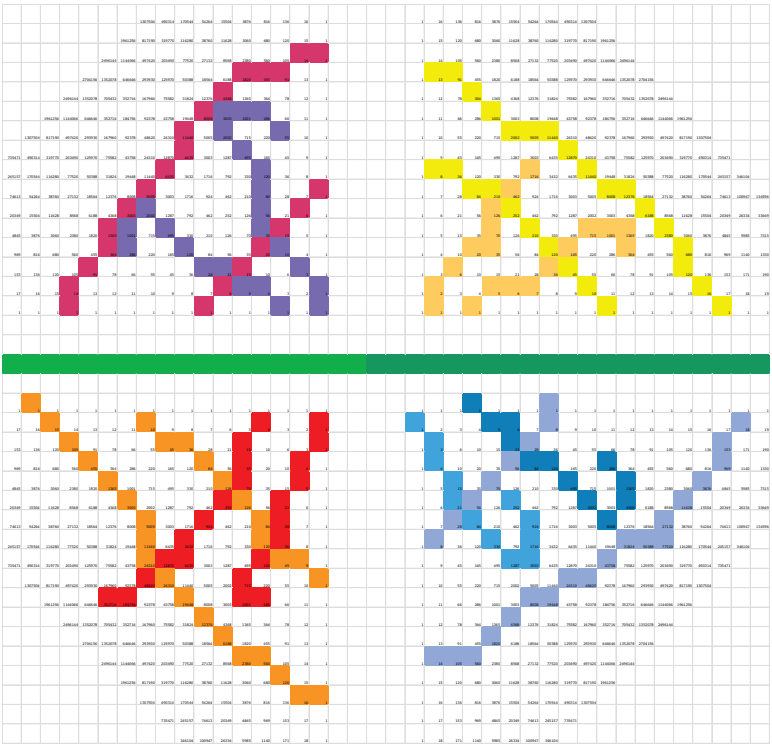
Just as there is a ceiling there is also a floor, Iv-B plants and Oy-R animals suffer through the collapse which reaches its nadir from where they can then regrow to accelerate to the next ceiling. For example as weeds use up their Gb nutrients they seed and collapse so they create humus for their seeds. Eventually then the race to collapse faster to make a better space for their seeds reaches a floor, some plants might even revive as more nutrients arrive with rain. This is like Iv-B businesses staving off bankruptcy long enough that they regrow when the economy regrows after hitting the floor. With the Oy-R animal kingdom the R prey are overeaten when their numbers hit the floor causing mass starvation among the Oy predators, however this lightens the burden on the R prey so they rebound in numbers more quickly allowing the predators to also rebound.

In Biv business then the glut of egg and milk eventually sends some B farmers broke, they try to preserve a nest egg of savings to rebuild their farms when the market recovers. This is like the B roots of plants surviving in the ground to sprout

again as the Bi-B equivalent of seeds. For example some plants can grow just from a cutting from them instead of only from their seeds.

The Iv agents also have a nest egg to survive the collapse and perhaps buy out those who cannot recover, it is then better to let the collapse happen quickly so their savings last and the more it hurts others the more opportunities later. When it becomes obvious the collapse has reached a floor then there is a competitive disadvantage in waiting so the Iv-B businesses start up again to accelerate towards the next ceiling. In Oy-R the same process occurs except in a negative sum game there will be a wave of crime as people rob and kill to avoid starvation and build a nest egg for when the G economy rebounds. For example more rain might save some cows and chicken and so those that can hide their remaining assets or steal enough of other people's food will survive. Like Gresham's Law the bad people drive out the good by robbing or killing them, this happens for example with Oy warlords in famines in some third world economies.

This chaotic tendency to boom and bust is usually counterbalanced by Y-Ro in G and V-Bi in Gb teams. When the Iv-B and Oy-R loners are competitively deceiving each other some people then form teams that are open and transparent and use this as a survival strategy. The Ro and Bi lines were shown earlier, in the diagram below the Y and V team lines are added as well.



Sometimes instead of competing against each other people tend to form teams, this has some advantages and disadvantages. For example the two Ro lines are approximately at right angles to the two R lines in the lower left quadrant, they point approximately to the North West. Ro gangs here then might be able to rob R farmers and miners more easily to fend off starvation in a drought, they survive hitting the floor in the worst of the drought by causing a greater chaotic crash with R workers. This is like Ro herds such as buffalo pushing away R prey from the remaining grass or water so R numbers crash faster.

The Ro gangs can also cooperate better to defend their farms and mines so they don't have to hide them, they can be like Ro buffalo that team up to ward off Oy and Y predators. The two Bi lines approximately at right angles to the two B lines in the lower right quadrant pointing North East represent unions, cooperatives, etc where some find it is more efficient to work their farms and mines as cooperative teams than as B competitive loners.

The two V lines in the upper right quadrant can be where some Iv agents decide they can make more money forming a monopoly or cartel by working as a V team, for example instead of the egg and milk drying factories competing and going broke in a glut they might work together as a V team and restrict supply so they make an averaged out profit all the time. The two Y lines can be where some of the Oy predatory businessmen decide to form a mafia like team where they can intimidate the other Oy people and make them work as their agents. This often happens with a Y mafia where they use their numbers to control smaller Oy petty criminals.

In the animal kingdom the Y predators such as lions and Ro prey such as buffalo stabilize the chaos of the Oy-R animals. Instead they wage a Y-Ro war of attrition against each other, the Y lions work as a team to try to break up the Ro team of buffalo into chaotic R that can be picked off one by one. In the same way the Ro herd tries to isolate a Y lion by ganging up on it and perhaps goring it.

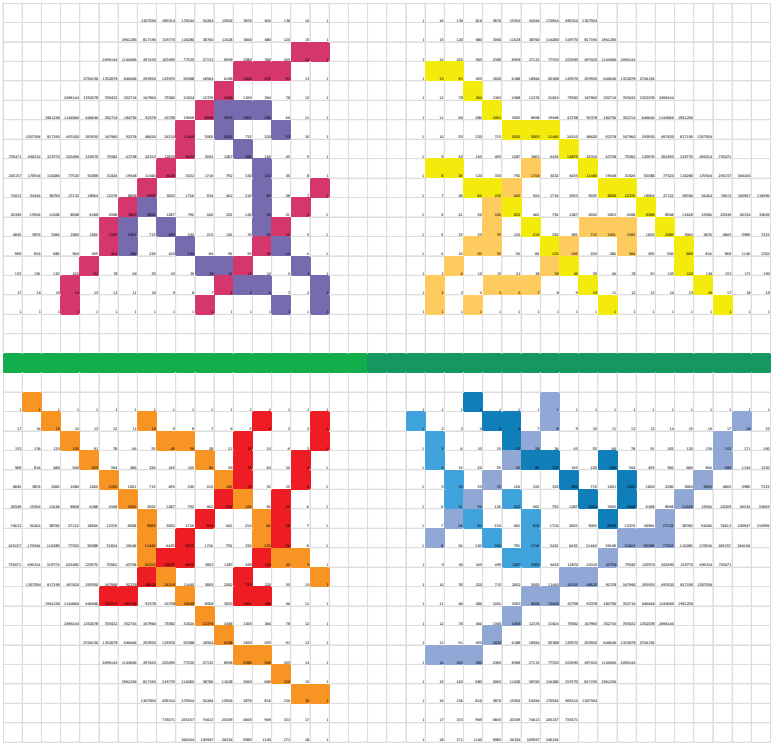
In the plant kingdom the V team is represented by the leaves as they work cooperatively to catch all the sun falling on a tree, this forms as separate Iv branches with some leaves combine to form a V canopy that cooperates to catch all the light available. The Bi lines can be where the roots join together onto the I trunk to share nutrients from one root to another, for example one root might find water and another minerals and each might die without sharing. So unless this B competition is moderated by Bi then roots might be dying too often making the plant inefficient, this is like a Biv economy where if B farmers are going broke from booms and busts then less food is produced. Most modern economies then stabilize these B farms with subsidies, Bi cooperatives to buy their produce, and Bi loans paid out in droughts.

Seven principles in economics

1 (a)The Scarcity principle

This is where goods and services are presumed to more scarce than people's needs and desires, they are then forced to

choose between many of them. In Aperiomics however this is often only true when people are insatiable or greedy, there are three kinds of economy with Roy, G-Gb, and Biv. In Roy resources are chronically scarce, people then respond to this scarcity by having to choose what goods and services they can afford like in the scarcity principle. For example in a third world economy villagers might have to choose between medicine for a sick child and some food for the family. In Roy this leads to a loss minimization strategy or negative sum game. They then respond to this scarcity by working out which loses or costs the least, not getting the medicine or not getting the extra food.



In the diagram Roy is the bottom left and upper right quadrants, in the previous example poor R people might have to compete to minimize losses in third world economies. This is shown by the R or red lines pointing north east that can grow chaotically to larger values on the spreadsheet but also collapse back to the center if they fail to find food.

R people compete against each other, this causes chaotic booms and busts in how well

they play the negative sum game of minimizing losses. For example they might find some food or manage to grow some crops to stave off disaster for a time, for man however a drought may mean a chaotic collapse. Ro people are represented by the red orange lines in the lower left quadrant, they work as a team or gang and share food as a loss minimization strategy. Because of this they have fewer booms and busts, when one Ro person finds extra food this boom is dissipated on sharing it, when he cannot find food he receives some from his team members.

In a Roy society then abundance is rare and often controlled by the more powerful and predatory Y-Oy elite, for example in an Authoritarian dictatorship. These are shown in the above diagram as the upper right quadrant with Y yellow and Oy orange-yellow colors. Oy people are competitive loners like R and are represented by lines coming out of the center, they can also experience booms and busts as they act as predators on Ro-R people. Examples might be militias and warlords in a third world

economy like Somalia. The Y lines represents gangs where instead of competing for pillage they act like Ro and cooperate sharing what they get. They are then like teams of predators such as wolves and lions working together and sharing the kill.

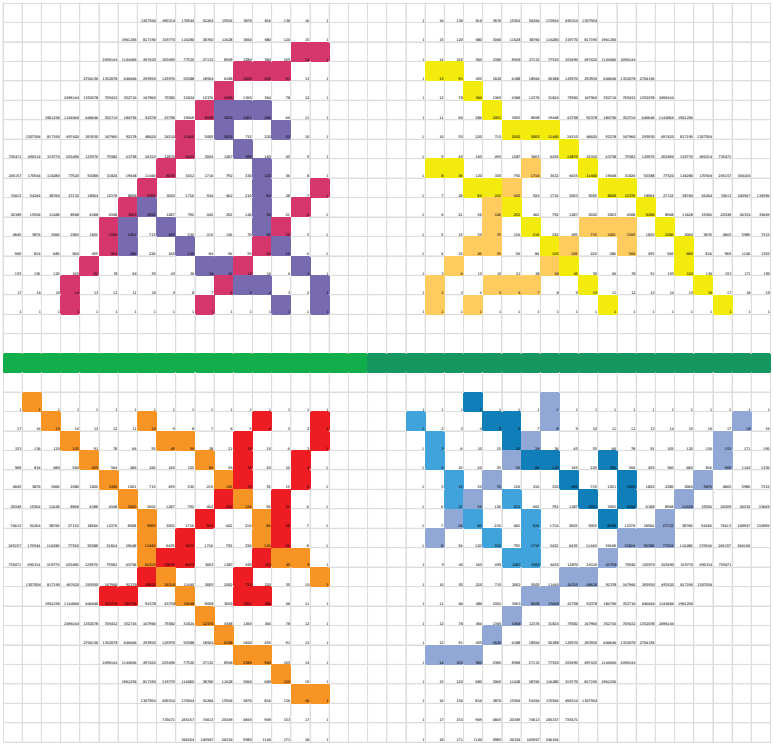
1 (b) The Abundance principle

In a Biv society resources are relatively abundant but people often still experience a relative scarcity by not being able to gratify all their desires. A Roy society satisfies few desires, they are instead usually designed to reduce many of their fears of loss such as starvation, disease, war, predatory crime, colonialism, and so on. In Biv then the Abundance principle is similar to the concept of utility, that in Biv people try to maximize their utility or profits because they need to choose between things they want.

This limitation of their desires need not mean resources are scarce, for example people might choose between different

dishes at an all you can eat buffet. The food is abundant not scarce but they still must choose because their stomach has a limited size. In the same way maximizing utility can be difficult because of limits of V-Bi time and Iv-B energy, for example people might not have enough V-Bi time to eat all the food in the buffet or Iv-B energy to keep going back to the buffet table. The time and energy might be scarce here but need not be either, for example they might not have enough time or energy because there are other good things to do rather than eat all the food at the buffet.

A Ro-R communist society such as the Soviet Union was designed to minimize costs losses according to the scarcity Principle rather than to provide benefits and abundance, people generally had access to cheap education and basic health care rather than having the benefits of Western elite universities and advanced pharmaceuticals, technology such as MRIs, etc. Starvation was reduced rather than satisfying people's desires for delicacies.



Communism was a system based on a single quadrant, the lower left Ro-R. It assumed that these people were the most important and that the upper right quadrant of Ro-R was unnecessary as it contained mainly predatory people such as imperialists, fascists, Nazis, capitalists, etc. It is a similar concept to that of Ro-R prey in the Roy animal kingdom in Africa that would no doubt prefer to rid their environment of Y-Oy predators such as lions, hyena, cheetah, wild dogs, foxes, crocodiles, etc.

The objective of communism was to create a society where resources were abundant and workers united to form unions and cooperatives. In effect this was to convert the lower left quadrant into its overtones in the lower right quadrant of Bi-B. In many Biv left wing democracies this vision was pursued by heavily taxing and regulating the upper left V-Iv quadrant which is the other half of Biv society.

The result can be like a stunted plant in the Biv plant kingdom such as grass, it is highly resilient and provides food for Ro-R animals but cannot grow like a balanced Biv economy need to do to counter innovate. In effect Ro-R animals might consider an environment of Bi-B grass as ideal for them and have little use for the V-Iv higher parts of plants such as trees as well as the Y-Oy predators, however they need Y-Oy predators for them to continue to evolve.

In the same way Ro-R communism could not refine their goods and services without Y-Oy, this caused them to fall behind the

West with its stronger V-Iv counter innovations. For example earlier the Iv agents worked out how to dry eggs and milk to preserve them, without Oy in a communist society no one is trying to counter innovate to match the revolutions and innovations R comes up with. The result them is goods to a level of quality but no refinement after that, cars for example were functional but not reliable and well suited to consumers.

An extreme example of this was the invasion of V-Iv and Y-Oy South Vietnam by the Ro-R North Vietnamese. When they took over territory they would often kill off V-Iv people such as businessmen, teachers, administrators, etc. This also happened in Cambodia with the Killing Fields where the whole refining V-Iv part of society was murdered by the Ro-R communists, the rest of the population became Ro-R instead of Bi-B working on farms that were G public property.

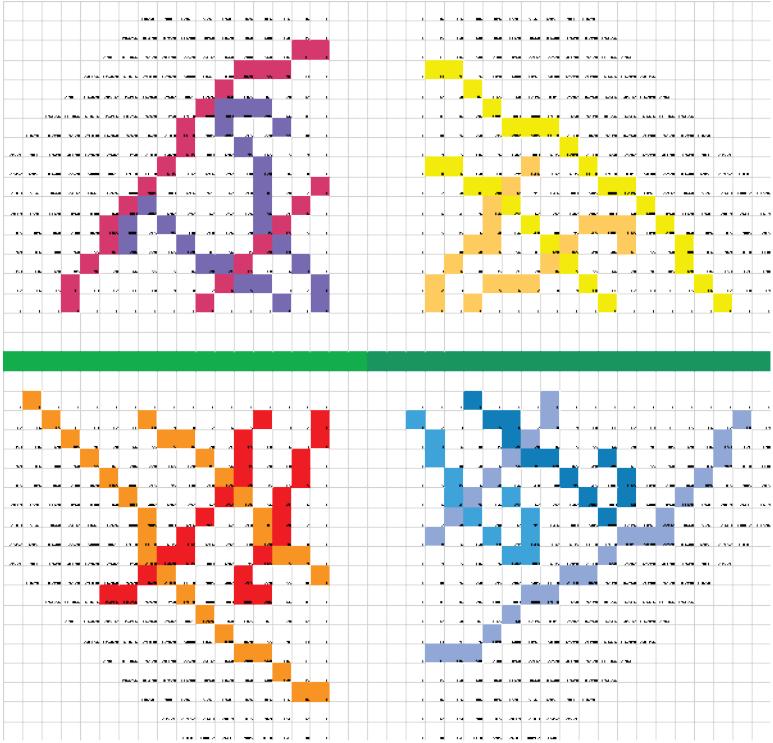
2. The cost-benefit principle

This is where people are assumed to do a cost benefit analysis with each decision, for example if they want to buy something then they might analyze the costs of goods and services compared to the benefits from it. However in Aperiomics costs and benefits are two separate issues, in a Roy society a person might be trying to reduce costs and in a Biv society trying to increase benefits or utility. This is because in Roy, a fictitious economy called Scarcia in this book, it is more important to work out the costs because resources are so rare.

Because of this benefits are usually foregone, for example in a recession a health insurance scheme might have to defund preventive medicine even though it would give benefits and reduce costs later on. A government might have to reduce spending on road works to save money even though they could give many benefits such reducing traffic jams which would make goods and services more efficient.

In the diagram below the economy after the GFC has become more Roy and less Biv,

much of this from the destruction of wealth in the crash. The Roy quadrants of the lower left and upper right then have increased in scope, the central horizontal line illustrates the G-Gb fence. On the left of this fence is G public property and on the right Gb private property, this has shifted to the left in the US and Europe because much of the financial system has been nationalized or the government has taken shares in banks and businesses.



This is then a negative sum game where those that minimize losses tend to do better than those trying to maximize gains. For example a shop might spend more capital to get better stock, this might seem to be a benefit because it would attract more customers. However it might just lead Y-Oy criminals to rob the store, another shop that spent its capital on weapons and iron bars over the windows might then do better overall. In the same way some economies are practicing cost cutting and austerity as a Roy strategy after the GFC, some economist instead believe they should be trying to maximize profits with a Keynesian stimulus and ignore cost cutting.

This cost benefit principle then is similar to the theory of using Austerity versus Keynesian stimulus in a deep recession, a person might decide to either impose austerity on their household budget to cost costs in a negative sum game or spend money to make money in a positive sum game. In the Roy parts of society resources are scarce and so these are usually G public

property, for example busses, trains, government employees, road repairs, and so on. It also includes parts of the economy that have been partially or wholly nationalized, since the GFC the scarcity of Gb private capital and investment has caused the government and Fed to buy up distressed assets and ready them for resale later as with its Maiden Lane investments. Often this cost benefit analysis has been to reduce the chances of further collapses in a negative sum game rather than to make profits in a positive sum game.

As of 2012 the US government provides most of the housing finance with government G agencies using public money, for example Fannie and Freddie, the FHA, etc. When resources are scarce this is the correct policy according to Aperiomics, it is necessary to reduce costs rather than provide benefits because these costs are a negative sum game leading to disaster. People are making do with fewer benefits so as to avoid more costs and losses, they are saving more money to pay down debt, not going out to restaurants and shopping

as much. The cost benefit analysis then is more Roy where costs are more important than benefits, this can lead to many investment opportunities being missed however.

In the G-Gb part of the economy there is a zero sum game where costs and benefits are equally important, for example in trying to work out whether a G iron mine is worth enough to make Gb private property the costs of production must be compared to the benefits from it. If the costs are too high then the mine is worthless in a Biv economy and remains G public property such as an abandoned mining lease. It still might be mined by Scarcia because they need to minimize losses and avoid starvation, there might then be enough iron to do this with basic cookery but not enough to provide benefits such as cars, buildings, etc. For example in a third world economy some mines might be viable with enough workers provided by the G state. For mines like this costs are most important in the cost benefit analysis.

This zero sum game is being played out in the global economy since the GFC, many banks were formerly Gb private property and were either nationalized as G, the governments took part ownership of them which is a G-Gb fence running through them, or some were dissolved completely so their assets became either abandoned as G like some furniture becoming trash or it was sold off in auctions as smaller pieces of Gb property. For example as offices were broken up a lot of property was discarded as G while office desks, computers, buildings, etc were usually sold and used by other Biv businesses. Some buildings might also have been rented or bought by the government, this would make them G public property. Some buildings and infrastructure might even have been torn down as no longer economical, the equivalent of abandoning them as G.

In the Soviet Union after the communist takeover in 1916 there was an Ro-R society where resources were very scarce, steelworks and other industries were publically owned which allowed them to

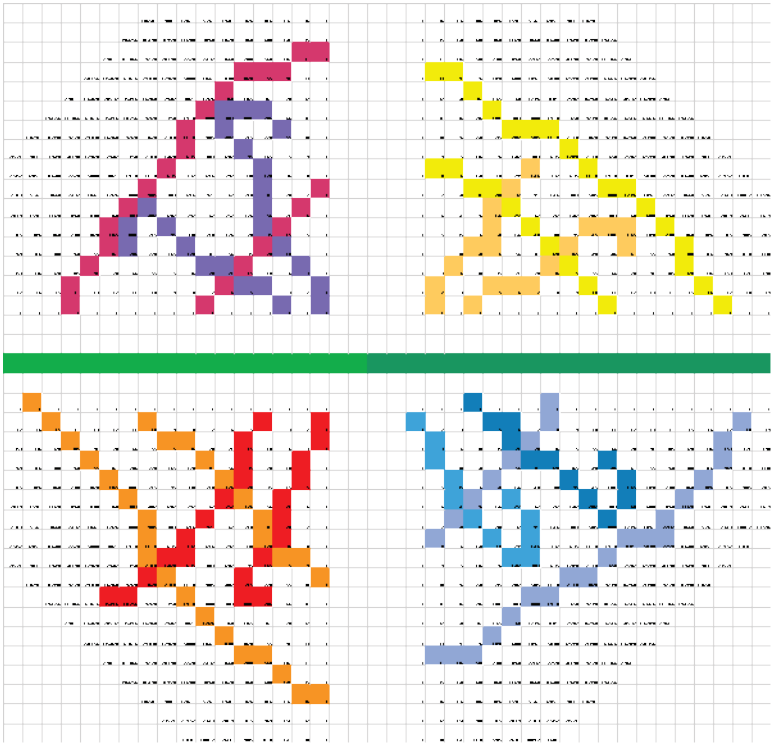
expand their economy rapidly under Stalin. Much of these resources had languished before Ro-R communism because there were not enough resources with the level of technology available to run a Biv free market economy. The cost benefit analysis of Ro-R communism then was that Russia could not afford to leave these G resources idle.

The wealthier areas in Russia associated with the V-Iv aristocracy had used Gb private property and had Biv private businesses, other resources in poor areas were left undeveloped because there was no Roy government to develop them as public G property. For example there were few funds for major G public initiatives to improve the economy such as railroads, roads, electricity, welfare, public schools, etc. When people tried to do this with Biv free enterprise instead they failed as they still do today in many third world economies, investment in a poor area might just lead to people stealing the money and the equipment to avoid starvation at the expense of long term benefits. This V-Iv

aristocracy then would often not expand their businesses unless the benefits were high in their cost benefit analysis.

If V-Iv businesses were set up the Ro-R people still had few resources to buy the goods and services, this was also the problem in the Great Depression in many economies. They could not get the benefits of this Biv economy but they had the costs of inaction to consider such as starvation and remaining technologically behind the rest of Europe. The Ro gangs worked for the state as a team to build more industry and the R people worked competitively to innovate, costs were often reduced as with the Y-Oy Nazis by using slave labor and criminals. Any people suspected of being Y-Oy such as former sympathizers of the Tsar, mafias and criminals imperialist spies, capitalists, etc were often killed or sent to Gulags. This was like the Ro teams of animals fighting back against the animal predators and caging or killing them off. The objective then was to build a society where costs and losses were minimized rather

than a consumer society with the latest fashions.



The strategy of the Y-Oy Nazis and Fascists was similar to that of Ro-R communism, using G public property to minimize losses from the Great Depression and put idle people to work as there was a greater cost with this unemployment. Like with Roosevelt's the New Deal leaving people idle had such a great social cost that even making work for them with few benefits

was preferable, the equivalent of the Keynesian idea of hiring people to dig holes and then fill them back in.

There was little intention to provide benefits to the population with Y-Oy and Ro-R such as desirable consumer goods, instead losses from unemployment, disease, a lack of infrastructure such as roads and rail, etc led to economies that were uninspiring in terms of beneficial consumer goods but both the Ro-R and Y-Oy approaches reduced the losses from the Great Depression by playing this negative sum game. In Aperiomics this is why most poor economies have trouble maintaining a democracy, instead a system of G public ownership is most efficient though vulnerable to dictatorship. It can also give a false view of how efficient a Roy economy can be because it has few benefits of a Biv capitalist economy, instead it works more efficiently in reducing the costs and losses such as with a G public health system.

By contrast with the G based industrialization of the Ro-R communists

and Y-Oy Authoritarian governments the Biv economies of the West such as the US spent less on G public workers but still created infrastructure such as dams and a national highway system like the Germans were doing with their Autobahn, the British Empire maintained free trade between its colonies but this failed to give many benefits and the losses from the Great Depression continued to grow.

Much of the problem stemmed from these economies not realizing that stemming these losses was more important in a Roy situation rather than trying to grow out of the problem. It is like a Biv forest in a drought, the lack of resources causes collapses and so the plants must cut costs by shedding Iv branches and V leaves rather than try to grow their way out of the problem.

These increasing losses led to many Ro communist sympathizers in Bi British labor unions making the Y-Oy and V-Iv parts of the ruling class feel threatened. By contrast the Roy based Y-Oy Nazis and Ro-R

communists seemed to be handing the depression better in the 1930s, this led to many Nazi and communist sympathizers in Britain.

Resources in the Great Depression were too scarce for Gb businesses to recover just as they often are in many third world economies, this made it much harder for the global economy to get out of the Great Depression because it costs so much to even get small benefits with the traditional Biv way of doing business. This is like the forest in a drought wasting large amounts of Gb resources to grow even small amounts, any new V leaves might be quickly eaten by Roy animals breaking new Iv branches.

To a large degree this was resolved by the large G public spending associated with World War Two, it put people to work and industrialization grew rapidly as the combatants played the negative sum game of avoiding losing the war. When the war ended much of this surplus industrialization from the war changed to Gb private

property and led to a resurgent Biv economy. Also the imposed austerity from the war made people more cost conscious rather than trying to maximize utility as in the Roaring 20s, this also stemmed much of the losses of the Great Depression.

Biv governments had built a consumer society in the Roaring 20s where people sought ever more benefits and utility with the latest goods and services, this led to complacency about possible losses as people went into debt. This attitude needed to change to minimize and repair these losses before consumers could look to benefits again, often this can take some time because people often wait for the economy to recover on its own without giving up their addiction to consumer goods.

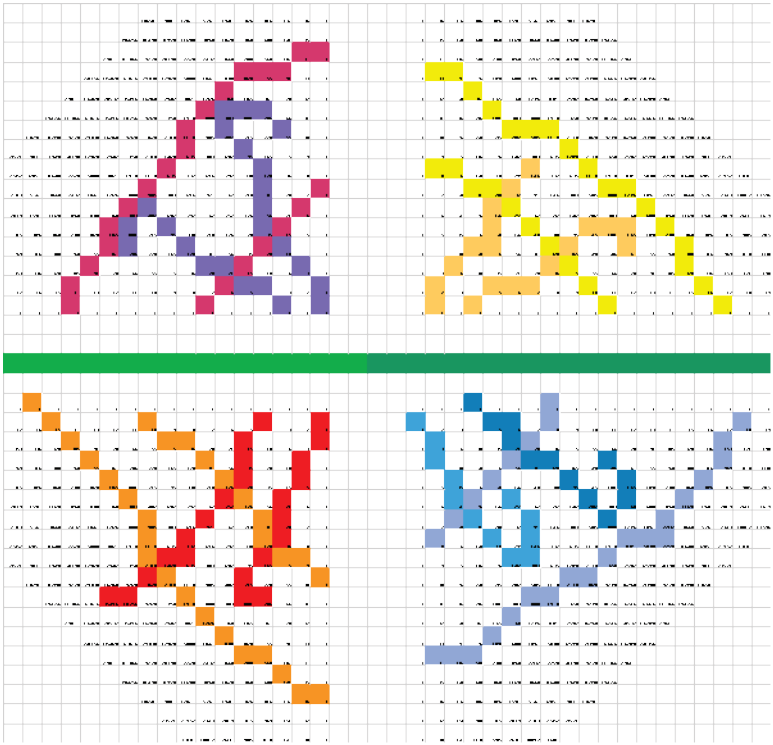
Booms like this are called Iv-B in a Biv economy, they are the lines radiating out from the center in the lower right and upper left quadrants like roots and branches of a tree. It is like a weed growing quickly, it looks to the benefits of flowering

and seeding before its Gb resources run out. It is not conservative by nature, it survives by ignoring losses because its death is certain if it does not seed. In the same way people in an Iv-B boom economy end up on a treadmill where they seek pleasure of many kinds, this is like utility in economics.

As the Biv economy booms this is like a flowering of the weed, if the economy is more balanced it can grow into a stable tree. However modern economic theory emphasizes competition over cooperation, this creates a race to get to market first even when wasteful. When this causes economic devastation as in the Great Depression and GFC this Iv-B economy becomes more Oy-R in a predator and prey relationship, this is seen below as the lines radiating outward from the center in the lower left and upper right quadrants.

At first then people are in a weed like Iv-B economy where they have to work faster and more deceptively to get more benefits in a positive sum game, the saying of who

dies with the most toys wins is similar to this attitude. When resources become scarce people have to change to Oy-R and trying to minimize losses in a negative sum game, people at this stage in business are often trying to rip each other off to stave off bankruptcy. If the O criminal police are weak at this time a lot of corporate crime can occur, this happened in the GFC as more Ponzi schemes and fraudulent subprime securitization was uncovered without people being prosecuted.



Since the GFC the advanced economies have not changed enough to minimize these losses, there is still more spending on perceived Gb benefits with consumer goods and not enough on G avoidance of losses such as people in the US losing jobs, being homeless, having their home foreclosed on, losing their skills through extended unemployment, and so on. For example there is still a strong motivation to get the benefits from the latest technological gadgets even when people are living in their cars and foreclosed homes. Some of these problems in Europe may not be solved until people get used to reducing costs at the expense of benefits to a level more common 30 years earlier.

This is then like the Iv-B economy still trying to revive itself by seeking more benefits so consumers are expected to keep buying to increase utility instead of minimizing losses first. As explained in my book Crisis Aperiomics a Biv economy is like a forest where Biv plants dominate and Roy animals are subservient, most of the animals in a

forest feed off it and when they die their bodies become fertilizer for the plants. In return for spreading seeds and pollen the animals get food. When the Biv forest starts to collapse this is like a deep recession or depression, plants that were formerly stable are like the Biv businesses that used to provide stable employment. As they collapse smaller businesses associated with them also collapse like a reverse multiplier, this is like plants under a forest canopy dying when the large trees collapse.

It then can turn into a grassland where the Biv businesses are very weak and prone to being trampled and uprooted by much stronger Roy animals. This is like a poorer economy or ghetto where Roy criminals might rob so many Biv businesses that they give up and leave, this creates more unemployment and public G businesses. In a recession then there can be a sudden collapse of some quadrants, Biv becomes farm weaker than expected and often takes longer to regrow. To regrow from this situation a Biv forest has to evolve back to reduce its costs, for example it might grow

more thorns and poisonous leaves and store water like a cactus. Then when the Biv forest revives it can evolve back to its former genetic strategy of maximizing its utility.

The temptation is to try to revive the economic forest with monetary policy but this is not like the real fertilizer or water that plants need, it does not address what the forest lack in Gb resources or what started the collapse. For example large scale Roy crime can collapse an economy, this happened in the US in the Great Depression as seen in the Pecora Investigations. The huge amount of subprime fraud in the GFC has been extensively reported on, this Roy crime is like large animals destroying a forest like elephants tearing down trees for the leaves.

Another reason for a forest dying is a contagion of R fungus or insects, this is like the secretive fraud of R liar loans that undermined the financial system. While little of this crime has been prosecuted O criminally it would be difficult for most of it

to happen again for a while, however once a forest is severely damaged its whole ecosystem is compromised as other parts reach tipping points and collapse. It must then adapt to being a sparse forest and then adapt back again later to a healthy one.

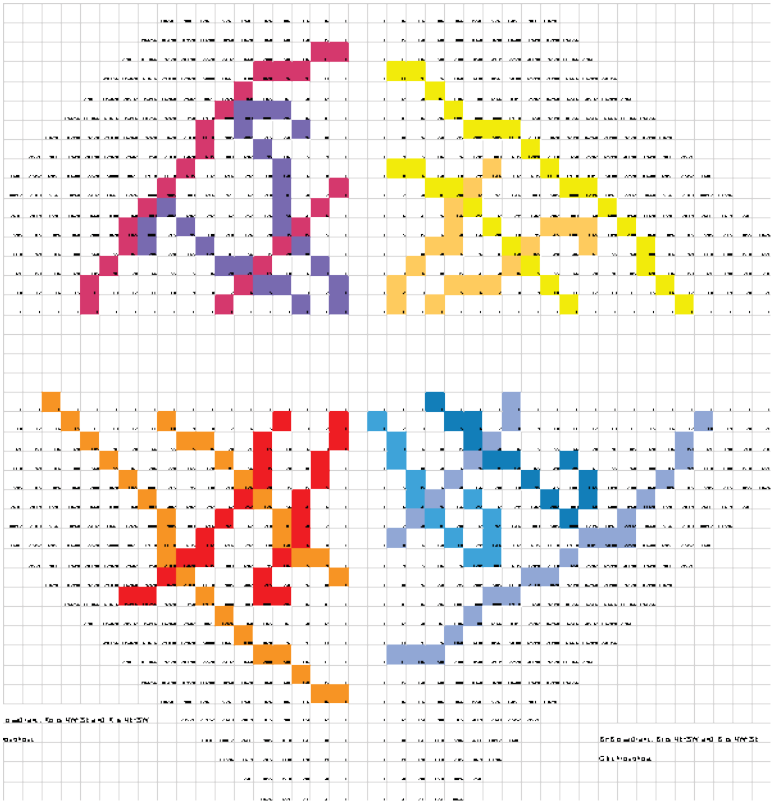
In the same way the global economy after the GFC first has to adapt to being much poorer and to minimize losses, this is wasteful but necessary because it will require skills unnecessary when and if the economy becomes healthy again. For example people with college degrees might have to take cleaning and fast food jobs to minimize losses, this experience will be wasted because when the economy recovers they will use their college degrees for employment. In the same way rainforest plants might have to evolve into desert plants and then back to rainforest plants when the drought ends. Usually however evolution take a long time which is why recessions can linger on, however this kind of plant evolution has occurred over

thousands of years in different parts of the world.

With the GFC then austerity in G government public property to minimize losses and costs is more efficient, this is because many formerly Biv areas are now Roy with the waste caused by the economic collapse as with the forest collapsing. For example many people in the advanced economies cannot find jobs because like with Russia before Ro-R communism many parts of the economy are too poor to develop as Gb private property because of crime.

In this case then the government should spend more with G Keynesian stimulus to reduce costs more than to achieve benefits, as these areas then become wealthier these new businesses can be privatized when it becomes a positive sum game again. Since the GFC this has been a criticism of Keynesian stimulus, that it seemed to give few benefits while its proponents argue it prevented many further losses.

This cost benefit analysis often occurs in new technology where investment resources are scarce, the government might invest in research funds with grants to universities and companies. Then if new technology is Gb viable to make profits in the Biv economy they get their money back in taxes and patent royalties, if not some discoveries remain G and are used in the public domain. For example many journals publish new discoveries that are not worth patenting as Gb, they are then in the G public domain for anyone to use. Research into a cure for AIDS was to reduce the costs of the disease rather than t produce benefits.



In the diagram above the different quadrants do a cost benefit analysis in different ways. The US economy prior to the GFC was mainly Biv, with the lower left and upper right quadrants. With the boom in the 2000s the consumer society was looking for more benefits because Gb private resources seemed so abundant as the Iv-B economies borrowed from V-Bi savers in Asia, as a result they were looking to accumulate benefits rather than

containing costs. This is the correct strategy in a positive sum game, however much of this abundance was this borrowed money from overseas and actual owned resources were scarce even then.

This borrowed money then represents the V-Bi economy, both in the advanced and emerging economies, becoming separated geographically. This indicates weak I-O regulators were causing this separation into Iv-B fast growing economies with other becoming stagnant as V-Bi savers loaning to Iv-B. For example the Japanese V-Bi economy in its lost decades was lending to the US until it started to run out of savings, it also then tried to stimulate its own economy using Keynesian principles.

However this Keynesian stimulus mainly works in Roy economies or after a collapse because it reduces the further costs of idleness rather than confers much in the way of benefits. This is because it is a G based public system by nature, instead Gb stimulus is achieved more by tax cuts and subsidies of Biv business.

For example in the above diagram the two Biv quadrants have the B roots as competitive workers and Iv branches as competitive agents, the other two colors are V and Bi where people work together as a team. In these V-Bi colors people tend to save a lot of money and assets, this insulates them against chaotic risk from Iv-B. An insurance company is a V-Bi like organization, it keeps on hand sufficient reserves to average out on the normal curve various chaotic events such as crime and natural disasters.

In a Biv tree the V-Bi parts tend to loan out nutrients to the Iv-B branches and roots, sometimes these loans pay off with faster growth but sometimes they lead to a loss or collapse. For example the B roots might get nutrients from the rest of the tree, particularly Bi, and use this to compete with each other to grow faster looking for water and nutrients. If they find nothing then these loaned nutrients are wasted, they cannot provide anything in return. The role of V and Bi then is to quench the chaos in

the system with the randomness of its saved reserves, also to loan these out to the chaotic parts of the plant and receive nutrients back to put in reserves.

People’s bodies work the same way, they store energy so in case of disaster a person can survive hunger or work hard to try to survive such as in looking for food. If they succeed then like the B roots they repay this energy back into fat cells where it sits in case of another emergency.

In the same way a healthy economy has savings which are invested in risky high growth enterprises , for example a V company hires Iv agents and salesmen, it investments its savings in them and sometimes they fail to make enough sales or leave the company or even sometimes commit fraud the V company is liable for. In those cases like an insurance company V pays out these expenses as the cost of doing business, it also makes profits on other salesmen and sometimes fraud it gets away with or can deny plausibly.

In the diagram then as workers saved in China and Japan they loaned this V-Bi money to the US where it was invested in risky subprime securities. This is how the system is supposed to work, some of these bonds would default but others with higher returns would theoretically cover these losses like with the Biv tree. However when the I-O police are weak this is like the trunk of a tree being weakened, the tree then is more like an Iv-B weed or parasitic vine that will use up any V-Bi reserves to quickly seed and collapse.

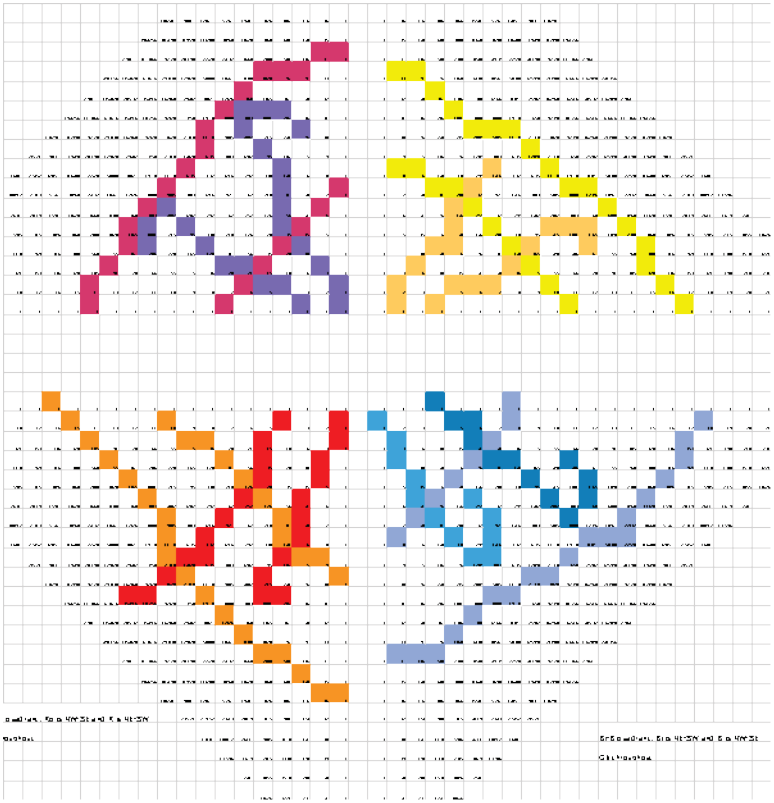
In the same way an Iv-B economy will tend to use deception to get these V-Bi savings, then deceptive competition will force businesses into a boom with too much momentum. When this boom hits the ceiling this momentum causes damage and so some of the money is lost to the V-Bi investors, the difference is without strong I-O policing the Iv-B deception can grow to systemic levels. This is because with competition against deceptive people those who are not deceptive will go broke or be driven out of business, this is Gresham's

law. it is like lending money to poker players that bluff for a living, if they are able to also bluff their creditors then they can lose all they borrow.

The global economy has weak I-O policing between nations, this causes many Iv-B and V-Bi disconnects where V-Bi investors can be defrauded by Iv-B businesses. Because these weak I-O police have persisted since the GFC the situation has not changed much, even as of 2012 V-Bi investors are still nervous about lending to potentially deceptive Iv-B companies and workers. Because of this Iv-B and V-Bi disconnect then where there is savings still available it is not getting to the Iv-B innovative areas because of fears of being deceived again. This can only be fixed by the I-O police deterring fraud with O criminal and I civil penalties.

Much of the GFC also occurred because free trade damaged the Biv forests of the advanced economies by changing them too quickly form their traditional ways of operating, too much innovation and

mutation of businesses caused booms in some parts of the economy and collapses elsewhere. As we see in protected ecosystems suddenly exposed to foreign invasion by new plants and animals mass extinctions can occur, these happened as the global economy innovated until they caused a crash in the forest with the GFC.



The Iv-B colors in the diagram then grew like weeds, as these roots and branches

innovated this is like plants or animals mutating and the suddenly growing when a mutation is more successful. At other times these mutations cause crashes, the subprime bonds and much of the shadow banking system was like this.

At first subprime seemed like a good idea like junk bonds had in the past, they mutated into many different derivatives and tranches of securitized bonds of which some grew exponentially and others failed. Like Iv-B weeds however the deception associated with them caused increasing fraud so V-Bi investors found they were subsidizing the growth of a financial contagion like putting fertilizer on weeds.

The savings rate in the US had been dropping over the previous decade and as people lost high paying manufacturing jobs they were increasingly playing a negative sum game trying to stave off bankruptcy, make payments or lose their home, pay for rising health insurance or college tuition, etc. This was an Iv-B economy based on mutating innovation but also on

competition and using up the V-Bi savings of Americans and then later of foreigners.

No one really knew whether the new kinds of jobs could replace the old, the same mindset happened in the 1920s as the car and electricity transformed the US economy. Many people found their skills were obsolete and could not retrain in the new innovations, the result was a general collapse in the Biv forest economy. It was like Iv-B weeds that grew and mutated using up all available resources and then crashed when there were no more to borrow.

The 2000s then were a similar situation to the 1920s where there were growing dangers in the global economy from economic disruption and innovation, most of this could have been prevented if a strategy of loss minimization had been followed early where the price of housing and rising mortgage debt was reduced at the expense of the benefits of capital gains. Economic policy could also have concentrated much earlier on loss

minimization instead of the benefits of globalization, just as in economics a cost benefit analysis indicates transactions are bad when their costs outweigh their benefits.

For example if the I-O police had been strong enough they would have deterred fraudulent B liar loans as well as Iv subprime salesmen faking documents. Then the real estate prices would have hit the ceiling much earlier with less of a crash, also subprime securitization would probably have survived as a more viable way of financing.

In effect then growing parts of the economy were actually becoming Oy-R as deceptive predator and prey business in the boom as V-Bi resources were used up, Japan had already entered its lost decade and the US was temporarily protected from this with capital inflows from the carry trade. For example before the 2000s many Wall Street banks played a positive sum game where they tried to benefit all parties in a deal, this changed to a G-Gb zero sum game where

the objective was to “rip their face off” or gain while the client lost.

Then as the GFC approached it became an Oy-R predator and prey relationship where these hedge funds and banks had to prey on each other merely to survive if they could in a negative sum game. At this stage many bad investments were sold to clients to reduce exposure to the coming collapse, there was little hope of actual benefits or profits compared to the crushing amounts of debt and fraudulent Oy-R bookkeeping they were trying to minimize.

This increasing scarcity of Gb resources led to a growing need for government services which in turn led to an explosion in government spending in the 2000s, this was a de facto nationalization of large parts of the economy as Gb areas shrank and the need for G public property grew.

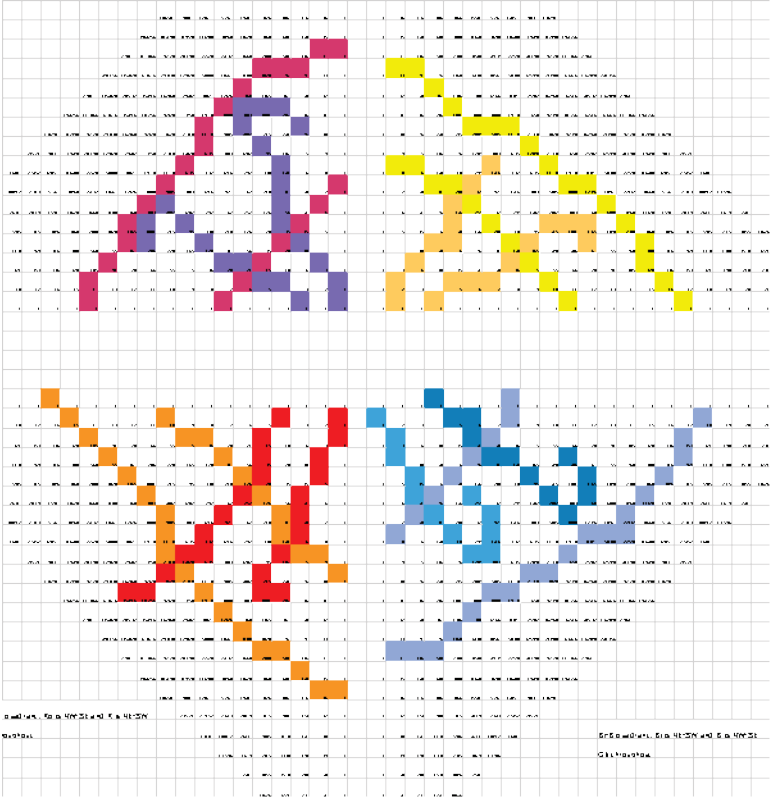
With the GFC however this Roy part of the economy had to shrink with austerity to minimize losses, the prospect of many governments collapsing under G public debt

became too dangerous compared to the benefits of Gb Keynesian stimulus. This created a controversy in economics, some wanted to follow Roy austerity to minimize losses while others wanted to follow Keynesian stimulus to maximize benefits.

The diagram below is after the GFC a Biv forest collapsing into a Roy dominated grasslands, large Biv companies collapsed in the GFC and smaller companies are being trampled and dismembered by crime in the poorer Roy society that is growing. This also occurred in Russia as the weak shoots of Biv privatization were often devoured by Y thieves by law as the Russian mafia. The economic forest is being drained of resources with the increased welfare of Roy people, for example extra unemployment benefits and food stamps in the US create extra tax burdens and debts on the Biv economy. This is like Roy animals eating more of the Biv forest to avoid starvation causing the forest to collapse even faster.

Loaning more V-Bi money into the system through central banks does not address the

main problem of why the Biv forest is sick, it is because the V-Bi savings were wasted so unless these reasons are addressed the additional V-Bi stimulus will also tend to be wasted.



The US currently has cheap finance available and the temptation is to benefit from this with more capital works, against this is the Roy scarcity in the economy where the negative sum game of

minimizing losses by not borrowing more is indicated. The decision depends on how scarce resources really are, whether this is from wasteful economic collapse, losses from persistent trade deficits, financial crime and contagion making a wealthy economy so inefficient resources become scarce, and so on.

Once the scarce and abundant resources are calculated then the correct response is to use Gb private stimulus such as with tax cuts and deregulation so business can create benefits, however this deregulation should not be relaxing penalties on civil and criminal injustices as this would cause the economic contagion to grow faster. More on this was explained in my book Crisis Aperiomics. Where resources are scarce property can be nationalized as G and people put to work until there is a recovery, this minimizes the losses from paying out welfare and profits can be made selling off these businesses to the Gb private sector later. For example the US government took stakes in many banks and businesses, many

of these have turned a profit when sold as resources became more abundant.

Sometimes people get their cost and benefit analysis wrong with the pervasive secrecy and deception in an Iv-B boom and bust economy, as do governments and businesses. This is like in a game of poker where bluffing players need to work out the benefits of winning a pot versus the risks or costs of losing it. In the same way an Iv-B economy has so much deception that people make mistakes in assessing these costs and benefits, they then tend to go with the momentum of a boom or bust trying to get out in front of it. This however just makes the crash even worse when it reaches the floor or ceiling and has to reverse. Benefits analysis then becomes like irrational exuberance while costs analysis becomes panic.

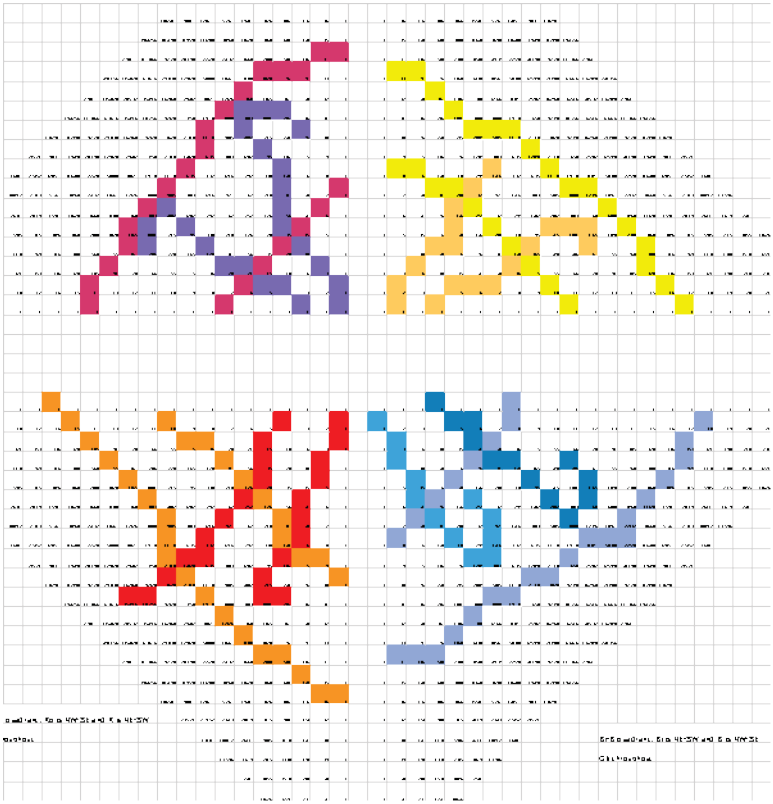
Iv-B people in a Biv economy are more at risk of the costs associated with scarcity and so are more prone to become Oy-R, for example in an economic downturn they can experience chaotic collapses in their

finances and become homeless living on G public land, in their cars on G public roads, in G public shelters, and so on. This can cause them to commit more O crimes such as shoplifting and embezzlement, in the lead up to the GFC the mounting scarcity of new business led many subprime and shadow banking institutions to commit criminal fraud. Some legitimate hedge funds as with Bernie Madoff became criminal Ponzi schemes when profits became scarce.

This is like Biv people who are used to living and working in a Gb private property economy having to get used to a G public property system. For example they might have had Gb annuities and investments and then have to live on G pensions, food stamps, unemployment insurance, etc. Before they may have owned their own home or rented from a Gb private owner and now live in G public housing or are homeless in a G park.

Many Iv agents were ethical salesmen that at best might be liable for I civil prosecution

because of misrepresentation, when resources became scarce and the O criminal laws remained weak many became Oy predators looking to minimize their own losses at the expense of their R clients. For example Iv subprime agents were looking to benefit from high commissions and B buyers were profiting from refinancing and capital gains, this changed to Oy predatory salesmen doing fraudulent loans with fake paperwork and their R clients minimizing losses by walking away from their homes when prices went down. At this time many banks became G public property through the FDIC, when resources became too scarce they would collapse and be nationalized by the government.



In the diamond graph this is like the upper left V-Iv quadrant turning into the upper right Y-Oy quadrant as people used to working in the refining part of an economy have to become more predatory to survive. It is like the Iv branches and V leaves of Biv plants having to change to a predatory system of Oy loner predators like foxes and Y team based predators like lions. This cannot happen in nature, plants cannot turn into animals or vice versa except perhaps

over millennia, however in business there can be a fine line between a Y mafia and V business management.

For example Y mafias typically move into V business as they accumulate enough G money taken off others, then they convert or launder it into Gb private property and run large corporations as happened with thieves by law in Russia. There can also be similarities between a Y mafia and an eventual V aristocracy in how their family accumulated their money, in the middle ages many aristocratic families were indistinguishable from a Y mafia with ties to the Crown more like families in La Cosa Nostra. Oy petty criminals such as conmen might move into becoming more ethical agents as in Biv there is more money in trading Gb property than stealing it in G.

The reverse process can be traumatic, however it is easier for those who retain Y mafia and connections to empire building such as the British aristocracy. For example in the GFC V businessmen successfully got their governments to bail their businesses

out, often without losing their shareholder equity or even bonuses. It was similar in the US where the military industrial complex as Y-V means bailouts became linked with the idea of national security, an economic collapse cold mean vulnerability to R terrorists.

This becomes similar to cronies of poorer and less democratic Y-Oy governments such as currently in Russia and Eastern Europe. These businesses then can minimize their losses in a negative sum game by having the government give them special contracts in an economic stimulus, lending the businesses cheaper money through central banks, and in the US using G public money to engineer mergers and takeovers of weaker companies by the strong such as Bear Sterns sold to Morgan Stanley.

This is in effect a Y-Ro predator and prey relationship, also though it can become where rival Y teams attack each other. For example Morgan Stanley and Goldman Sachs were supported with G public funds but the less well connected and popular

Bear Sterns and Lehman were allowed to become prey for the others.

In a Biv economy then companies can take over weaker ones in a positive sum game where all benefit, such as with Leverage Buy Outs, when the economy turns Roy the same occurs with increasing G public funds to minimize losses in a negative sum game of predator and prey. The decision to not bail out Lehman was based on loss minimization, the cost side of a costs versus benefits analysis, there was no opportunity to consider whether these decisions would ultimately create wealth or benefits later on. This was also because an Iv-B economy is short on time and high on energy, at the ceiling then decisions usually have to made quickly in a meltdown.

When V-Iv parts of the economy become more Y-Oy then the G public money that supports them would repaid as these assets are sold off again as Gb private property if the Biv economy recovers, in this way Roy losses in banking etc are minimized and Biv benefits in the private sector are

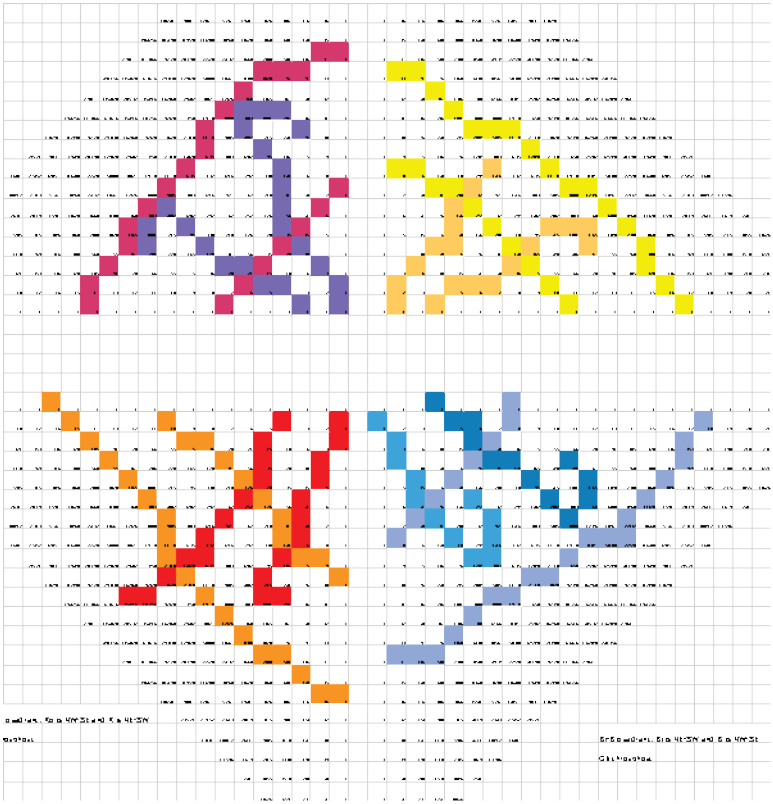
maximized. In the Great Depression this process was begun where the government with the FDIC could G nationalize banks and then sell off whatever assets were viable in the Gb private property market.

In effect then the government acts as a Y-Ro insurance fund to absorb the chaos of an Iv-B economy, this is like a Biv forest becoming more weed like and booming then busting but the V-Bi survive this and protect the overall forest ecosystem. If the V-Bi trees are not strong enough this causes the Biv forest to decline as happened with the global economy in the GFC. The role of Y-Ro governments in this situation is to stabilize this chaos with Y-Ro randomness, they use central banks to lend money to Biv businesses and sometimes to take them over with G nationalizations. This quenches the chaos but creates stagnation as Iv and B are where growth occurs in the Biv economy,

However with deregulation there was no process to do this with the Iv-B shadow banking sector before the GFC, the

innovations of the Iv-B economy use up V-Bi credit in creating too many mutated and overly innovative benefits for consumers such as subprime loans and continual changes in technology without looking to minimize losses, when they got into trouble there was no mechanism to G nationalize these shadow banks and then resell the viable parts as Gb like with conventional banks.

Because of this the government had to play this negative sum game in an ad hoc way, lending money to some banks to reduce the G scarcity, buying distressed assets as G and reselling them later as Gb, etc. When losses were not minimized as with Lehman these had catastrophic effects on the global economy, in effect the Treasury was trying to reduce this scarcity in newly G businesses such as Bear Sterns and Merrill Lynch by selling them to healthier Gb businesses with public money guaranteeing some losses.



In the diagram above the Iv branches in the upper left quadrants began collapsing in the GFC, these were companies like Bear Sterns, Lehman, Merrill Lynch, etc that grew like weeds on the Iv counter innovations of subprime securitization and derivatives. The original innovations that began this was in trying to make more R poor people buy their own home as well as using R liar loans.

Like a poker game it was believed R-B people had more money than they could declare for tax, for example from drugs and the black market economy. The liar loan then was a revolution in getting at this money while trying to manage the risk with different tranches of subprime bonds like Michael Milken did with junk bonds for corporations.

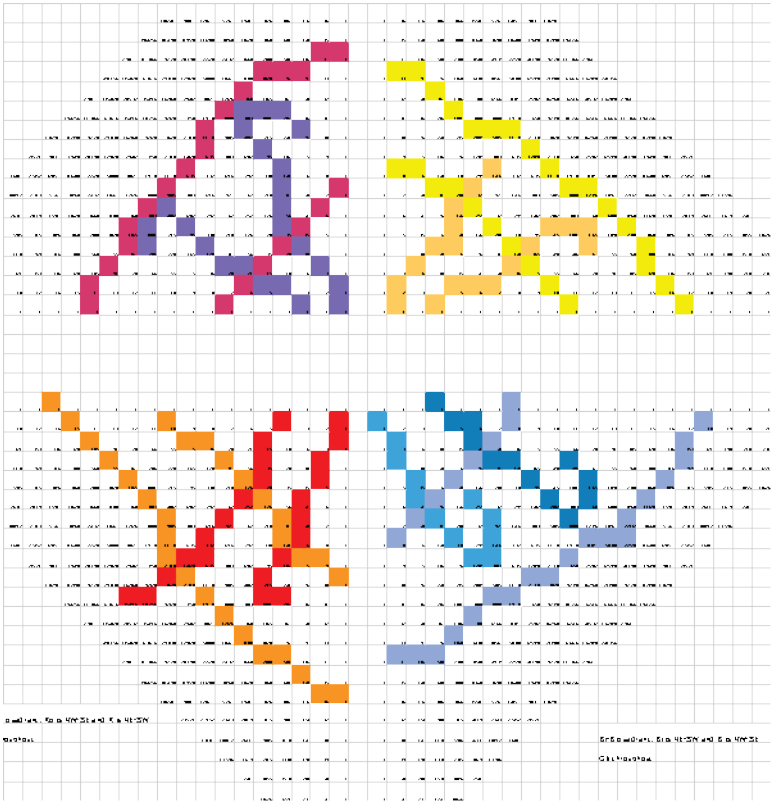
The same thing happened in effect as with junk bonds, they were too chaotic for the usual randomizing V-Bi insurance industry to handle. Usually these collapses would be insured against by these V insurance companies but they had lost too much money and were often highly leveraged from speculating in Iv-B derivatives in the case of AIG, often this chaos also occurred inside these V insurance companies where dishonest Iv traders and salesmen had deceived their V management to get higher bonuses to the point where the companies became insolvent.

Without enough money in V to insure these losses the Y part of the government in the

upper right quadrant had to step in with G public money. This causes the central horizontal line of G-Gb to move to the right. That is, the line would have more G or green and the line between the two colors would move to the right indicating there was more G public property and less Gb private property in the US economy. In a recession this is often temporary as G nationalized assets are sold off as Gb so the G-Gb fence moves back to the left.

V-Bi companies and workers are more resilient to Roy scarcity because they cooperate with each other to prevent chaotic collapses, however they can also become stagnant with a lack of growth and innovation. Before the GFC Bi unions pursued extra benefits, lower hours and higher pay along with some minimization of losses such as improving workplace safety. However the increasing scarcity of resources caused by lower wages made them realize that loss minimization was more difficult, if they pursued more benefits in higher wages then more businesses closed or moved offshore.

Many of these Bi unions bore the brunt of this Iv-B collapse, their pension funds had purchased these securitized bonds so when B people could not repay their loans the value of some of these bonds collapsed. This was then an effect of the erosion of Bi unionism and the rise of B competing workers, these B workers ultimately hurt the Bi union pension funds with their defaults. Much of this was caused by I-O deregulation which was in turn caused by a bias in the I-O police towards Iv-Oy. In some ways this bias was caused by the aging of the baby boomers and their rightward tilt in politics as they became more predatory to get money for retirement. As can be seen Iv-B cause and effect in Aperiomics can be hidden and often misleading.



In the diagram above the Bi lines in the lower right quadrant represent the unions and their pension funds, they had bought bonds from the Iv agents back by V management in the upper left quadrant. They had created these bonds by loaning money deceptively to also deceptive B workers who had increased in number in the lower right quadrant. They had grown chaotically because unions had decreased in strength because of increased innovation

through competition along with much lower wages paid to B workers as their jobs were sent offshore.

This is then like the B roots of a plant beginning to break down for lack of Gb nutrients, these B people could not make much money often because of overseas competition in manufacturing and used liar loans to try to get themselves out of trouble. These lies were believed by the V-Iv subprime businesses often abetted by Iv salesmen who sometimes knew they were fraudulent. More often though Iv and B bluffed each other so much that their understanding of the economy became highly divorced from reality, this is like poker players who really don't know what cards the other players have.

In effect then the Iv-B parts of the economy went into hyper drive looking for more profits because of the rising scarcity of funds caused by Bi manufacturing jobs being lost. Just as the Iv-B parts of plants borrow from their V-Bi reserves to frantically grow, the Iv-B economy tried to

innovate and grow out of this problem but failed in the GFC. Then the V-Bi lines in the quadrants lost much of their loaned money to Iv-B and had to get loans or be nationalized as Y-Ro while the Iv-B parts often became Oy-R predatory to survive through even more fraud.

It is important to understand this process and trace out these changes on the diagram, usually this would result in a recession where the colors would rebalance. However if the Biv quadrants are damaged too much they can remain depressed just as Biv forests in nature sometimes turn permanently into grassland.

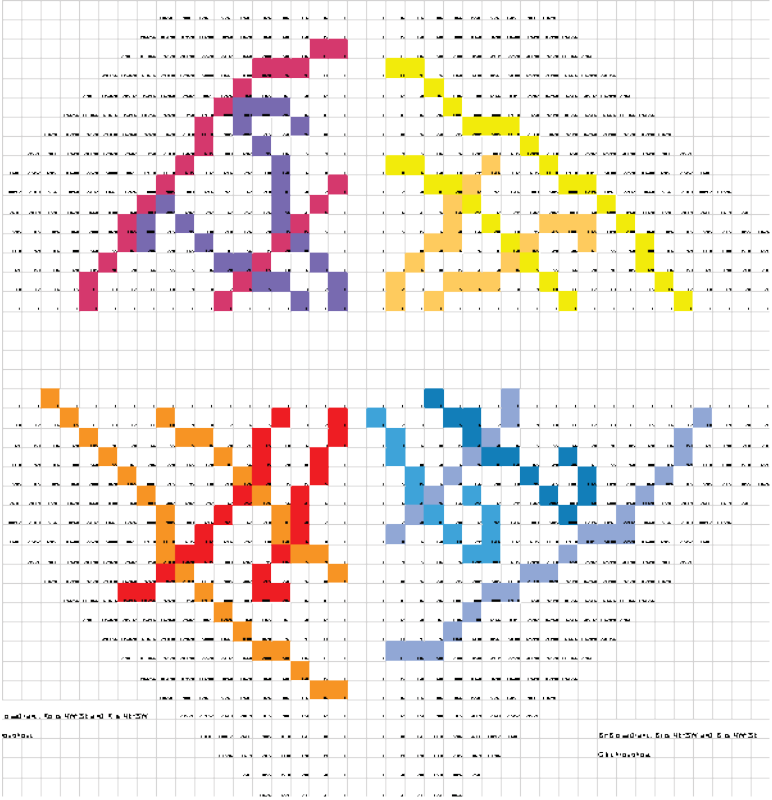
Many workers then had tried to become B and work competitively against each other when they lost their higher paying manufacturing jobs to free trade, the better and more innovative workers won to some degree just like some always win more in poker. Others however collapsed chaotically with ever lower wages and more workplace injuries like losers in poker, they often tried

to make up for this with B liar loan real estate speculation or refinancing their house with subprime.

As more of the economy became Iv-B these Bi unions were decimated and more workers had to become B competitive and deceptive, the Roy public sector however still had Ro government unions that at first took up the slack by hiring more people as the G part of the economy expanded in the 1990s and 2000s. However with the GFC the tax revenue borrowed from the Iv-B profits collapsed chaotically.

After the GFC it became a struggle for these Ro unions to minimize losses in the negative sum game of austerity as money was divided up between them and the Y subsidies to V business in a war of attrition played out with campaign donations and Oy-R lobbyists, pursuing extra benefits in higher pay became very difficult after the GFC even when G government money was being paid to V businessmen in bonuses and covering their losses. Often then Ro government unions also had to play a

negative sum game in giving up some of their recent gains in exchange for fewer job losses.



In the diagram above the Ro lines in the lower left quadrant were public sector unions, they still used their team strength to maintain their wealth though their Bi overtones or private sector unions were getting torn apart in the 2000s. In effect these Bi unions were being broken up by V

management as V was winning the war of attrition by using cheaper B workers overseas and importing goods from there, this is like in Roy where Y team predators like lions try to tear apart Ro herds like buffalo to divide and conquer. The Bi unions then had to fight to keep their money against the Y lines in the upper right quadrant, they were bailing out their V overtones such as the Fed bailing out he V banks but not the Bi community homeowners.

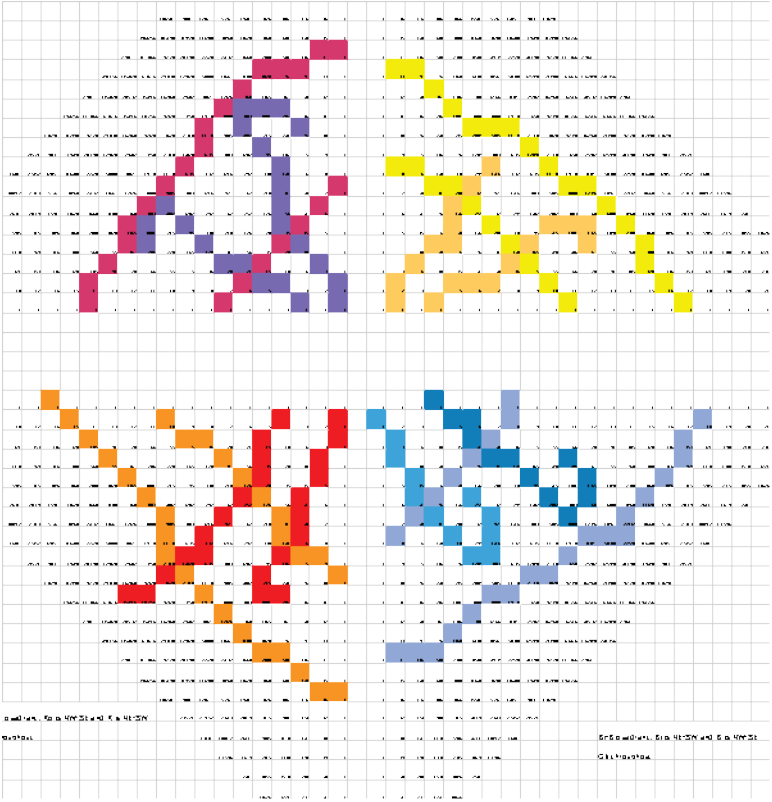
In V management the 1990s and 2000s saw rising wealth inequality benefit them which is like Biv trees trying to grow faster and higher to seed before the crash, they pursued a positive sum game of trying to benefit ever more from the boom with higher management salaries and stock options. This is like the diagram above, the Biv quadrants being like a tree were growing faster in V-Iv in the upper left quadrant like a top heavy tree that would collapse under its own weight.

They V-Iv management and agents were also preparing to get out and short the market like Y-Oy predators when it collapsed, their capital then would act as V seeds to regrow businesses and buy out other like Y-Oy predators taken over the territories of weakened rivals after the downturn. This was usually a team effort because many had gone to the same ivy league universities and these connections allowed them to help each other to become more wealthy and insured against Iv-B chaos, in effect cooperative price fixing of wages and prices between team members.

This pursuit of higher benefits led them away from avoiding losses, the shadow banking system was hooked on bonuses to the point where there was no way to minimize the looming losses in the GFC. When many companies were nationalized or had the government by a G share in them these V executives became in effect Y public employees. This created a conflict between the austerity based strategy of minimizing losses and these executives still trying to maximize benefits even at the

expense of these G public companies struggling to become Gb private again.

As the emerging economies developed more abundant resources by winning the trade war they became more Biv, this caused the reverse effect. For example in China the Ro-R public employment system worked so that economic losses were minimized and economic benefits such as Western consumer goods were banned or unaffordable. For example the communists reduced poverty under Mao by building a system with few luxuries but one that was resilient to hunger and chaotic disasters. In the diagram below this refers to the Ro-R quadrant on the lower left, it is trying to grow to become Bi-B on the lower right just as many parts of the advanced economies are trying to become Biv again after the GFC.



As China moves to a Biv economy more Ro-R workers become Bi-B and are pursuing economic benefits such as modern goods and services though they are not minimizing losses and costs as much anymore. This has led to some living a more modern lifestyle with many benefits and little chance of economic loss, many though fail to get these economic benefits because of B low wages with competition and sweatshop like conditions. As part of this rush to a Biv

economy the loss minimization strategy is also reduced, many then have no G government job and G health care but no Gb based economic security either. This risk losing the modest benefits they have received so far if they fall back to a Ro-R economy and communism.

Many people can then find themselves in a G-Gb economy where a transition to a Biv abundant economy is stalling and sometimes failing. Sometimes they can enjoy the benefits of higher incomes but at other times they have to endure and minimize losses in a system no longer geared for it. Much of Chinese society is not wealthy enough for a Biv economy, it then remains G government owned and this is unlikely to change with so many people.

However now more people are tempted and addicted to the benefits side of a cost benefit analysis, they then take more chances to achieve these such as leaving villages to go to newly industrialized cities. This is similar to the process that happened in the English industrial Revolution written

about by Karl Marx, in the process they often fell back into Ro-R where they had to minimize losses. In this situation the V-Iv capitalists were more Y-Oy predatory, because of the British Empire there was a strong military industrial complex or merging of Y-Oy and V-Iv. This meant there were more G public lands involved in the Industrial Revolution just as there are in communist China, for example land might have been owned by the aristocracy and working for the Y-Oy predatory capitalists was not so different from predatory serfdom.

Opportunity Cost

This is where making one choice costs people, animals, and plants another opportunity hence the term opportunity cost. In Aperiomics however there can be opportunity benefits and costs, in a Roy society the objective of a negative sum game is to reduce costs and in Biv to maximize benefits. An opportunity cost can be regarded as forgoing the benefits of another choice, however in Roy societies it

can also be to forgo the greater or lesser costs of another decision.

An often quoted example of opportunity cost is to promote specialization, Bob might be good at picking strawberries and Alice better at picking blueberries. In a Biv economy both might sometimes benefit from specializing in what they are better at doing, they then have the least opportunity cost because they each give up something they cannot do as well. Picking strawberries costs Bob the opportunity to pick blueberries but he actually benefits because he ends up with more fruit by only picking what he is more efficient at. The theory is that if each picks the fruit they are most efficient at then their opportunity cost is lowest because each would have picked less fruit in anything but their specialty.

In a Biv society however each tends to seek benefits because losses are less dangerous, in this case then Bob picks strawberries because he increases his opportunity benefits compared to what other job he might do, so does Alice.

In a Roy society this can be a similar situation but applied to a negative sum game, for example Bob and Alice must pick fruit not to benefit themselves but to stave off loss such as malnutrition or even starvation. They might still specialize as before but here Bob picks strawberries because he minimizes his opportunity losses or costs though he is often still losing. If they are trying to avoid starvation then reducing their costs compared to other opportunities such as picking apples is a negative sum game.

In a Biv society reducing opportunity costs can be inefficient because costs are often less important than benefits or profits. For example Bob is making a profit picking strawberries and while he might find picking cherries is more profitable it is not costing him to continue to pick strawberries. In Biv Abundia then Bob would maximize his opportunity benefits in picking cherries over strawberries, in Roy Scarcia he would reduce his opportunity

costs by moving to cherries because reducing costs is a survival strategy there.

The low hanging fruit principle says that picking the easiest fruit first generates more profits or reduces more costs, in Biv then this is said to increase the opportunity benefits and minimize opportunity costs.

This however results in chaotic tactics where there is no overall strategy, Bob just looks at the strawberries in front of him and selects which ones according to what is easiest to pick. However easiest to pick can be defined in terms of time or energy, for example some berries might take less time to pick while others take less effort. In between these two choices there must be uncertainty.

This is because in Abundia time is a V-Bi strategy and Iv-B is an energy tactic, in Scarcia time is a Y-Ro strategy and energy is an Oy-R tactic. So in deciding what to pick Bob must decide whether to minimize this opportunity costs or maximize his opportunity profits, he must also decide

whether he is trying to minimize time or energy in Roy or to maximize their use in Biv for profits.

For example if he is Biv Abundia there are plenty of berries so he might decide to use a V-Bi strategy of working longer hours while saving energy to maximize his opportunity benefits, otherwise he might decide to Iv-B work much faster saving time but using up more energy. In Roy Scarcia he might have to Oy-R minimize his time spent picking berries to minimize his opportunity cost, alternatively if he is short on food he might have to minimize his energy used and take longer to pick the berries or he might become weak from a lack of food.

In using Iv-B to maximize benefits or Oy-R to minimize costs the low hanging fruit principle will work best for him, he picks the fruit that is fastest to get to even if he has to expend more effort or energy. However if the strawberries were distributed randomly then this tactic would confer no advantage, he might try to move to a bush with easier to pick strawberries each time

but this might move him away from another area with much easier picking.

He then can pick strawberries quicker when the berries are distributed randomly but increases in productivity might become exponentially more expensive. For example if he works harder then working twice as fast often uses more than twice as much energy so his food costs increasingly more, he can then eventually hit a ceiling of how many he can pick because of exhaustion or the cost of this extra food. To maximize profits or minimize costs in a random strawberry field then he often does best by conserving his energy and using more time.

His tactics then do no better than chance against the random positions of the strawberries, he can no more improve on this than a gambler can by trying harder betting on a roulette wheel.

Another possibility is the strawberries are distributed chaotically, for example last year John planted the strawberries according to the low hanging fruit principle

so he first went to those areas easiest to plant in and to those that needed the least amount of weeding. He then skipped over many areas so if Bob can work out that pattern then he can save time because the pattern is no longer random.

For example collecting 10 kilos of strawberries in a random field might be best done by picking 10 square meters in one area, he loses time because he is often gets bogged down picking berries that are sparse and hard to find. However he saves a lot of energy because he is walking less, this is then a V-Bi approach to random berry picking that is high on time and low on energy.

If instead the next day he works out John's chaotic path of planting strawberries then he uses up much more energy in walking but he saves a lot of time because he gets the 10 kilos of berries in half the time. This is then an Iv-B or Oy-R tactic of high energy usage and low time.

Opportunity costs then can cost either time or energy while opportunity benefits can deliver energy or time profits, in Scarcia Bob might want to reduce the time he takes in picking strawberries or reduce the energy he expends on this because resources are so scarce. They are however not the same thing as time is more a Y-Ro random activity and energy is Oy-R. For example assuming he wants to pick strawberries because he is faster with them then he needs to design a strategy that reduces wasted time even though he burns up more energy. Picking the low hanging fruit might save time by going through a field quickly, it is then a chaotic strategy on the margin.

However this does not work in reducing energy as an opportunity cost, this is because to reduce energy he needs to walk as little as possible even if it takes longer to get the berries. So he is better off picking a small area of berries and picking all of them because he uses less energy in picking the hard ones than in walking long distances to pick the easy ones.

So this takes him much longer to pick the berries but reduces his energy consumption, if food is more expensive but his time is less valuable then this random strategy is best for him. For example the lowest energy way to pick strawberries in a field is to do one row completely then move to the next until the whole field is covered, he walks the least distance possible.

It depends then on whether his opportunity cost in Scarcia is Y-Ro time or Oy-R energy. For example if he can earn $10 an hour elsewhere then to minimize his opportunity cost he needs to pick the strawberries quickly to get to the other job even if he burns up more energy, he might then run between the richest patches of berries. However if he can earn a 1000 calories of food daily picking apples elsewhere then he might need to rest more and avoid the harder work of walking even if it takes longer.

Opportunity cost is then the cost side of a cost benefit analysis, this is more important in Roy because losses can be life

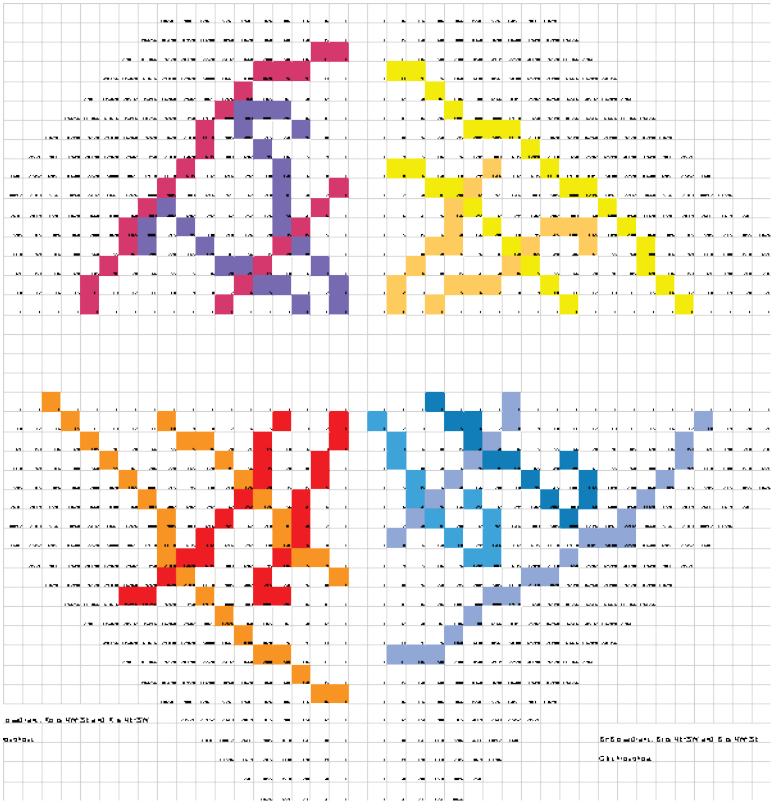
threatening. So Bob might want to reduce his opportunity cost because he must get enough food to survive, he minimizes the chance of starvation by reducing his opportunity costs.

However in Biv Abundia the chance of starvation is remote and so often people can do business in a wasteful way if it leads to maximizing profits or benefits. So instead of minimizing opportunity costs Bob can maximize his opportunity benefits. For example he can pick either blueberries or strawberries and make a profit either way, both are then economic benefits to him in Biv though there are more benefits to picking blueberries. Even though he minimizes his opportunity costs by picking strawberries in Roy Scarcia he might maximize his opportunity benefits by picking blueberries in Biv.

For example he might be faster at picking blueberries but the risk cost of doing this is to sometimes hurt his fingers. If he does this in Roy then with food so scarce he might die of hunger waiting for his hands to

heal, he might lose his job and not find another one, etc. So in Roy Scarcia he should pick strawberries because though he gets less of them they don't hurt his hands. However in Biv Abundia he might pick blueberries because even if he hurts his hands then the chances of starvation are very low, he might then still average out with higher profits in blueberries with time for recuperation because all the wages are higher there. The situations are then identical, Bob hurts his hands the same amount in Roy and Biv. In Roy however this identical cost must be minimized by picking strawberries while in Biv the identical benefit is preferred so he picks blueberries.

This risk of hurting fingers is not part of an opportunity cost because it is only a risk, it might be random from being unlucky or reaching a tipping point with a chaotic strain to a tendon. However depending on whether the economy around the picker is Roy or Biv then he needs to think of opportunity costs or benefits.

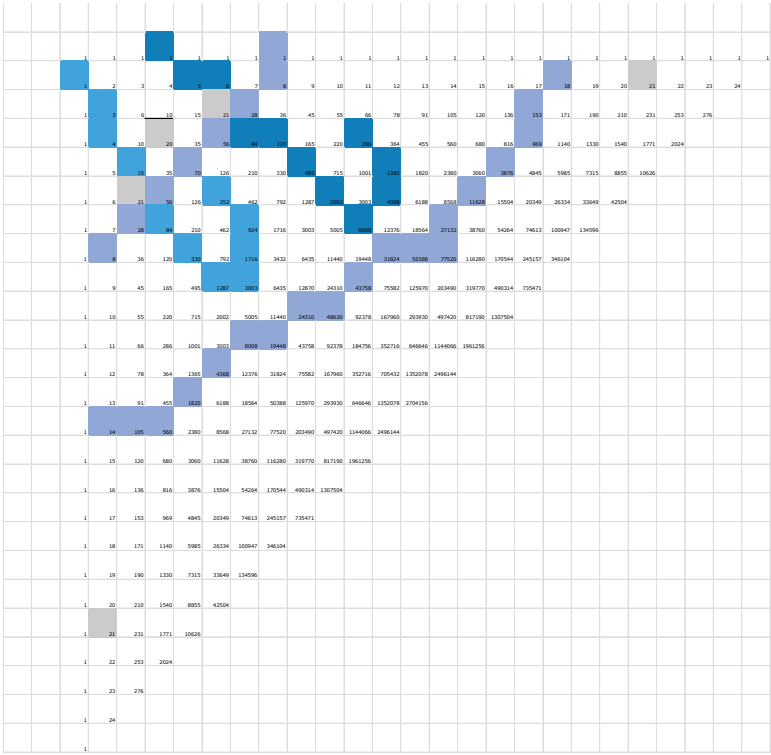


This diagram can then be used to illustrate the various opportunity costs and benefits, also whether they involve time or energy.

Bi-B

In the Bi-B quadrant on the lower right the X or horizontal axis can represent strawberry production and the Y or vertical axis can represent blueberry production.

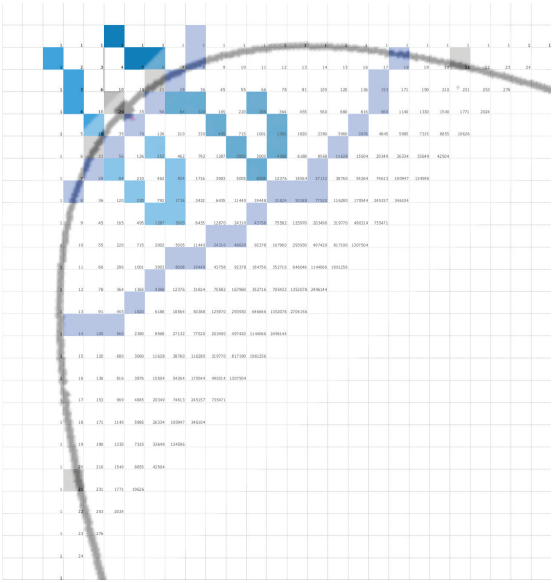
There are two lines radiating out from the center, this are chaotic B or blue lines as discussed earlier but here they can be Bob and Alice with Bob being the darker blue one. Usually the darkness of a color can be used to represent other parameters, for example a line growing faster might be represented as darker but here it can distinguish different people.



In the diagram I have colored in cells with an arbitrary value of 21 in grey, these tend

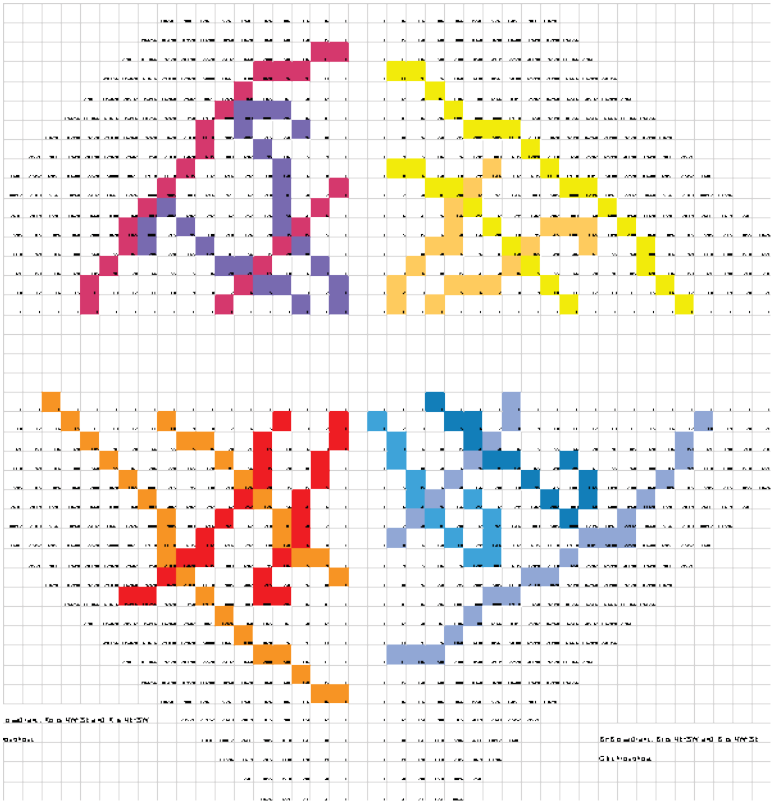
to form a parabola where at each point the production of berries is 21. This might be defined in terms of time or energy, for example Bob might pick 21 kilos of strawberries a day in Abundia and so he must work out his opportunity benefits by comparing this to what other profits he could maximize with this time. It might also refer to 21 kilos of strawberries per 1000 calories of food consumed or perhaps per liter of fuel if using a mechanical picker.

In the diagram below I have superimposed a parabola on these grey cells.



This would represent where Bob is as good at picking strawberries as blueberries, any point on this parabola would be a given ratio of him picking strawberries to blueberries but still giving the same total production of 21 kilos.

However if Bob is aiming to pick 21 kilos a day then this is random time, the best line for him would then be Bi as a normal curve in the diamond graph. So 21 kilos might be his normal or average yield in a day with some deviations above and below this, he might compare this with other normal curves of what else he could do with his time. For example he might be able to pick an average of 42 kilos of apples a day and to compare these two yields the two normal curves give the probabilities of either strawberries or apples being a better opportunity. This would be shown as two Bi lines on the diamond graph shown below.



In Abundia Bob moves randomly around either the strawberry field or apple orchard to maximize his energy profits, he works slowly and so need much less food with the food saved representing this opportunity benefit. He can then compare the average of picking either strawberries or apples to see which one saves the most energy as profit per day worked.

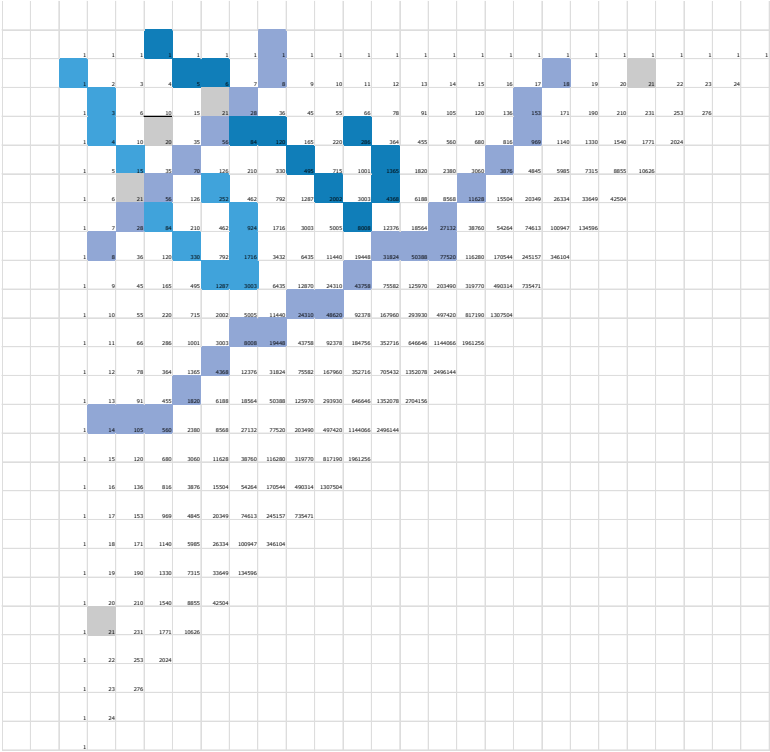
Instead of this he might try to have his opportunity benefits as time instead of energy, he works much harder to save time and so his profit is in more time off for leisure or to work another job in the time saved. To do this he works chaotically using the low hanging fruit principle.

If then Bob is trying to maximize profits in Biv compared to the 1000 calories of food he eats per day then he would work as the darker blue B line in the diamond graph above. Because resources are abundant in Biv he might each day pick strawberries or apples that he can sell for much more than 1000 calories of food, he then needs to maximize his benefits rather than minimize his costs.

His production would then vary chaotically because he is trying to save time by using more energy, sometimes this would be successful and his production would increase as the B line grows because he finds rich patches by using the low hanging fruit principle.

However this leads to a boom and bust scenario where, like the Iv-B weeds that use up the available resources and crash, Bob finds he starts to run out of easy picking as he reaches a ceiling of production by working faster and often has to retrace his steps into areas where he already found the easy to pick berries. He might then crash in production to the point where the search for berries becomes Roy, he might then start to work out his opportunity cost because he might otherwise pick fewer berries than will pay for his 1000 calories of food for the day.

Eventually he might have to abandon the field and allow it to rebound later as more berries grow, then the cycle of boom and bust would repeat. His tactics then resemble the Iv-B weed that quickly used up the easy to get nutrients near its B roots like Bob used up the easy to get to strawberries, then when these ran out for both a collapse was inevitable.

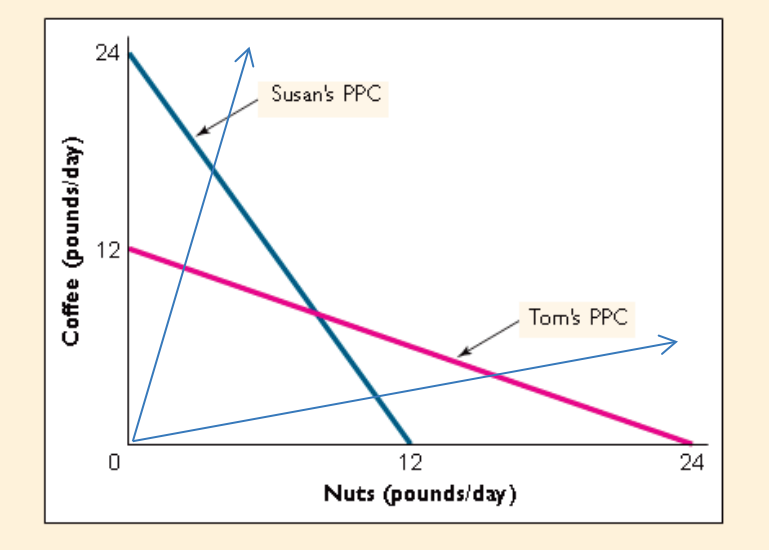


The principle of comparative advantage in economics implies that Bob and Alice should specialize, for example Bob should pick only strawberries and Alice only blueberries. However this also depends on whether their opportunity costs and benefits are defined as time or energy. For example if Bob and Alice are in Scarcia then they need to minimize their time and energy, the best job for them is where the opportunity cost is minimized.

If berries are rare then they might need to minimize the time spent in picking them so they have more time to look for other food such as eggs or vegetables. This means they have to work harder and use more energy so more of their scarce food has to go on replenishing this energy. They also have to decide whether they will work as a team or compete with each other. If they specialize in what they can pick faster then this doesn't necessarily mean they are cooperating, they can do business later by trading strawberries for blueberries so both end up with more than if each picked both kinds of berries.

So Bob and Alice are competitive loners trying to minimize their costs in Scarcia, when they trade some berries at the end of each day they also try to minimize their costs compared to the energy needed for food. To work faster each uses the low hanging fruit principle. However this can lead to chaotic booms and busts that risk their starvation if they don't minimize their costs, for example each tries to work harder than the other so as to get more of the

other's berries when the trading is done at the end of the day.



The diagram above shows two people, Tom and Susan, where one can pick more coffee per day while the other can pick more nuts. This standard economics graph is then different to the Aperiomics diamond graph where they would be B lines coming from the 0 intersection of the X and Y axes, shown in the diagram as two arrows. The B lines are then more like supply curve lines in economics, the more vertical a line here the more it represents someone picking more coffee than nuts. The difference here is the

B lines can show the production growing chaotically and collapsing while the conventional lines above do not change over time.

The lines without arrows in the diagram above are more like Bi lines in Aperiomics, instead of these lines implying specialization is better they act more like normal curves where the most efficient production is in the center. For example Susan and Tom might sometimes be better picking both coffee and nuts in case one of them runs out or has a crop failure. So workers must decide whether to specialize and increase the risk of chaos from that or to generalize by picking both and increase the risk of falling behind in production if there is no collapse of one crop.

With the B lines then the increasing momentum along with the low hanging fruit principle eventually threatens to exhaust the berries more quickly than they can regrow, then one of them is likely to suddenly have a chaotic drop in production towards the floor and so the other then

loses efficiency because they miss out on getting the other's berries in a trade at the end of the day. Before this crash however the can each produce a glut of berries that they cannot eat before they spoil, this becomes even more chaotic because often one or the other will want to trade much fewer berries because of this. So a glut can leave Bob or Alice with having wasted energy is working hard only to have their berries rot.

However if they instead want to minimize their energy use in picking berries because food is scarce then they might have much more time available for picking, it then makes more sense for them to work as a team. it is less important that each can specialize and work faster because this uses up too much energy, instead they need to work out how to harvest berries using as little energy as possible.

This means working at an average pace just as driving a car is most economical to run at a particular slow speed and with less accelerating and braking. Because both can

pick blueberries and strawberries at this slow speed then they can reduce the chaos in the situation by being methodical and sharing tasks to save energy. For example sometimes they might work side by side where one pulls off a branch of blueberries and the other pulls off the berries from it.

The energy from occasionally having a glut of berries is saved because it is no longer worth working harder and having some berries rot just to get more on the margin. Also they are both less often weak from a lack of energy after the supply of berries crashes from overpicking.

When one is tired they can rest while the other continues on so they average out some production with resting. This is then like a Bi trade union where workers get paid by the hour and so have no incentive to work harder, they often then become more lazy.

It is the same with 10 berry pickers, if they compete against each other while working for one farmer then each tries to pick the

most to maximize their income eventually creating a glut of blueberries and strawberries the farmer might not be able to sell. They can do this by picking the easiest fruit first, however this is inefficient for the farmer because someone has to go back later and pick the rest of the fruit which requires more distance to be travelled. The B workers are here being paid in energy, for example for 21 kilos of either blueberries or strawberries they get 1000 calories of food such as bread. They might also be allowed to keep 10% of the berries they collect as a commission in lieu of the bread. So this is like paying them in energy because they can work harder using up more energy and then get more energy back by being paid more food.

There might then be 10 farmers each with 10 workers, the result then is 10 chaotic B lines where the worker's income booms with increasing momentum and energy as they race each other to market until they hit the ceiling of fruit available and consumer demand. This causes a bust where some B farmers sell nothing and

might go broke. Then with no more income some of the B workers would give up fruit picking until the market recovers, the result then tends to ravage plants by over picking them and then letting them grow wild to recover. Each also has an incentive to work faster because they can get their energy payment for the day in fewer hours and then go and work elsewhere or use their leisure time.

There are then 10 B lines like the roots of a plant but each B line has another 10 smaller B lines running off it representing the workers. So this becomes more like the roots of a plant with smaller roots coming off the larger ones. This root system can become more complex as some act as contractors, for example of the 10 workers on one farm 4 might work for a supervisor who works for the farmer, this is then like the farmer as 1 root with a supervisor as another root, then 4 worker roots coming from him.

This is then like R grazing animals as they overfeed on plants, they eat the low

hanging fruit and leaves first and then as they overeat and damage the plant there is suddenly no more food and so they move on hoping the plants will recover to repeat the same process later.

This also creates a chaotic market because strawberries and blueberries might have slightly different seasons and reach premium prices then a glut at different times. A chart of the prices of strawberries versus blueberries would be like two of the B lines, each would grow chaotically in value as more of both strawberries and blueberries are picked, then the growth of each B line would become increasingly disconnected from the other as each moved to a ceiling then crashed to a floor.

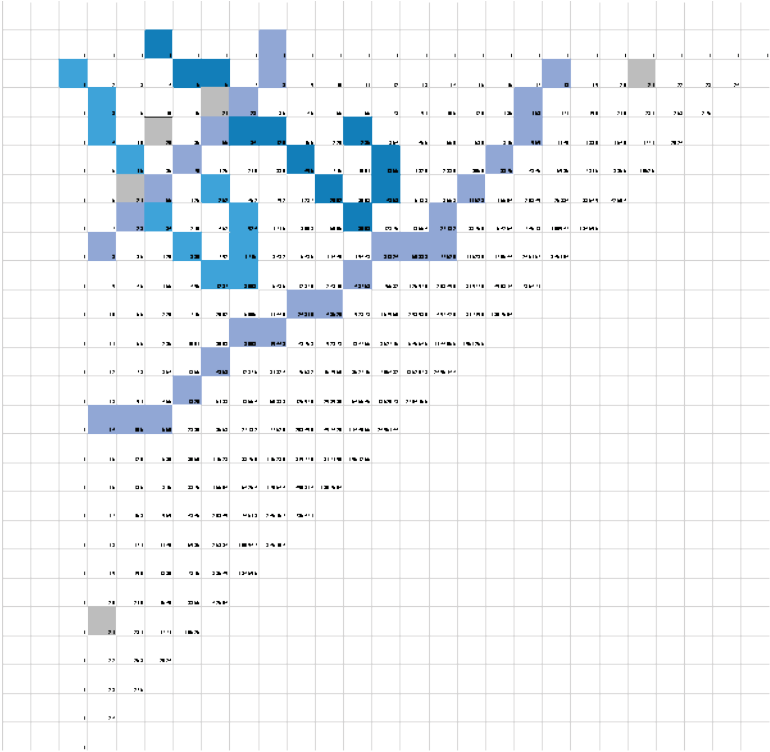
The momentum of these lines increase as each farmer tries to deceptively get his produce to market without the others seeing him, also on each farm the B workers start rapidly changing from blueberries to strawberries or vice versa to increase their yield while causing more chaotic destruction of the crops. Then when

strawberries start to hit the ceiling of a glut the prices would fall, the farmer would then be expected to pay less energy as food for more berries. Those B workers who understand this faster will switch to the other berry before the others catch on. The result then is like the B roots of a plant chaotically growing as it find small pockets of nutrients, its roots searching from side to side for other nutrients while some roots are dying off.

It would also describe two kinds of R prey overeating the grass in their territory, for example gazelles versus ibex. As they compete for limited grass in a drought their numbers and ratios of gazelles to ibex change chaotically with new births until they hit the wall of no more grass available, then their numbers decline chaotically as they starve and move elsewhere for food. Each kind of animal goes for the low hanging fruit, in this case the easiest foliage to eat which is inefficient because they might have to go over the same area again looking for grass that was missed.

Those with the most momentum of breeding and fastest eaters increase in numbers and get more food, this is like those B farmers who get the most berries to market make the most before a glut drops both prices. This assumes that consumers like each kind of berry about the same and would tend to switch from one to the other depending on availability and price. When the prices of berries start to crash those workers who made the most profits might do better, in Roy some of the slower workers might starve as prices plummet.

In the same way the R ibex and gazelles can start to starve, those that got the most grass when available and had the most offspring would survive more than the other. Evolution then pushes the ibex and gazelles into using the low hanging fruit principle to get the easy food first even if it damages plants because the other prey will do the same. Also the high birthrate guarantees more starvation but the species that doesn’t do this can get wiped out by the one that does.



In Aperiomics then comparative advantage is not always the most efficient, the problem is with chaos specialization can lead to more disasters for some. For example blueberry farmers might initially do better by picking the berry they are fastest at, however if there is a fungus that wipes out blueberries they will lose far more than if they had not specialized in one kind of berry.

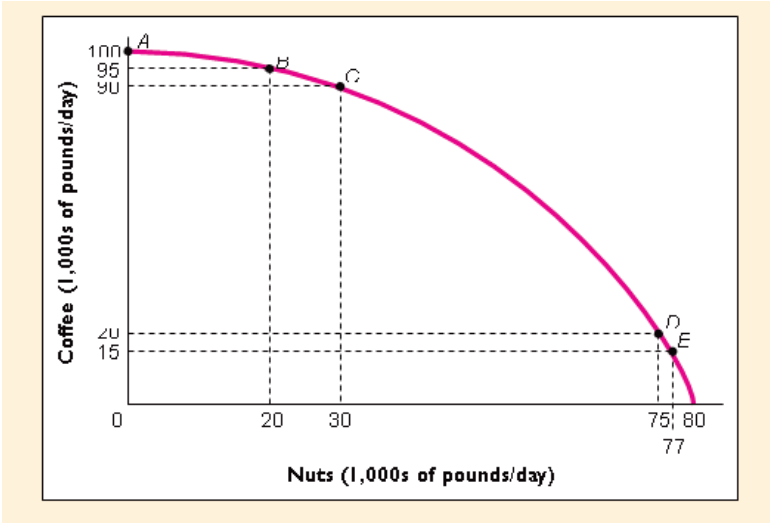
Instead of using B tactics a second farmer also hires 10 workers but he pays them 100 calories of food for an hours work. Now these workers know that is they work more slowly and efficiently they might be able to pick enough berries for the farmer but there is no incentive to work faster because they cannot leave work early. The workers then need to average out the amount of berries they pick so the farmer is happy, this is most efficiently done by their working as a Bi team. For example one worker might be better at using a wheelbarrow to ferry the berries to a storage shed and so the workers save energy by him doing this rather than each ferrying their own berries.

If a worker is injured it works out more efficient to let him recover than to have workers become more injured so their overall production can crash. The farmer works out an average production he expects from the workers, if he sees one using a wheelbarrow exclusively then it is the same to him and so he would pay that

worker to be cooperative rather than competing with the others.

If there were 10 farmers each with 10 workers like this then there would be fewer booms and busts because everyone is trying to average their production, the market price for berries would then have an average price. If there were 10 farmers each growing something different then this would create a highly stable economy where the workers could barter with each other for a balanced diet. For example the farmers might offer each worker 100 grams of what they pick for each hour of work, they could then barter this with other farms. Because each farm has a normal output the barter rate for each kind of food would become normal with some random deviations.

This would look more like a Production Possibilities Curve when plotted on a graph, the bulge in the center is like the bulge in the center of a normal curve. The Production Possibilities Curve is shown below.



B farmers can then make more profits in a boom and then lose much more in a crash while Bi farmers average out lower profits and losses, it makes sense then for some to be Bi teams paying by the hour while others are B farmers paying with energy. The random Bi farmers can then help the economy to recover in a crash while moderating a boom in price because they would not tend to put up their prices as much in a boom.

For example a Bi-B primitive economy might have people growing and raising wheat, berry, poultry farmers, milking cows,

and so on. If some B farmers specialize in what they do best then they can increase production more than other Bi teams with similar farms, however this can create more booms and busts causing some businesses to collapse which then reduces demand for some produce.

For example if wheat is high in price while eggs are low then products using both such as bread making might be driven out of business by the scarcity of eggs as B farmers won't produce them at that price. If berries are high in price and milk is low then a resulting scarcity of milk can cause flavored milk and yogurt makers to go broke. In effect this is what happened in the GFC, the encouragement of specialization and innovation made each part of the supply chain increasingly chaotic, sooner or later these booms and busts created a perfect storm which exploited the weaknesses in the market to crash it into a near depression. The Bi farmers would tend to have a normal price for eggs and milk which would partially protect the bread and

yoghurt makers from the effects of booms and busts.

Ro-R

In the Ro-R quadrant R workers also compete with each other but to minimize losses in a negative sum game, for example R workers might pick berries like B because they are scarce and if they do not pick enough then it might be disastrous. This would be in Scarcia as mentioned earlier, the rainfall might not be as good so people have to struggle to survive there. They then have a different problem to in Abundia, instead of trying to work out the greatest benefits by specializing in picking strawberries or blueberries they have to work out which avoids the most losses.

This also depends on whether time or energy is the most important factor, each opportunity they take even if it is selecting one strawberry plant over another has an opportunity cost of time or energy. For

example if they pick a plant that is hard to pick then this costs them time to get to other plants. It also cost them energy, for example if they were faint from a lack of food then picking the wrong patch might be the difference between life and death.

In the Oy-R economy energy is more important, people then try to minimize the time taken to do things by using more energy. For example Oy predators like hyenas reduce the time taken to get to their R prey by using more energy in running fast, just as the R prey do the same in trying to escape. In the same way the R workers have to use up more energy to move quickly through the strawberry patch so that other R workers don't get to the few remaining berries first.

These R workers would also have to minimize the time they spent on picking berries so they have more time to forage elsewhere, like the B workers they use the low hanging fruit principle to survive at the expense of chaotically damaging the berry crops.

1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
171	153	136	120	105	91	78	66	55	45	36	28	21	15	10	6	3	1
1140	969	816	680	560	455	364	286	220	165	120	84	56	35	20	10	4	1
5985	4845	3876	3060	2380	1820	1365	1001	715	495	330	210	126	70	35	15	5	1
26334	20349	15504	11628	8568	6188	4368	3003	2002	1287	792	462	252	126	56	21	6	1
100947	74613	54264	38760	27132	18564	12376	8008	5005	3003	1716	924	462	210	84	28	7	1
346104	245157	170544	116280	77520	50388	31824	19448	11440	6435	3432	1716	792	330	120	36	8	1
	735471	490314	319770	203490	125970	75582	43758	24310	12870	6435	3003	1287	495	165	45	9	1
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								1307504	490314	170544	54264	15504	3876	816	136	16	1
									735471	245157	74613	20349	4845	969	153	17	1

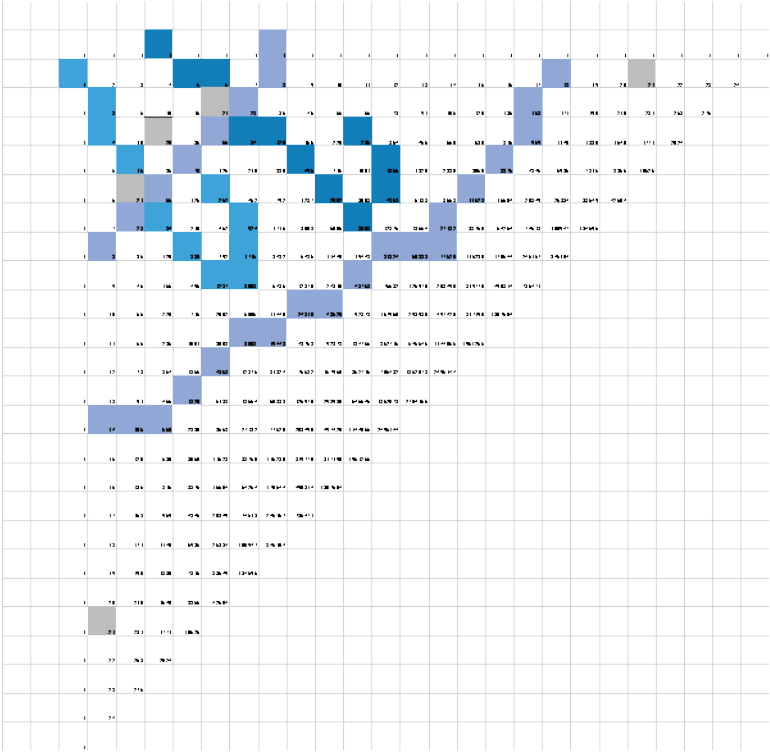
In the diagram above the two R or red lines can be workers trying to pick strawberries or blueberries on G public property. It might be a third world economy, the US in the Great Depression where people looked for food on public lands to survive, employees of the state in a communist country, and so on. It can also be the same B workers as before in a drought, suddenly farms might be in danger of being abandoned and where before people tried to maximize

their profits now they have to minimize their losses to save their farms.

Prior to the GFC B workers were trying to maximize their profits, increase their opportunity benefits, to buy consumer goods. They also speculated in real estate to try to get more money not to minimize their opportunity costs but to increase the benefits they could get out of their Biv opportunities. In the GFC crash instead of B farms being abandoned these B workers often became R and abandoned their homes to foreclosure while struggling to minimize their losses with unemployment.

Many in the US became homeless sleeping in cars and in parks like R nomadic people. By that time they had to minimize their opportunity costs, any job application often meant spending scarce money on fuel which would exclude them from another opportunity such as buying more food. These B people then went from being directly connected to abundant Gb resources to being more like R prey feeding

on the V charity from trash cans while often being robbed by Oy thieves.



Compare this situation to the two Bi lines in the diagram above, they point approximately NE or 45 degrees clockwise from vertical. In these two Bi teams each has 10 workers and they have some people who are better at picking each kind of berry, however instead of competing with each other they cooperate to pool their profits and also to help each other. Their

strategy is high on time and low on energy, it can seem lazy but it reduces chaotic risk.

Each team tends to move to the normal center of the Bi lines and pick about the same numbers of each berry with some on the edges of the normal curve specializing in strawberries or blueberries like the B workers. This assumes then that most people can pick either berry at about the same efficiency with some better at one or the other. If not then the Bi lines would be an oblique slice out of the Pascal's triangle or Cone, for example the line might be at 30 degrees clockwise from vertical. This would means there is some chaotic growth favoring one kind of berry over another, for example strawberries might be much easier to pick and so the Bi team favors them but still picks plenty of blueberries to maximize their profits in the case of either crop collapsing.

The Bi teams might pick fewer berries at times than each group of 10 B workers, this is because some Bi workers who might be better at strawberries nonetheless still pick

blueberries around half the time. However they also tend to avoid the booms and busts since there is no reason for them to keep increasing their momentum of picking because they are not competing or trying to trick each other. They can also avoid chaotic collapse from a natural disaster, for example a fungus might kill off the strawberries and bankrupt the B strawberry pickers but the Bi teams have a buffer in still having their blueberry farms until the strawberries recover. Because they have more time and use less energy then chaotic injuries are also less common, the Bi workers catch up in some productivity when B workers are recovering from injuries or are fired for not being able to work.

When the Bi teams get to market with their produce the prices for the berries are averaged out by their cooperative strategy, sometimes they get a higher price because of berry shortages. For example sometimes the B workers have given up after going broke in a previous glut which caused a crash in prices and moved on, then there

might be a shortage of berries and the Bi teams are favored for being more reliable. At other times they get less money when they arrive at the market just as the B workers have sold so much fruit the prices have plummeted in the glut, however the Bi team saves a lot of their profit to help them through the below average times.

The Bi teams then average out their profits and losses, or opportunity benefits and costs still making a good profit. In effect then a cost benefit analysis can be an absolute assessment if it only refers to one business, for example the B or Bi workers might do a cost and benefit analysis on their farms regardless of what other farms are doing. However opportunity costs and benefits are a relative assessment, the point is not so much how good the farm is doing but how good in comparison to other jobs available. So opportunity costs and benefits are more about the margin between one job and another, however this can still refer to average opportunity costs and benefits.

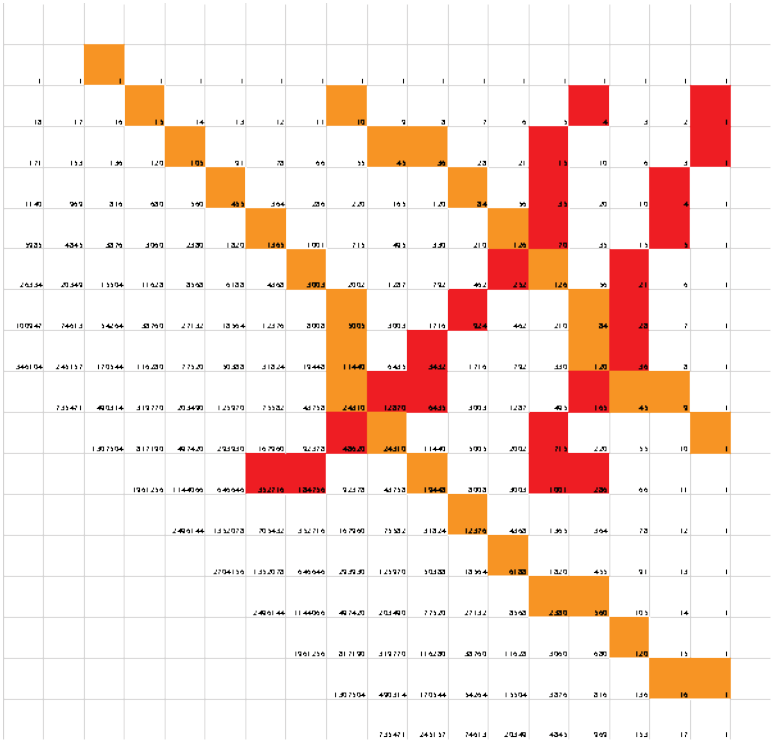
For example the B farmers might work out their opportunity costs and benefits, when the opportunity cost is negative one day then they might move to another job losing all their investment as sunk costs and hence irrelevant. However taking an average opportunity cost might require comparing a year's wages on both farms dividing by 52 to give an average opportunity cost to working on one farm compared to another.

In that case then sunk costs cannot be excluded because the B workers would be investing these sunk costs all the time, for example sunk costs might be the experience relevant to one farm or repairs to machinery that has to stay on that farm. When this is averaged out over a year however these sunk costs are part of the cost benefit analysis, otherwise no costs can be regarded as not sunk costs.

The Bi workers are like Ro herds of grazing animals such as buffalo that instead of competing with each other for food cooperate and do not vary their numbers chaotically then die off with a lack of food,

these animals also seem more lazy as do Y lions because they take their time and conserve energy. The Ro-R diagram below also then represents the two kinds of prey in the animal kingdom.

The red orange or Ro lines can be Bi teams that have fallen on hard times, they were not innovative enough and did not take advantage of boom prices enough to make a profit. Then they might form a Ro team and try to minimize losses, their cooperative strategy is still less efficient in some ways but they could easily minimize losses less than the R workers. For example when food is very scarce the R workers have a greater chance of starving than B, the berries they over pick in good times according to the low hanging fruit principle would often spoil in a market glut. The Ro gang however would have a cooperative strategy of hunting for berries and pooling them so any individual is less likely to reach a tipping point of starvation.



The Bi teams then can reduce chaos by averaging out their income, however their plans can be upset by too strong a boom and bust from the B workers or from resources becoming scarce such as a drought. Often their strategies become stagnant because they moderate chaos but also work against them needing to sometimes work hard and fast like B. For example if the weather becomes chaotic then there might be sudden storms and wild growth of berries followed by long

periods of drought. If the Bi teams do not speed up when it rains then they might run out of food in the drought.

The market then becomes a mix of chaos from the B workers creating booms and busts and the Bi teams normalizing the prices with a more dependable random system, it can also have some chaos and randomness from Ro-R workers foraging on G abandoned farms and public lands or working on government farms. The prices and quantities of berries would then be moderated from their highs and lows by the Bi and Ro teams but they can still fluctuate wildly at times causing trouble for the Bi-Ro teams.

No color is better than any other, sometimes it is better to work competitively as a loner and at other times as part of a team. Aperiomics is about the consequences of color interactions, not about one color code being superior to others. If any colors are suppressed, such as encouraging competition over cooperation

in an economy it leads to the suppressed colors trying to reassert themselves.

For example if a Biv economy tries to break up Bi unions then work will require more energy and less time in Iv-B competition, the result will be a society that speeds up until it may hit a ceiling like the GFC and crash. If Bi unions are encouraged then work might be done more slowly and with less energy, the result is a more stagnant economy. Often the colors will rebound violently to regain their efficient rations, the GFC was like this where the economy became too Iv-B hitting a ceiling then crashing into V-Bi stagnation.

In the case of encouraging an Iv-B economy it leads to increased innovation, mutations of goods and serves, booms and busts, etc. Encouraging a V-Bi economy leads to stagnation, evolution of existing products and services, stability around normal conditions, and so on. However an economy will grow with a bias to some colors depending on the resources available, for example an Amazon rainforest

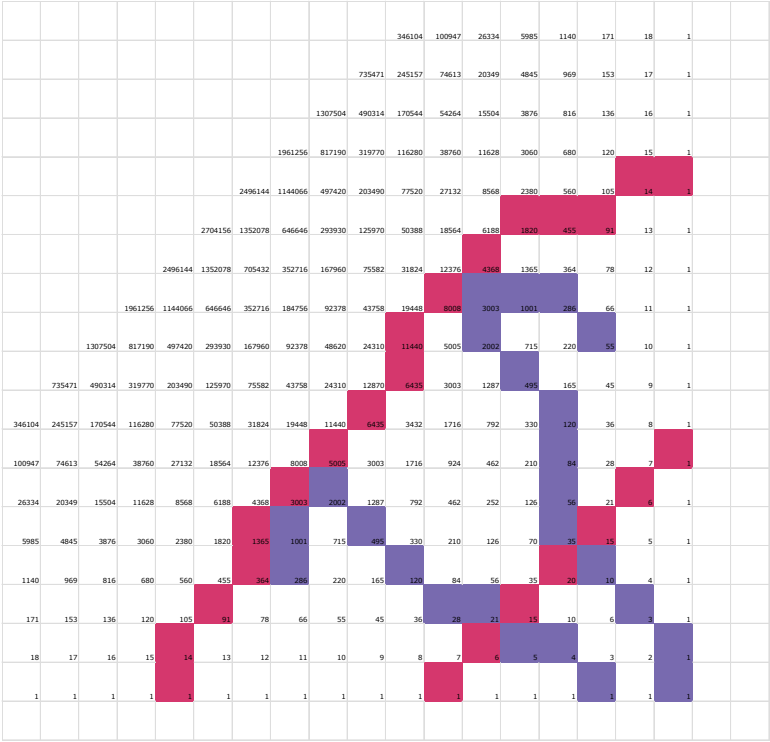
might be more Iv-B because there is more energy available from sunlight, plants and animals can grow and mutate quickly and also collapse .A rainforest in a colder climate might have less energy from the sun so it is more V-Bi and stable, plants will be much older and with fewer mutations.

So economic crises such as the GFC need not be the fault of the polices followed but that the Gb resources available use more energy and so the system speed up and becomes prone to booms and busts.

V-Iv

In the V-Iv quadrant the opportunity costs and benefits can also be graphed in Aperiomics as shown below. However these are now responses to R-B revolutions or innovations, and Bi-Ro evolution of existing ideas. For example R-B people compete with each other and so they need to innovate if possible to maximize profits as B or minimize costs as R. this is part of evolution in the sense that if those that

cannot innovate might die or have fewer offspring than those that can.



However Bi-Ro teams tend to evolve existing ideas rather than innovate, they in effect normalize revolutions and inventions from R-B. For example communism was an R revolution but after a while Russia became a less energetic Ro state where the ideas of communism evolved, other communist states also tweaked the Marxist theories to produce more stagnant

economics with less energetic R revolutionary fervor and more Ro normality.

Iv and Oy tend to counter innovate or have counter revolutions to survive their competition, this is why R communist were afraid of Oy counter revolutionaries such as the Nazis in Germany crushing their revolution. This is like R prey such as gazelles having a genetic revolution where some mutate to run faster and then these genes spread through a dominant faster male getting more females. The result is like the R communist revolution where the R prey are now free from their Oy predatory oppressors such as hyena. However they would fear a counter revolution where the Oy predators mutated to run faster and those that could not starved.

In the same way then R people must innovate even in picking berries to counter Oy counter innovations, for example R might hide their berries in new places while Oy thieves always try to find them. Y-V teams are counter evolutionaries, where Bi-

Ro teams try to evolve existing ideas then Y-V responds by trying to counter these evolutions with opposing ideas. For example B farmers might come up with revolutionary ways to pick berries faster and Bi teams evolve this into a more normal and still efficient system. Then Iv agents might make jam from the berries and counter innovate to handle the increased amount of berries available, the V teams then counter evolve the Oy ideas to make them more stable and resilient to chaos.

In the Bi-B quadrant then the workers either B competed or Bi cooperated in picking strawberries and blueberries. In Iv the agents try to counter innovate to take advantage of the B innovations such as specializing in picking certain berries, picking the easiest to get first, racing their produce to market, etc because this creates gluts of berries that will rot if not sold or preserved. It also produces shortages of berries because with a glut B farms and workers go broke and get out of the berry business until prices recover.

In the diagram above the horizontal X axis can represent strawberry jam making, Iv agents worked out how to make this because they could buy strawberries cheaply to experiment with. The vertical Y axis can represent blueberry wine, the Iv agents discovered that as some blueberries rotted they fermented to give a smell like alcohol and experimented making wine with them.

These jam and wine businesses would later lead to further Iv counter innovations as branches of further specialization because of other gluts in Bi-B, for example strawberry wine, blueberry jam, using wheat eggs and milk to make strawberry and blueberry flavored scones and muffins, strawberry flavored milk, and so on. So the Iv businesses would specialize as more Iv branches just as the B farms specialized into more complex B roots.

These counter innovations would then spur further innovations in the Bi-B quadrant, for example the demand for these Iv scones might cause some B farmers to secretly

grow more wheat and keep more chickens for eggs. They think they can deceive others and get to market first when prices for wheat and eggs are higher, this will then produce a chaotically different glut of wheat and eggs to that before the invention of these scones and muffins.

Without the Bi farmers and pickers these increasingly specialized Iv-B businesses would lead to more complex and chaotic booms and busts, Iv agents might be left with unsold muffins that go stale and cancel orders for eggs and milk which bankrupts some Iv agents and B farmers. Some berries might be diverted to extra wine production which keeps longer but is slow to sell with a glut, this causes the Iv wine makers to sometimes go broke as well.

The two quadrants so far represent the B competitive roots, the Bi cooperative upper root system, the Iv competitive agents as branches, to complete the colors the V teams shown above as violet lines are included. Some Iv agents might find they do better specializing in different counter

innovations, however they often suffer the disadvantages of booms and busts as well as the market prices sometimes being dominated by the Bi teams.

As a counter evolutionary response to the Bi teams some Iv agents would form their own V teams, where the Bi teams combine strawberry and blueberry production to reduce chaotic booms and busts the V teams combine strawberry jam and blueberry win production to stabilize their profits. For example when the prices for strawberry jam are low the prices for blueberry win might be higher or vice versa. Some Iv agents still continue to work as loners, they can also become salesmen for the V team and sell their products on commission.

Other Iv agents compete against the V cartel trying to make more profits in the occasional booms than they would by joining V. They might also have ambitions to create a rival V cartel such as with blueberry scones and strawberry wine, or grow large

enough to join the V cartel on favorable terms.

The last color remaining in the Biv quadrants connects them to each other, this is I or indigo representing the neutral and free market with its civil police and law courts. Here B, Bi, Iv, and V can take their goods and services to sell on neutral ground, they can also make direct sales to each other but often they get higher prices by letting a range of people see them in a marketplace.

Prices and quantities of goods and services then depend mainly on six interactions in both Roy and Biv , each can affect the economy. The first is where B and Bi workers pick berries, other farmers might grow wheat, cut down lumber, have dairies for milk and beef, as well as poultry for eggs and chicken each with interactions between B loners and Bi teams. As mentioned earlier in the book the intention is to keep this economy primitive to illustrate economic principles, so far all of this would be

consistent with the Roman Empire for example.

Additionally there are five different kinds of miners with B workers and Bi teams, iron ore, gold, salt, coal, and copper.

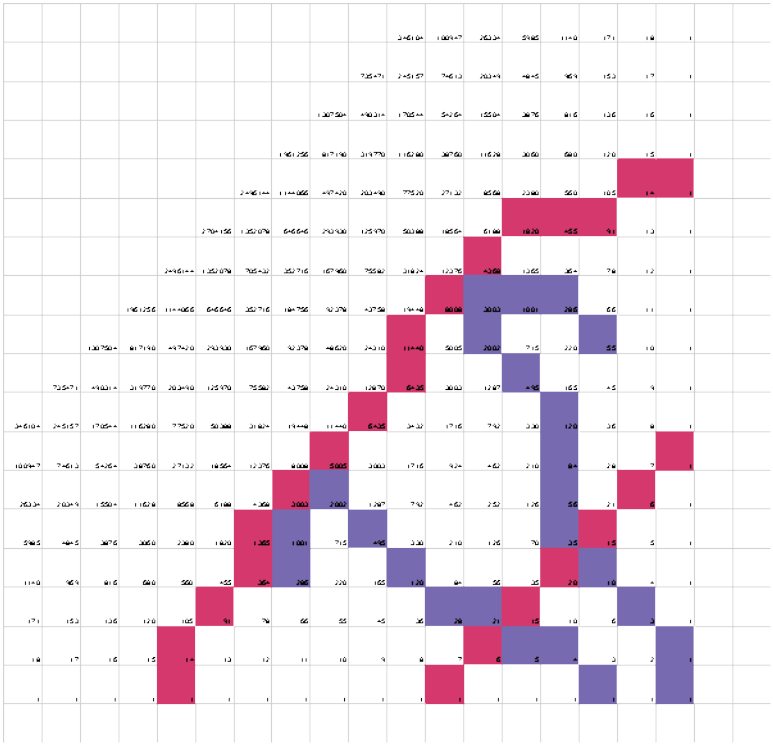
As mentioned earlier the B loners compete with each other deceptively and can make prices boom and bust while the Bi teams tend to moderate the prices. B and Bi can trade with each other, for example a B strawberry picker might buy or barter for wheat and eggs from another B farmer or he might go to a Bi team. He could also barter with R or Ro farmers in nearby Scarcia. A Bi team mining iron ore might barter for or buy milk and coal from B or Bi farmers or Ro-R farmers in Scarcia. The primitive Bi-B and Ro-R economies can then buy and sell goods and services inefficiently but it has little capacity to refine and improve them.

In the same way the V cartels and Iv agents can buy and sell to each other, eventually they might create counter revolutions and

counter evolutions from the Bi-B goods and services to produce steel, copper pipes, timber furniture, salt in bread and scones, salted and preserved beef, charcoal for fireplaces, and so on. The Iv agents tend to be counter revolutionary, they take advantages of B revolutions in mining copper to work out how to make copper pipes.

The V cartels tend to be counter evolutionary, they would buy some of these new inventions but demand evolutionary improvements such as thinner and straighter pipes, better tasting muffins, biscuits that last longer, more varied kinds of timber furniture, and so on. These products are not really new but as they become more normal they might appeal to a wider normal consumer. This often happens in business where inventors innovate but fail to make a product with wide appeal, for example Nokia arguably invented smartphones and Microsoft tablet computers but both failed to evolve these products into high sales. Then Apple was able to take these established ideas and

tweak them into something with mass appeal leading to large increases in sales.



In the diagram then the V and Iv lines can represent trading and creating these goods and services, some still boom and bust as Iv agents compete to outdo each other while others are more stable because the V cartels tend to pay a normal price with few deviations. Also the V cartels when they sell goods and services can have the Iv agents trying to buy cheaper from V and then resell

the goods to other colors, this can create more chaotic variations in the prices and quantities available.

The V cartel might then respond sometimes by restricting supply to agents who try to trick them, in this way they stabilize or normalize prices and quantities of their goods and services while reducing the profit maximization possible from deception. Sometimes though the Iv agents still win by spotting bargains V misses, at other times they might speculate in V goods and lose money when other Iv agents happen to sell the same things creating gluts.

Another interaction mentioned earlier is Iv-B where the Iv agents and B workers try to outwit each other like people playing poker. They might try to deceive and bluff each other to make more profits which creates more booms and busts. For example B workers picking strawberries might try to bluff Iv agents that make strawberry jam, each tries to convince the other that their product is superior or if they don't get more money they may go elsewhere.

Like bluffing to win pots in a poker game this creates gluts and shortages of both strawberries and jam, sometimes there might be too many strawberries as B workers compete to get to the Iv agent before other for the best price. At other times there might be too much Iv jam as agents compete to grab cheaper berries and then face a market glut and possible bankruptcy. Iv-B interactions can then cause chaos just as Iv and B can individually.

V-Bi interactions are where the V cartels would buy raw produce from the B teams, because both tend to normalize prices and quantities these deals are usually around the same price with random deviations from them. Both tend to evolve new goods and services rather than create revolutionary ones, for example Bi teams might try to grow tastier strawberries by combining different strains, B workers might instead try to innovate by finding new kinds of berries or working out how to make them grow faster.

Because V and Bi favor the normal customers when there are too many V-Bi sales the market can become stagnant with fewer innovations but also with fewer booms and busts, they tend to ignore opportunities for innovation because they come to rely on Iv and B for this. However when Iv-B collapses then this innovative engine is lot for a time as happened after the GFC, often the V-Bi economy does not realize this and cannot understand why the economy is stagnant. Often this is because Iv-B is so deceptive and misleading that no one really understands why it is working when things are booming and then what went wrong in a bust.

It is the same problem in watching a poker game, looking at the bids sometimes it seems everyone has poor hands because of low bids but it can also be because of a lack of bluffing. In the same way the bluffing aspect of the Iv-B economy is needed to impress V-Bi businesses to loan them money, when V-Bi loses confidence such as after the GFC then Iv-B might have just as

many ideas but cannot get enough funds deceptively to build momentum.

V and Bi can engage in wars of attrition against each other in deals, for example the V cartels might want large volumes of strawberries and blueberries at low prices, the Bi teams like unions might then threaten to go on strike and cut off all supplies. Generally as with the Bi unions striking or V cartels locking out unionists the prices and quantities are worked out according to who has enough savings and reserves to outwait the other.

The most efficient deals however tend to occur in the I market where Iv agents make deals with Bi teams, this combines the chaotic deceptions of Iv with the transparent random behavior of Bi. The Iv agents might be trying to buy cheaply from the V cartels and sell to Bi in the I market, sometimes the Bi teams and consumers buy directly from V but they can get smaller quantities and some bargains from the Iv agents. For example V might have old stock they sell cheaply to Iv agents who then try

to sell it quickly in the I market before it goes stale, Bi consumers who want to eat it that day might then get a better deal. The Iv agents try to get a better deal with price discrimination to compete with each other.

The Bi teams can also sell some of their goods and services in the I market, they might sell some directly to the V cartels but other produce goes directly to market where Iv agents sometimes pay more. For example the V cartels might need more wheat sometimes and so Iv agents stock up on it from the I market, then they either sell it for a good price or lose all their money if it rots before selling it. This can be a form of arbitrage such as happens on the stock market, Iv agents look for small variations in price of goods such as wheat.

Often this is related to the Iron Law of Price, that there is a normal price and if the wheat can be bought on one side of this normal price then profits can be maximized. For example V might expect to pay an average price for wheat and so will sometimes pay more expecting to pay less later, the Iv

agents might anticipate this and contract to buy wheat from Bi for delivery in 6 months when prices will be higher making a profit. At other times Iv believes the price will fall so they short the price by making a contract with V to sell at the current price in 6 months, then buy the wheat cheaper from the Bi cooperative.

Iv then uses chaos to try to make money from the random deviations on a normal curve as in arbitrage, however when this occurs too much it introduces so much chaos into the prices that booms and busts are created. Then the models based on this normal curve such as the Gaussian Copula fail when a tipping point is reached as in the GFC.

Iv agents then make their profits from competing and privacy, they are kept honest to some degree in the I market by the neutral I justice system. For example if an Iv agents deceptively sells stale eggs as fresh then the I court might order they compensate the Bi consumers who bought them. If an Oy agent did this in Scarcia they

might be prosecuted as criminals by the O police there.

Prices and quantities can then fluctuate in chaotic and random ways not only in these color interactions but also in smaller color variations like different color tints. For example a B worker might sell some of his strawberries to a Bi team and get some wheat back, then go to market and sell some of this wheat to an Iv agent for some blueberry wine and strawberry jam, then he goes to the V cartel to sell his remaining strawberries and buy some steel pots and pans. In a modern economy this would be done with money instead of bartering but this primitive economy example includes gold mines, so it can then evolve money as gold coins to substitute in some cases for barter.

Different transactions for this B worker are chaotic and other are random, when he deals with Iv they bluff and deceive each other but the Bi and V teams demand honest transactions. A V cartel member might have excess charcoal to sell and goes

to the I market making deals with Bi teams in wars of attrition grinding each other up and down on price.

He might then meet an Iv agent that tries to deceive him and also a B worker looking to trade the charcoal for eggs he knows are stale. Here then the V cartel seller works on averaging out profits and losses randomly, he might encounter chaotic booms and busts in prices with the offers he gets from the Iv and B people and random deals from the Bi teams.

Y-Oy

The Y-Oy quadrant show below can act in a similar way to the V-Iv quadrant.

1	15	120	680	3060	11628	38760	116280	319770	817190	1961256								
1	14	105	560	2380	8568	27132	77520	203490	497420	1144066	2496144							
1	13	91	455	1820	6188	18564	50388	125970	293930	646646	1352078	2704156						
1	12	78	364	1365	4368	12376	31824	75582	167960	352716	705432	1352078	2496144					
1	11	66	286	1001	3003	8008	19448	43758	92378	184756	352716	646646	1144066	1961256				
1	10	55	220	715	2002	5005	11440	24310	48620	92378	167960	293930	497420	817190	1307504			
1	9	45	165	495	1287	3003	6435	12870	24310	43758	75582	125970	203490	319770	490314	735471		
1	8	36	120	330	792	1716	3432	6435	11440	19448	31824	50388	77520	116280	170544	245157	346104	
1	7	28	84	210	462	924	1716	3003	5005	8008	12376	18564	27132	38760	54264	74613	100947	134596
1	6	21	56	126	252	462	792	1287	2002	3003	4368	6188	8568	11628	15504	20349	26334	33649
1	5	15	35	70	126	210	330	495	715	1001	1365	1820	2380	3060	3876	4845	5985	7315
1	4	10	20	35	56	84	120	165	220	286	364	455	560	680	816	969	1140	1330
1	3	6	10	15	21	28	36	45	55	66	78	91	105	120	136	153	171	190
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

The Oy orange yellow lines radiate out from the center like the Iv lines of the V-Iv quadrant, they represent more predatory and chaotic agents that play a negative sum game of minimizing costs and losses rather than maximizing benefits and profits. They often treat the people in the Ro-R quadrant as prey, for example Y-Oy might be imperialists and capitalists of the early British and other empires and Ro-R can be their colonies.

In some cases there was a positive sum game between the colonies and the

empires, for example Bi-B India benefitted from being part of the V-Iv East India Company in the British empire by becoming more industrialized. Generally people were paid for their goods and services, these were usually raw materials that were shipped to the center of the empire and in return more refined goods were brought back to the colonies.

The Y-Oy empires were more predatory however such as the Belgian empire in the Congo, without a criminal O police to moderate their behavior empires usually became two warlike interactions with Oy-R and Y-Ro. For example the Y Nazis used highly visible and team oriented armies to conduct a war of attrition against other Ro countries in Europe that were preyed on, this was more overt when they attacked Ro Russia because communism was based on a Ro like philosophy.

Once these European countries were pacified then Oy-R interactions kept them subjugated, the Oy Gestapo engaged in a war of secrecy and deception to find equally

deceptive R terrorists and partisans. In France there was more of an O moderation of this occupation, the Vichy government to a large degree policed itself and kept the R terrorism down in exchange for more freedom for its people. While this Oy-R phase continued there was a Y-Ro war of attrition against the British such as the Battle of Britain in the air along with an Oy-R deceptive battle with U-Boats versus destroyers.

In the same way the Y-Oy parts of a government might act in a predatory way, for example they might be either nationalized businesses that can gouge the Ro-R citizens as a monopoly giving perks to their bureaucrats or they might be corrupt government departments aiding V-Iv companies in overcharging people.

The Biv color interactions just described are overtones of those in Ro-R and Y-Oy, they work in a similar way except in Roy they minimize losses and often engage in criminal behavior rather than break I civil laws. For example in the Soviet Union there

was little or no Biv free market system because there was hardly any Gb private property. Because of nearly everything being G public property the same kinds of businesses found in Western economies had to be run by the government.

Instead of B farmers and miners then there were R farmers and miners working for the state, they could still be secretive and deceptive such as in creating a black market with stolen goods. For example people might buy fresh eggs and milk on the black market or wait for longer to get Y-Ro rations from the team based economic system. In effect then with weak O criminal policing the system became corrupt, a flourishing black market ran with R people providing basic food and materials, Oy predatory businessmen would sell more refined goods and services sometimes stolen by other Oy petty criminals and overseen by the Y mafia.

Set against this Y imperialism inside Russia was Ro communism that acted much like a Bi cooperative in a Biv economy, people

worked as teams on state owned farms and in mines to produce goods and services cooperatively with little specialization and at normalized prices. Because Y-Ro is time based this meant that people could wait a long time for these goods and services.

A Biv economy can also have a large Roy economy run by the government, this can sometimes become corrupt if the O criminal police are weak or corrupt themselves. For example government officials might ask for bribes to do their jobs, this can be a secretive Oy-R system where predatory government officials prey on people. The most efficient economy tends to be a mixture of Roy and Biv, G and Gb property. It is also a mixed economy such as in most advanced economies where there is G government intervention in the Gb private enterprise system.

Price discrimination

This can lead to different kinds of price discrimination where Iv agents might pay

different prices from the V cartel. V can also use this directly with Bi and B consumers.

Hurdle method

In this system the V cartel might offer discounts to Iv agents according to who is fastest or has the most energy, for example V might have excess stock they sell cheaper on a first come first serve basis. This works well with Iv agents because they compete with high momentum and speed anyway. Often this can be chaotic by introducing a tipping point for example the fastest Iv agents might maximize their profits but the slower ones if they keep missing out on discounts might go bankrupt because they can no longer compete on price.

Other hurdles might require more energy to be expended by the Iv agents, for example they might have to pick up the goods themselves even from remote locations.

First degree price discrimination

This would mean the V cartel would perfectly understand the maximum they could get from Iv agents and B consumers, however this can be like the principal agent problem where Iv and B are so deceptive that V is misled as to how much they really want the product so maximizing profit here is unlikely.

Second degree price discrimination

Here the price might vary according to the quantity demand by Iv, for example the agents might buy in bulk and then sell small quantities to other buyers. More likely though this is a V-Bi interaction where a large Bi cooperative might negotiate for a large purchase, in the same way the V cartel might get a discount for buying large amounts of berries from the Bi teams. It would be hard for the B farmers to compete like this because they would not cooperate enough to get large amounts of berries together.

This can also occur to some degree in the I-O market where Bi consumers will buy large

amounts of strawberry jam and blueberry wine from Iv or V if the price is discounted, this is a common situation with supermarket sales for example. The supermarket acts as a Bi cooperative and contracts to take large amounts of goods at a discount knowing the normal buyer will take it giving them a normal profit.

Third degree price discrimination

In this case V might sell at different prices in different cities in Abundia, then sell for less in Scarcia because people cannot afford to pay as much. This can also be time and energy based, for example a V electricity supplier might sell energy at different prices depending on what time of the day it is. When people have more time flexibility to use this power then the energy cost might be lower, for example hot water systems might heat during the night and store this heat for the next day.

At other times people cannot wait as long for the energy and so pay more, for example in a heat wave a business might

find its productivity plummets chaotically without air conditioning. This can also be priced on the margin where cheaper electricity is from power stations that run continuously, they are then a low energy high time V-Bi system. Then with booms and busts in energy demand more expensive power plants on the margin are started up and so prices are more expensive at peak times.

This system can break down into a V-Bi and Iv-B disconnect with strong I-O policing as was seen with Enron. For example they would buy up electricity at cheap prices to create a shortage then sell it back to California at a higher price. At other times they would deliberately idle some power plants to drive up the price so they could resell energy for a higher price. These are Iv-B deceptive tactics that create chaos just as in the subprime boom.

Statistical discrimination

Sometimes the V teams will use statistical analysis to charge different prices, for

example younger people have more car crashes and so pay higher car insurance. In effect then this is modeling with an assumption the consumers are random, this can be the case such as with a V company selling to Bi consumers.

However it is also the cause of the GFC to some degree, for example the Gaussian Copula as a 2D normal curve was used to predict the risk of defaults with Credit Default Swaps. It failed to predict more chaotic and deceptive parts of the market Such as B people using liar loans or Iv agents falsifying the documents on subprime loans. This added more chaos to the pricing, it could also cause the Gaussian Copula or normal curve to become an oblique slice through Pascal's Triangle or Cone.

Costs and benefits as proportions versus absolute amounts

The cost versus the benefits of decisions in Aperiomics are worked out differently according to a person or organization's color code, this also happens according to

whether these costs and benefits represent a proportionate or relative difference versus an absolute one. For example a person might only change from eating strawberries to blueberries if there is a 10% difference in price, another person might change if blueberries are a fixed dollar or barter amount cheaper.

This is like thinking at the margin versus thinking at the average, for example in an Iv-B economy competition drives people to take any edge they can find before someone else does. Since the system accelerates in momentum towards a crash the best most can do is get ahead enough in the competition and get out before the end. In this case then taking a profit at the margin is usually a good idea, sometimes even breaking even as a G-Gb strategy or minimizing losses in Oy-R by selling nearly stale goods early at a small loss can be wise.

However in V-Bi people tend to work as a team and assume that many prices changes are random, so if someone comes to a shop

and offers a low price an Iv-B strategy would be to take it as a sure profit.

However a V-Bi team might be testing them and afterwards demand all their other sales be at that price because the seller has shown his hand as to what price he can sell for. A Bi cooperative might respond to someone offering a low price by accepting it randomly and then averaging it out by charging higher prices later to give an overall normal price.

This works on the assumption that the buyer was random, if a Bi team then demands more at the same price the seller can work out his averages and simply refuse to sell too many at a lower price. The difference is the Bi team has not shown any additional information by accepting a lower price once because they do this randomly, doing it once does not mean they have to do it again in any predetermined pattern.

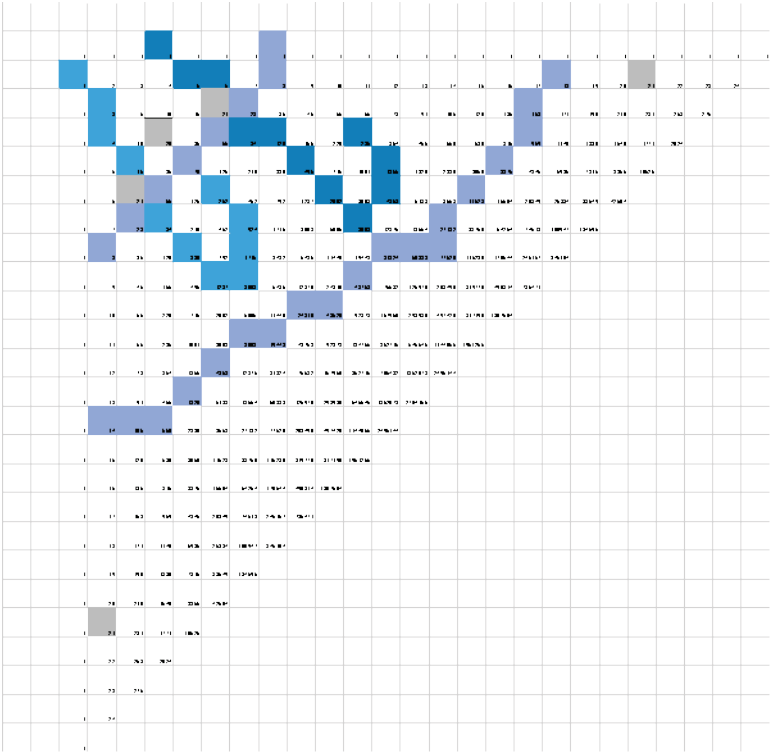
This is how many large department stores work, they offer special prices on goods occasionally so Iv-B people will come in

more often waiting for bargains and then buy at a normal price because of their sunk costs in coming to the store. For example they might have wasted fuel in coming to the store and so buy something so the trip is not wasted rather than coming back over and over looking for a bargain each time. These buyers might try to bargain at the department store on the basis that the store sold at a discount once and should so it again, however the store knows on the average most people will come back and pay the higher price until the next discount sale.

The Iv-B person then can waste a lot of energy that appears to be economic activity, by haggling with customers on each of their prices they might overall sell at the same average as the V-Bi shop that sticks to an average price with some deviations from it.

In the diagram below B farmers might grow wheat and sell it in the market next to a Bi team selling its wheat. Price can be on the Y axis and quantity sold on the X axis, the B

lines then represent prices and quantities sold booming and busting in scarcity and glut, also with some speculation as people panic buy when they think prices will go higher or wheat will be scarce.



This selling at the margin then tends to hit floors and ceilings over and over, as the prices of wheat rises in scarcity B makes more profit but will make more losses later in a glut of wheat. Because they are so highly competitive few get a chance to save

much money from this except for those much faster and more deceptive than the others. Consequently each cycle some will go broke and will have to start again.

The Bi team however has a stagnant business that charges a normal price, with some chaotic customers it might use price discrimination to take a lower price for older wheat to get the sure profit and for other premium customers it might charge extra for better wheat. Normal wheat however is usually a normal price, instead of some B farmers going broke either the whole Bi team survives or they all go broke together. Sometimes however when they are close to bankruptcy this might break up the team, this is like a Ro herd of buffalo being attacked by predators where towards the end they might scatter break their team strategy.

The Bi demand curve then gets pushed to the center by the buyers and sellers, if the price rises too much then the buyers want less wheat and if the price drops then the sellers don’t want to sell as much. Each of

these is also elastic in both directions, the customers might buy less if the price goes up but will only buy a limited amount more if the price goes down abnormally. This is because they might eat a normal amount of wheat and aren't competing with others to buy this wheat.

In the same way the Bi cooperative might sell a little more when the price goes up but don't want to price gouge their customers so might prefer to sell out at a lower price than they can get. Then they don't drop their price as much in a glut, however they usually retain many customers because they are not deceptive or creating ill will with price gouging.

The problem of price and quantity then depends on whether people have a competitive or cooperative strategy, this also extends to other aspects of goods and services such as quality. As mentioned earlier a premium jam might get a higher than normal price while an inferior jam might get a lower than normal price. A Bi cooperative in the same way might charge a

lower than normal price for strawberries close to being rotten and a higher than normal price for the freshest and largest ones, they might also mix them together as often happens at fruit shops so people get a normal quality.

A B seller has to devise a strategy for quality with marginal not average prices, for example with older strawberries he needs to sell them more quickly than his competitors. If he doesn't he might have to charge more later on other goods and potentially go into a spiral of losing money if he cannot, in a perfectly elastic market his customers would desert him so he is always racing against his competitors to avoid this. He can then move into the Ro-R quadrant where he has to play a negative sum game of minimizing losses better than his competitors.

In Aperiomics as will be explained later the perfectly competitive market is not elastic but brittle, this is because if a company has to raise its prices above its competitors it can often collapse. For example a company

makes losses perhaps from deception and has to raise its prices, it loses many customers so because of its fixed costs it must raise them even more and goes into a chaotic tailspin.

An Iv-B business increases profits at the margin by using leverage, this is done in the plant kingdom by the roots and branches of a tree increasing their length and narrowing their width like the construction of a lever. They can then grow much longer with the same amount of wood.

Once leverage is available those Iv-B people who don’t use it are unlikely to be at the front of the momentum of a boom, they cannot accelerate their profits as fast as others can and will usually lose from being behind with fewer savings in the bust. Iv-B people can rarely borrow money from each other for leverage because their competitors gain more from them losing, also Iv-B is highly deceptive so people don’t really know whether the money will be paid back. Loans for leverage can be money but can also be any goods and services, for

example an Iv agent might borrow blueberry jam stocks from a V cartel to sell in the I-O market and this increases his momentum of sales in a boom.

A salesman then uses the leverage of his employer's stock, when these are very large such as with a V cartel then the Iv agent has potentially thousands of times more stock available to sell than he could afford to buy himself. He might sometimes buy stock under option to resell, if he cannot then he loses his deposit. Other Iv agents without enough different branches of this stock then can be at a competitive advantage and go broke in the bust or shake out coming.

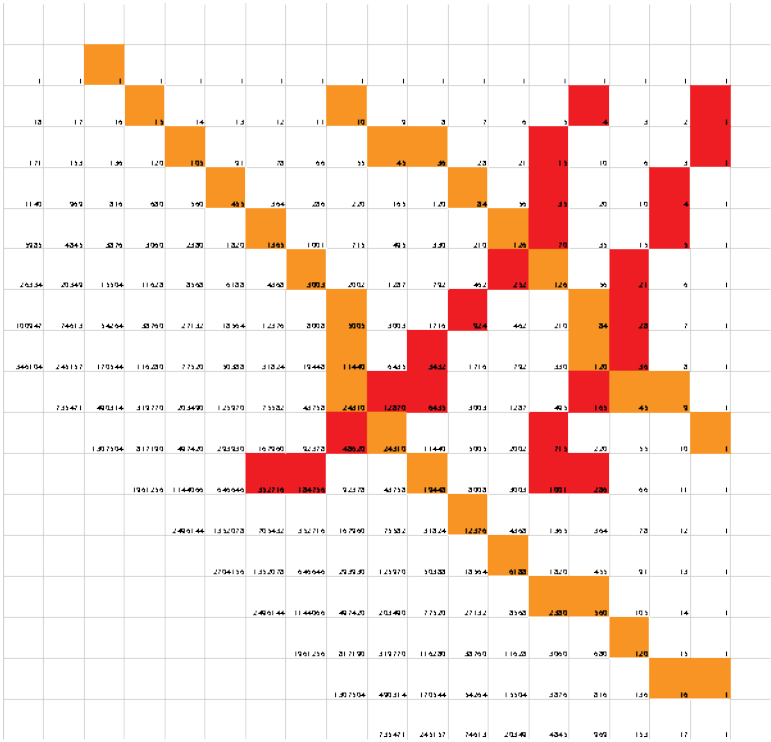
For example a salesman in a department store might be able to sell all the goods in it as if they were his own, he also usually gets a wage plus commission. His ability to maximize profit is highly leveraged, the V department store absorbs the chaos from his mistakes, for example he might misrepresent goods in a sale so the store has to refund the customer or even get sued.

A B worker can also get leverage from Bi cooperatives, for example a B wheat farmer might get loans to plant crops if he agrees to sell all his wheat to the cooperative. Bi takes the chance that chaos such as drought or the farmer stealing the money won't affect his average profit much. B might also take out an option to sell to the Bi cooperative in case the price of wheat drops, the Bi cooperative insures against this by its savings. In this way options and futures markets can be formed, they can also become completely chaotic where Iv agents and B workers try to use futures and options to compete with each other.

For example an Iv agent might take an option to buy strawberries at a price from a B farmer, he hopes to sell it at a profit to the V cartel for making jam or the Bi cooperative to add to its reserves. This gives him extra leverage because like getting stock to sell from the V cartel he doesn't have to buy it if it doesn't sell.

The difference here is there are no teams involved in the transaction, this can become more unstable if the Iv agent makes his own jam and the B farmer has no other clients. When jam prices are increasing the Iv agent might take options on strawberries in case he can sell more on the margin, this can cause the B farmer to go bankrupt if the option is not completed or the Iv agent cannot pay for what he promises.

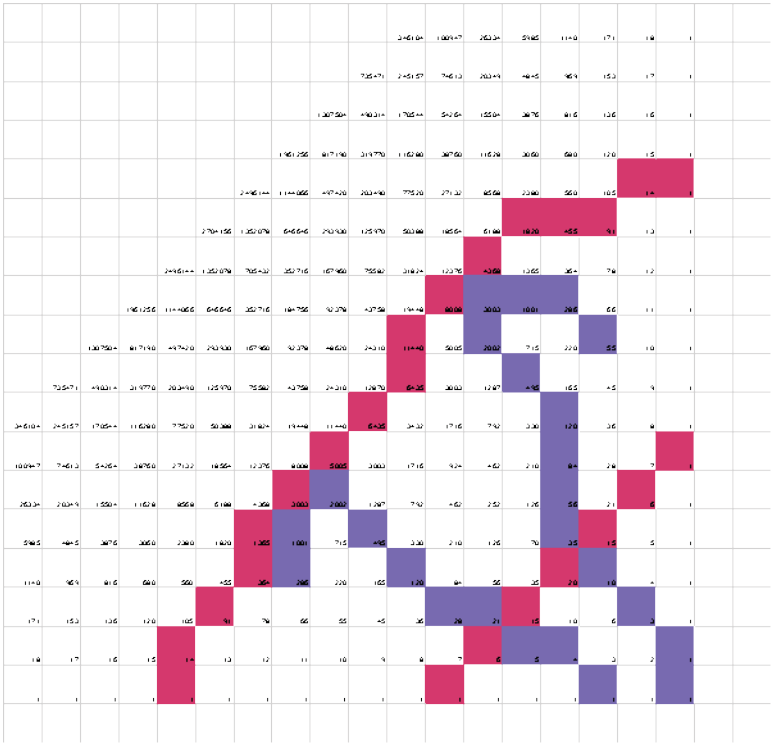
When the market prices are low then strawberries might not be worth growing, the B farmer then might become R and tries to minimize costs and losses in a negative sum game. The Iv agent might also become Oy and sell in a predatory way, now he can see his clients as potential prey to avoid bankruptcy with. This Iv-B business between the Iv agent and the B farmer can then become Oy-R where both are trying to survive at the expense of each other, usually their transactions can become criminal if the O police are weak.



A Bi team can have similar problems causing it to turn Ro, sometimes the B sellers around him have cheaper strawberries and so they must minimize losses if their savings run low. For example they might try to negotiate a large deal with a V cartel at a fixed loss and average this out later when prices have risen with scarcity after an Iv-B glut sends many B farmers broke. In this case the Ro team can still have an advantage sometimes as R sellers might be going broke around him

leading to a coming scarcity, Ro might even save enough in the situation to become Bi again and maximize profits again instead of having cost minimization as a Ro strategy.

In the diagram below the Iv strawberry jam makers might sell on the margin, taking profits where they can because the buyer might go to another Iv agent for a better price. The V cartels however would also charge a normal price, a lower price on the normal curve for older jam and a higher price for premium jam. They then look for proportional profits around an average rather than pursuing absolute profits on the margin.



Implicit costs

When Iv-B and Oy-R people are competing at the margin this is like a race, the difference between first and second might be small but it is often the most important part of a race. For example when there are crashes at floors and ceilings there is a big difference between getting caught in the crash and being fast enough to escape it.

This winning margin however can be made of up many smaller winning and losing margins, for example genetic ability, training, use of illicit drugs such as steroids, mental attitude, etc. These can be regarded as the implicit costs and benefits towards a winning margin, in business for example a company might post enough of a profit to survive by many thousands of different kinds of cost cutting savings and tiny extra profits on many transactions.

Calculating implicit costs on the margin then ignores V-Bi and Y-Ro averages of those costs, for example assessing steroid use in an athlete winning a race by a small margin need not look only at the margins of steroids they took compared to the one that came second. Instead it might be average steroid use that had less effect than pushing the limit of what a person can use, however there would be less chance of a chaotic crash from an overdose.

People at this company might also attempt to calculate the opportunity cost of not working elsewhere other businesses, then

they have sunk costs such as that of education which have committed them to a kind of business. When thousands of Iv-B agents and workers are analyzed this way the result is a kind of fractal pattern shown in each quadrant, the lines radiating out from the center can appear like a fractal tree shape, the individual deals where they win and lose money like small dips back towards the origin or center of the quadrants.

All of these can then be dependent variables and hence chaotic, for example an Iv agent might buy one more tin of strawberry jam to sell because he saved the cost of this at any one of many deals such as having a cheaper lunch, driving more slowly and saving fuel, and so on. This then makes the Iv branches and B roots more complex because each interaction is also dependent on every other one in the economy.

This is like any part of a plant ultimately being dependent on any other part, the implicit cost of the growth of a branch is

that less resources are available elsewhere. In practice the V-Bi parts of a tree have enough savings so that small changes don't make the whole tree unviable. Implicit costs as defined in economics can then be highly chaotic as they ignore the averaging effects of V-Bi where implicit costs can naturally change around an average.

Another problem is an this Iv-B economy people bluff and mislead each other, to work out these economic or implicit costs is difficult to do in practice. For example a company might be trying to work out whether to close down because of these implicit costs, other companies have every incentive to obfuscate this information so their competitors will calculate it wrongly. This was seen in the lead up to the GFC where many financial companies thought their economic profits were high, however in the crash this was shown to have been an illusion. In poker working out the implicit costs of bidding is nearly impossible because of the lack of reliable information.

V-Bi and Y-Ro people when working as a team also cannot work out implicit costs like this because each is independent, if one person saves money on lunches then it can indirectly affect the overall resources of the team but many others might not have saved as much or done it in unrelated ways. In this situation implicit costs are averaged out, a normal cost of doing business and their normal history is not only sufficient but anything more precise is not possible beyond a minimum uncertainty.

Implicit costs is similar to the concept of sunk costs, a company when it sets up in one city has lost the opportunity to set up in another city instead and might have an economic profit or loss because of this. However in a V-Bi economy companies tend to cooperate so the company would not lose an exact amount, when it needed resources from the other city then companies there would help it out and vice versa.

Normative versus positive economics

Normative refers to how normal people should or can behave in a probabilistic sense, positive economics is more deterministic as to how they will behave.

Normative economics can also refer to cooperative game theory while positive economics can refer to competitive game theory. Cooperation then relates to V-Bi and Y-Ro teams while competition relates to Iv-B and Oy-R people.

The Incentive Principle

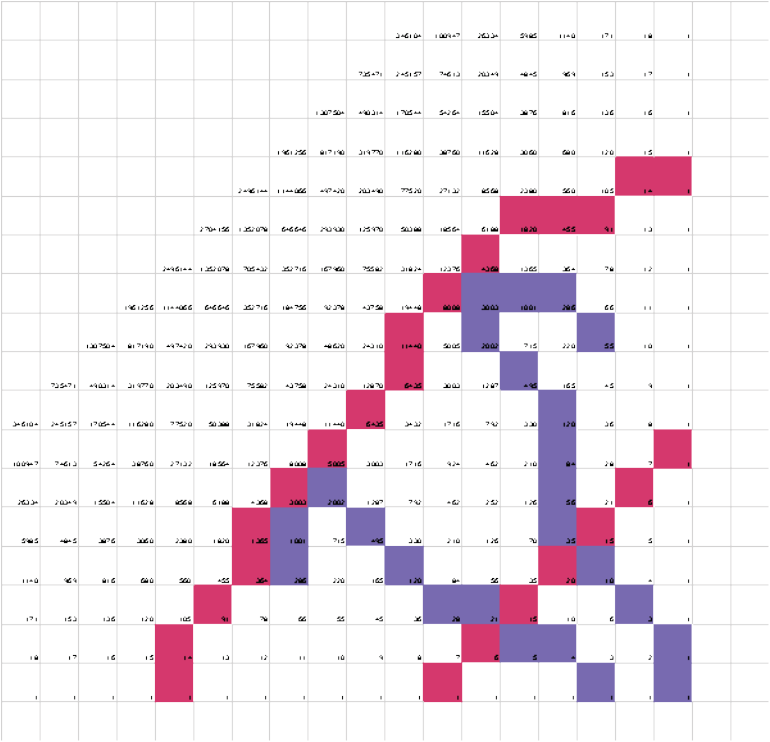
Incentives are usually related to self-interest of people and so are Iv-B and Oy-R, team members are more altruistic and often work for the team even when there are disincentives for doing so. For example with an average benefit from being in a Bi team about half the team a person would receive less than this benefit. At these times he might question the costs versus benefits of being in a Bi team but later he might get an above average benefit, many people leave Bi teams and become B workers but many B workers also join Bi teams.

For example a more innovative person might think they have more incentive to work in their own self-interest but they have to contend with the booms and busts in the market and deceptions from other B people. Someone might decide poker is a good game because they have an excellent memory for the odds but they find nonetheless they get bluffed out of the winnings, so the other players have an incentive to distort the truth about the game so others will lose their money in it..

In the same way according to Gresham's Law bad people have incentives to drive out the good, when Iv-B deception is high in times of deregulation or weak policing then it can be dangerous to be honest and a competitive loner. In this case then many decide to join Bi teams even if they earn less money, in fact over their whole career they might get less in a Bi union job or as a farmer selling to a Bi cooperative. However they also avoid the booms and busts more, this might benefit their family more or they find their whole community thrives better when people support each other.

There is then a paradox between competition and cooperation which is resolved in the I-O market. I is not competitive but it is also not cooperative but something in between those extremes. In the same way in this market deals are not made because of incentives nor because of altruism but something in between the two.

In the diagram below Iv agents have self-interest as their incentive, however the V cartel cannot survive if all its members only act out of self-interest. There will always be times one member can profit at the expense of another, if this happens too much then the Iv agents will reach deeper into the V cartel deceptively and try to do business with these self-interested V splitting it into smaller teams or chaotic individuals.



For example Iv agents might hope to find someone corrupt in the V cartel who will give them favorable terms on stock to sell, or collude in fraud against the company. Before the GFC many financial institutions had problems like this, the Iv traders were getting huge bonuses for trades that would later bankrupt their companies. Usually the V management would watch for deception in their salesmen but according to the principal agent problem monitoring can often be too expensive. The extension of the incentive

principle into V management can make the company boom and bust rather than maintain a normal stability, bonuses and stock options cause members of the team to compete against each other like a tree where the Iv branches can grow to the point where they break and collapse.

Commissions and stock options are a form of leverage and hence Iv-B, for example a CEO might make small decisions that cause their stock options to grow exponentially like the proverbial butterfly causing a hurricane. Incentives in V management should then move people towards normalized behavior, for example everyone might have their bonuses tied together so they work more as a team. Then some will notice if others are leading them into a boom and bust, there will be a tendency to either eject these people are move them towards strategies that benefit everyone.

This situation has been extensively described in my other books, it is like a Y junta or team of dictators being broken up by Oy intrigues, the Oy cronies have incentives to get as much as they can

even if it makes the junta unstable. This is because if it is unstable then they have even more incentives to get what they can before it falls as they cannot cooperate to moderate this behavior. In the Roy animal kingdom it is like a Y pack of predators such as wolves falling apart as the individual temptations of its members cause them to hide food they find.

For example a Y pack of wolves near a city might find they can secretly get into trash cans there and sometimes kill chickens and other animals kept by villagers. Because deception is needed the Y wolves become Oy over time like foxes and keep the food they find. If instead there are only Ro herds such as reindeer to eat then the Y pack will stay together, they would be more likely to starve if each tried to attack on its own.

In the Biv plant kingdom the V canopy of a forest is like a team effort between many trees to shade those underneath them and prevent their getting to the uninterrupted sunlight. If this collusion breaks down from V trees trying to grow over each other to get more sunlight then the result

will be more gaps in the canopy which will allow competitors to grow into them and perhaps overshadow the trees that would not team up as V. So those trees cooperating as V are stronger than if they compete with each other.

The principle of increasing opportunity cost

This is where the easier parts of a mine or farm are worked first because it is faster and cheaper, then as the output slows the more marginal parts are attempted. This principle then also works at the margin rather than taking a normalized approach. The problem is there is no way to know whether this maximizes returns or not because the future is uncertain and the extent of a mine is unknown. For example picking the obviously rich deposits might lead to veins of ore that were formed chaotically, however it might miss separate bodies of ore formed independently and deposited randomly.

Both systems tend to be inefficient to some degree, B workers might pick the highest grade iron ore out of a deposit and leave ore that seems

to be low grade G yet is hiding even greater profits. However the situation would now dissuade most B miners because their costs would be greater without the richer ore to help pay their costs while exploring. This can be exacerbated with the Iv-B booms and busts, for example when they mined the cheaper ore the rush of so much iron to market might cause prices crash with the oversupply. In that situation they might not have the capital reserves to take a chance on the lower grade ores and so potentially Gb viable deposits can become abandoned as G.

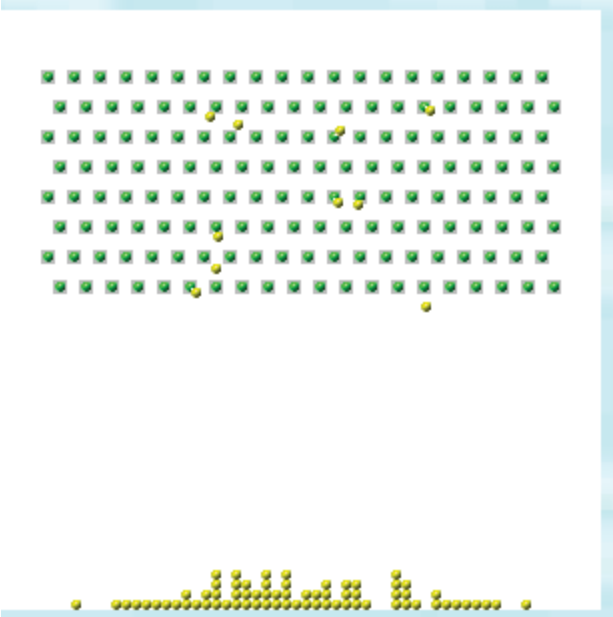
A Bi team mining a nearby ore body also has some inefficiencies, they would usually mine it according to a normal scale where the higher and lower grades would get less attention compared to the average grade. They would pick up more of the high grade ore that was randomly distributed but would miss some of the higher grade ore in veins. If B miners saw this high grade ore by spying on the Bi team then they might move onto it faster, however this high grade ore might peter out and leave them bankrupt. This lower hanging fruit strategy can be enormously damaging as well as profitable, for example in the Iv-B subprime

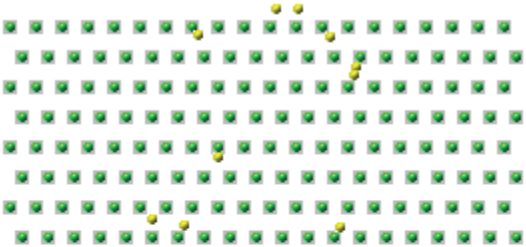
market prior to the GFC Iv subprime lenders picked out the highest profits out of the population leaving mainly toxic B borrowers.

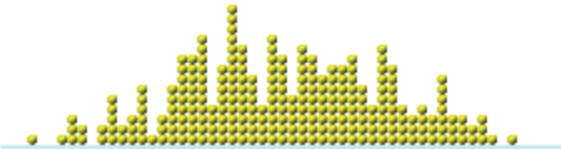
When they went back to these risky B borrowers they could only look good with liar loans, by that time there were few good clients left so the momentum of the business moved quickly into these deceptive B people and lost vast amounts of money in hitting the ceiling. It was also like a mine where the best deposits had been taken leaving the rest vulnerable to a cave in and collapse, the more the Iv subprime salesmen went for the last B savings the more chance they would be caught when it collapsed. It is also like an Iv-B weed growing quickly by using up the closest Gb resources, it might then be unable to spread its roots out wider like a tree does and get through patches of less fertile soil. This is seen in many weeds with a large central root and few spreading outwards more randomly.

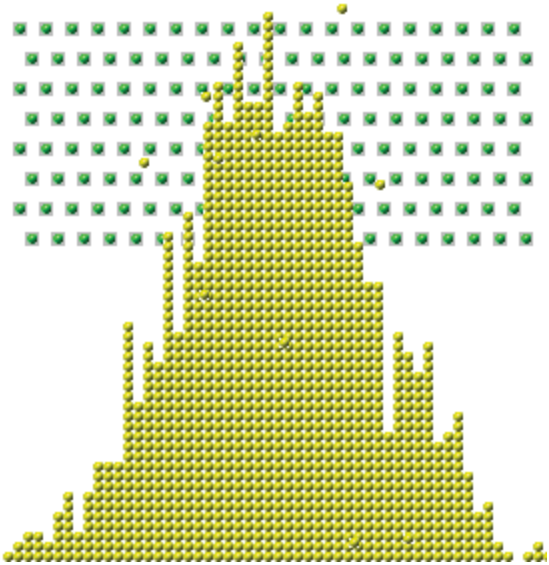
If instead the subprime lenders had a more Bi approach like traditional banking they would have made slower profits but got more business out of

the economy by allowing the chaos they create to heal, some lower grade borrowers defaulting would have been balanced against the higher ones paying reliably. This was the idea of different tranches of subprime bonds, however they were set up on the basis that risks were random. Higher tranches were progressively further towards the edge of a normal curve and so were supposed to be increasingly unlikely. However adding Iv-B chaos to how these loans were made caused the normal curve to become increasingly oblique as a slice through a Pascal's Triangle. The normal curve can be formed by balls falling down making a pile as seen below.









Imagine however if the horizontal surface the balls were dropping on was tilted, this is like an oblique slice through Pascal's Triangle. The balls then have a longer tail to the left, also each ball like snow on a mountain has a tendency to be pulled to the left and start an avalanche. Note how this tendency increases as the normal curve grows like with more snow on a mountain, also some curves in securities have higher peaks than a normal curve and so are even more prone to sideways slippage.

The Iv-B economy then created these subprime tranches on a normal curve that was increasingly being tilted like this as each ball normally being independent was increasingly being strained by the tendency of its neighbors to default. For example if one B worker defaults on his home then it depressed nearby values, also its likely this default is caused by spreading unemployment causing more defaults. The result then was the GFC where many more tranches of the subprime bonds had defaults than the normal curve had predicted.

Also ripping off those with more Bi and B money was highly chaotic and destructive to these communities, like a contagion foreclosures started appearing among them and this eventually caused the whole real estate market to collapse like rotting roots of a tree causing it to topple over.

In the diagram an iron ore deposit is fragmented, however it is also mostly buried so its shape is not completely known. The B miners would work on the low hanging fruit principle and start with the large ore body, then give up when the best parts were used up even though some of the other ore bodies were formerly part of it. Their tactics are high energy and low time, they work quickly and use a lot of energy in digging or running machinery, then abandon the mine and move onto another deposit.

The Bi miners might approach this as a normalized deposit and miss more of the main ore body, this is gotten by B miners on the edge of their normal distribution. Bi is high on time and low on energy,

they take their time and try to get more of the ore but because they use less energy their marginal costs are not restricted to what ore will pay for this high amount of energy. Hence who does best depends on how random or chaotic the ore deposits are, this is always uncertain to some degree.

The same would also happen with Gb farmland, the areas enclosed by Gb fences might be good soil while outside these areas might be G low grade for farming. Most of this land might initially be buried under some rocks and thick scrub so the farmers need to weigh up an opportunity cost of where to clear the land. B farmers then might select the easiest area to clear like low hanging fruit and leave the obscured patches of good soil. When they use this small area of land up then they might have to move on nomadically as R farmers using up only the best of what they find.

The Bi farmers might spread out the different patches of soil according to a normal curve and make one lower grade farm by perhaps selecting land within two standard deviations of average soil. R-B farmers and miners experience more stress and anxiety from their approach to uncertain resources, these are like stress fractures that can crack chaotically leading some of them to in effect crack under the strain of competition. It can also lead to repetitive work where they might strain their back from too much pick work when the Bi team with sharing jobs can quench this chaotic stress by allowing people time to heal. R-B farmers and miners also have to work much faster in a race to market, this can also cause injury.

The result of this approach is small areas of farms and mines overused and other parts untouched, This is the same pattern as a spreading R-B contagion such as with viruses and also prey animals like gazelles. The R-B farmers and miners then might sometimes make more profits in a revolutionary way but they also risk chaotic collapse from injury, they also have health strains from collapses in prices for their goods when there are good discoveries. R-B then can appear

like the poor conditions of workers in the Industrial Revolution, over time this was countered by Bi unions that were able to often match the output of B workers.

The Bi-B and Ro-R quadrants are more efficient with a mix of chaos and randomness though without the I-O legal system there is no way to prevent someone stealing the proceeds of any advantage gained. For example if a B miner finds a rich vein of ore then a Ro gang might openly or R miners secretly steal it.

The V-Iv and Y-Oy quadrants also change according to whether these G or Gb natural resources are randomly or chaotically distributed. More was explained about this in my book Crisis Aperiomics, for example chaotic rainfall can cause Iv agents to race to exploit this rainfall such as in factories. When the rainfall is more random a V cartel does better in utilizing the water, they keep enough savings on hand because they might calculate that the rain does not vary beyond two standard deviations.

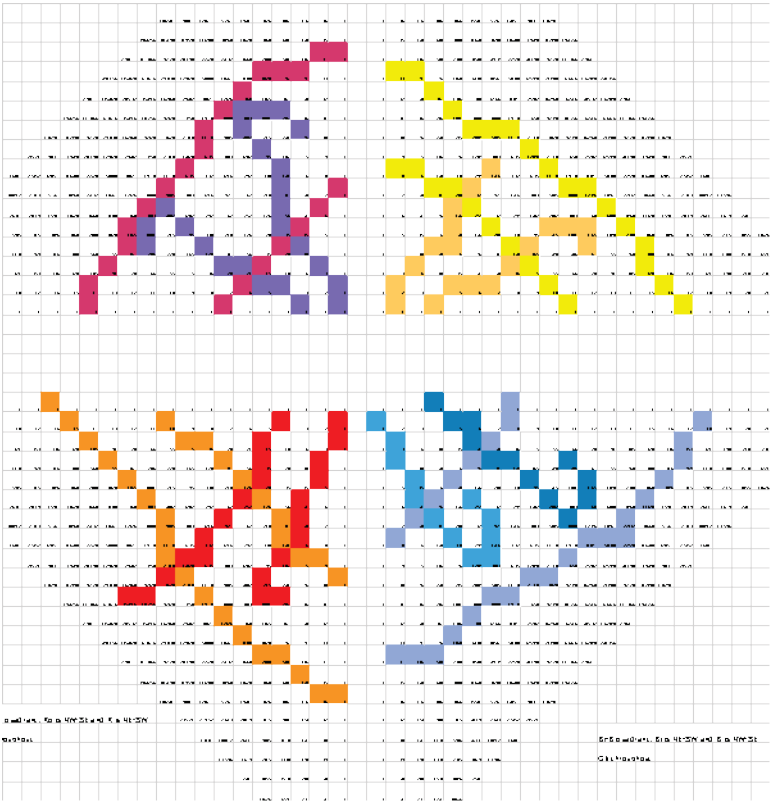
When these iron ore deposits are chaotic then sometimes a rich vein will be found, this causes a race to sell this iron in the market and also for the Iv agents to quickly get it to make steel products to race to market with. If too much is found then there might be a glut and so only those in early make money. If too little is found those in early again make the best profits. If the iron is randomly distributed then the V cartels can handle the random deliveries of iron best, they might keep a reserve of ore on hand to smooth out the variations in supply much like an insurance companies averages out the chaos of small booms and busts.

International trade

The same can apply to international trade, shown here with two countries, one called Onia and the other Twoia. The Twoia economy has similar farms and mines to Onia, it can also have two areas or states with one called Pooria and the other Richia. Pooria is like Scarcia, it has few natural resources and so Gb private property is rare. Richia is like Abundia with abundant Gb resources.

Free trade between Onia and Twoia is like inside Onia, without an international I-O legal system people can trade anything they want and immigrate between the two countries. Each person then has to consider the opportunity cost and benefits of leaving their own country.

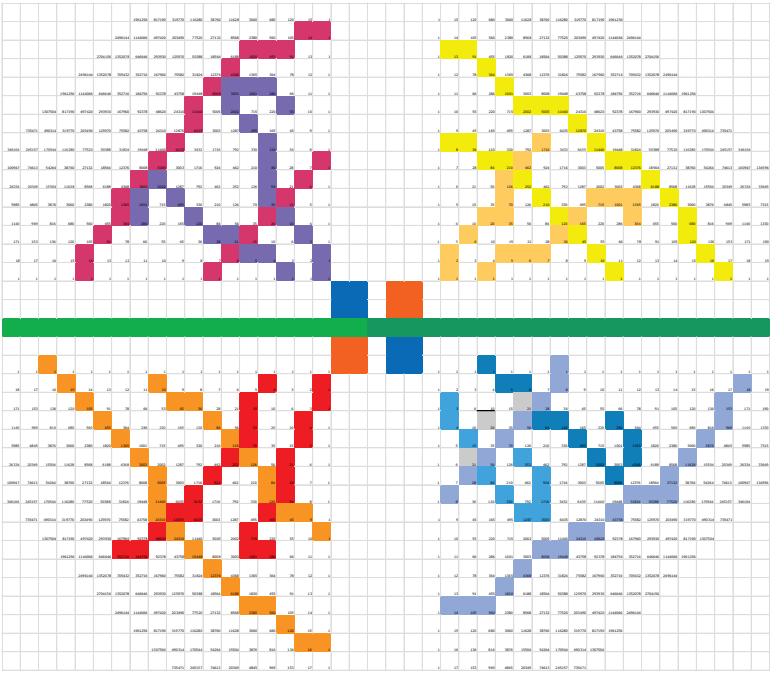
To illustrate this there can be two Aperiomics graphs like the one below, one still represents the Onia economy and the second would represent Twoia. The situation then becomes more complex where for example the Ro-R Scarcia quadrant of Onia might interact with the Bi-B Richia quadrant of Twoia. R miners in Onia might try to export their iron to Twoia, the B miners there might try to buy it if there is a current shortage there after a gut of iron bankrupted many mines.



The diamond graph above then can be used to illustrate a global economy, there might be one for each economy and then how they trade with each other can be analyzed. There might also be many diamond graphs in an economy, for example each suburb in a city might be represented on its own graph as they do business with other cities and suburbs.

In Aperiomics the color codes can not only be used in graphs but also on maps, for example a city might have different suburbs laid out in color codes according to the kind of people that live there. These colors could also change in real time as people move around, as the police patrol the O orange colors might also move. Criminals when spotted or apprehended can be marked with Y and Oy colors, their intended victims can be R marks and neighborhood watch areas might be marked with a solid Ro color. Other areas run by Y mafias could be marked in yellow.

This can be seen in the diagram below, the Aperiomics diamond graph can here represent a city called Oneville in the economy called Onia. There can be a rival city on Twoia which to make it easier to remember can be called Twoville.



Usually a city would not grow in exactly this shape, however it might be assumed here that Gb resources such as better soil for farming and minerals for mining follow an hourglass shape which is taken up by the Bi-B and V-Iv quadrants. These Gb resources might continue off the map so the quadrants would also continue to grow with more farms, mines, industries, etc. The Ro-R and Y-Oy quadrants are poor in resources so they are generally G public property, this could be a poor area of the city with public housing, nationalized

businesses such as state owned banks and insurance, and so on.

Oneville being part of a primitive economy can also be used to illustrate its connection with nature. The Bi-B and V-Iv quadrants of Biv represent abundant resources for plants and animals as well, there are some Biv rainforests virtually impassable to people. These forests then are like Gb private property where some animals and plants in effect own them. In Biv societies there can be many areas like these, they can be garden in people's homes, greenery left in place with their animals around highways and business districts to make them look more appealing, and so on.

The Ro-R and Y-Oy quadrants of Roy by contrast have few natural resources, the plants here then are much more sparse and prone to be overeaten by animals. Forests are rare and tend to be knocked down by hungry animals, instead of rainforests impenetrable except by the plants and animals that own them the Roy forests are thin so people as well as animals can encroach in any part

if they are strong enough. There are then two laws of the jungle here, in the Biv areas the rainforests are dominated by plants and animals are subservient, each tends to develop a niche and not move around much as with private property based societies. In the Roy jungles they are more like the traditional meaning of law of the jungle, Y-Oy predators might dominate and only plants either strong enough to not be knocked down or fast to regrow can survive.

In Biv the tendency of animals to own or be owned in forests tends to extend to people owning them, there are then private flocks of sheep and herds of cattle on Gb privately owned ranches. In Roy areas there is a sense of roaming around in G territory no plants or animals really own, people here then have herds they feed on G publicly owned land or pick from plants such as wild berries or wheat fields no one owns.

In this situation the ecology of the plants and animals becomes intertwined with people, even if there were no people here in Biv areas plants and animals would behave according to the laws of

Aperiomics. If most of the plants and animals were removed such as in a modern city then the people would still interact according to exactly the same Aperiomics laws. In Roy areas without people there can be nomadic Y-Oy predators such as lions and hyena chasing nomadic Ro-R prey such as buffalo and gazelle.

If most of the plants and animals are removed to formed a Roy city of mainly people then this can be like a Ro-R communist city like Moscow in the former Soviet Union or Berlin under the Y-Oy Nazis. Often though these two quadrants come to adapt to each other when controlled by a strong enough O criminal police, there can then be Y-Oy mafia and criminals along with Ro-R areas protected by gangs and neighborhood watch along with the O police to moderate crime waves. This would be more like near the end of the Soviet Union where Y-Oy crime and mafias were more prevalent, according to Aperiomics the Soviet Union broke up because of weakened O policing as well as the lure of becoming a Biv capitalist society because technology had made resources in effect more Gb abundant.

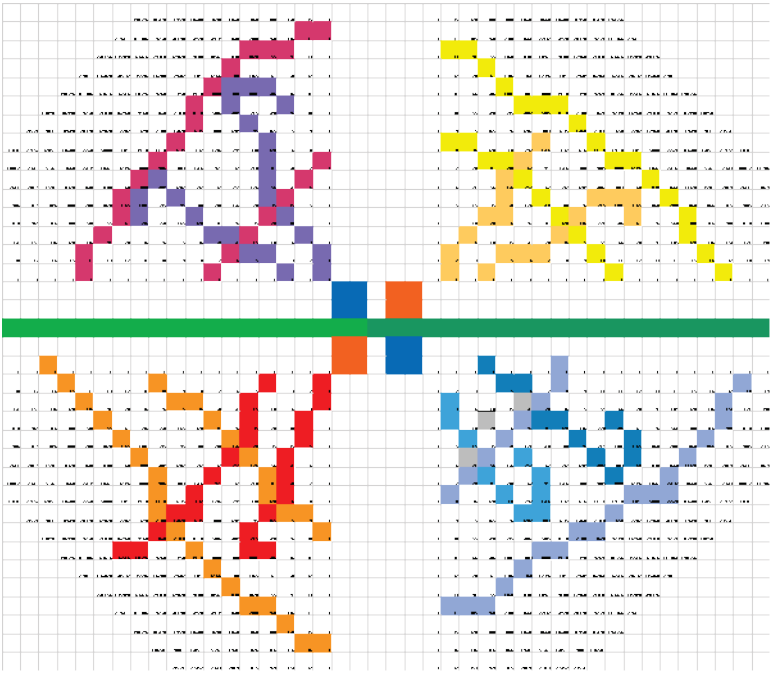
The diamond graph can represent the city of Oneville, there are 4 blocks which represent the government, half of this is publicly owned and half private. The O or orange blocks represent publicly owned government such as police, jails, licensing for such as cars and building permits, distribution of food rations and welfare, etc. The two O or Indigo blocks represent Gb privately owned versions of these, for example a stock and futures exchange, criminal lawyers funded by the state, private policing such as security guards, civil lawyers and private arbitrations courts, markets such as swap meets and malls, etc. Assuming that Oneville still has large numbers of plants and animals this center would tend to have O animals from the center of the food chain as well as plants with strong tree trunks as I.

This is because the Ro-R and Bi-B areas tend to clear Y-Oy predatory animals out of them to prevent them eating their sheep and cattle, however even without people there still tends to be areas where there are more Ro-R and Bi-B prey animals. In the Y-Oy and V-Iv areas there are fewer prey animals such as sheep and cattle because they refine and improve goods, they then

have little need to nurture these kinds of animals and might either expel them or overeat them. In the I-O center then animals in the middle of the food chain might be more protected, for example they can evolve into domesticated pets like cats, dogs, birds, etc that are not suitable for herds of animals to eat or milk.

They are also not dangerous enough to clear out completely as predators. Instead they tend to use their I-O niche to play one quadrant off against the other, for example O shepherds might keep Ro-R herd animals such as cattle or R animals less able to defend themselves such as sheep or goats. Dogs are like Y-Oy predatory wolves that became domesticated, in exchange for food from Ro-R animals they act like policemen to bark and attack predatory wolves as well as criminals trying to rob shops and homes. Cats tend to minimize R contagious problems from R rats, mice, etc where they might eat stored grain or caused sickness. In effect then dogs have become O animals by protecting against Y predators while cats became O by protecting against R animals.

In Biv areas plants can also become adapted to people and animals there, in the Bi-B quadrant plants tend to have smaller I trunks as on trees because this wastes nutrients needed for crops or to feed sheep and cattle. A Bi-B park then might have more grass because flowers and fruit have more chance of being taken, however a V-Iv areas might have more flowers in parks as well as private gardens because this is more consistent with their role as refiners and improvers. People would then tend to breed more flowers and fruit here to resell as well as to look good. In the I-O parts of town there would tend to be a compromise between the two, more trees with thick I trunks as they are less useful in V-Iv and Bi-B.



The same diagram is repeated above. The two green lines in the diagram represent G public and Gb private parks, the line between the two might move to the left or right according to whether the city becomes poorer or wealthier. In these areas plants and animals would still thrive, however in a city parks are usually much more scattered. In terms of plants and animals G can be regarded as existing throughout the Roy areas, Y-Oy predators have all of this G public land as their intended territory while Ro-R prey have all of it to hide in as well as to eat the plants.

In the Gb areas plants are more defined in terms of private property rather than being more nomadic in G. For example as plants are knocked down or periodically overeaten they respond with a nomadic strategy of using Ro-R animals to excrete their seeds wherever those animals nomadically move to. In Gb forests however there are few opportunities for seeds to find new territory except on the edge of the Biv areas, instead the seeds tend to drop down and regrow in the same area like the private property of that plant if it dies. In a Biv forest the animals are also adapted to having a smaller area to live in, usually there is enough food in this private property of theirs so they don't need to be nomadic. Both plants and animals then tend to evolve just like people do according to which quadrant they live in, as well as whether resources are G scarce or Gb abundant.

As the city grows each color code tends to form suburbs as well as business areas, the plants and animals as well as people then evolve changes to fit into those quadrants or move to another one. For example if a Roy area becomes more Biv then

Roy animals being unable to knock down a forest might move to neighboring grasslands, Roy people such as the nomadic homeless or vagrants might move to an area with more public housing if they cannot afford the higher prices of Gb private property with rents or buying a home.

Workers tend to live in the Bi-B quadrant, this is close to where farms and mines are Gb privately owned and where they have more of a chance to buy or find G public land worth turning into Gb private property. The B lines in the diagram then can be where lines of B housing has grown as some suburbs on the edges of towns might grow outwards like roots into unsettled land beyond. They can also represent mines growing outwards following veins of ore like roots of a plant would follow nutrient deposits, as the city expands then it can become more economical for mines further from the city center with its markets to be mined because of transportation costs.

What often happens however is a city like Oneville might split into two cities or a neighboring area might spawn its own city, this is like a Ro herd of

buffalo splitting into smaller ones as its numbers become too unwieldy. Also Y prides of lions might send some of their members away to start new prides when there are too many to hunt together effectively. Since Oy predators and R prey spread out they can more easily specialize into different environments and eventually have an R revolutionary or Oy counter revolutionary leap to become a different species.

With people a new city might form with Bi-B farms and mines clustering around it, this might be called Onely here. Onely and Oneville then might become two cities that at times trade or war with each other just as neighboring Twoia might develop two cities called Twoville and Twoly. Over time then each area evolves its own plants and animals if there are no people and rival ecosystems can trade with and attack each other, for example Y lions from the Oneville area might attack Y cheetahs from the Onely area. Birds might migrate from one to the other like Oy and Iv traders followed the Silk Road. Eventually they trade and war with the cities of Twoville and Twoly in Twoia, and so a global economy can grow.

In the Bi-B quadrant of Oneville B farms can also grow like this, because like with mines they look for low hanging fruit first they can move onto the richest soil first leaving less fertile soil untouched. This is so they can get the fastest profits and get to market before their rivals create a glut. So they might radiate out in B lines which can at time break off and cluster around a new city, this is like B based plants which spread with tubers through the soil.

In the primitive economy of Onia however these B farms and mines would tend to stay attached to Oneville, they would grow and collapse according to booms and busts in the market as well as according to innovations in their farming and mining. For example if a B farmer invents a better plough then wheat produce might surge sending other B farmers without ploughs broke, the B inventor might make more money by not sharing the secret of this innovation and buying up their farms as they go broke. Generally B innovators do not share because of evolution, those who do tend to lose their maximum profit and then would lose out as others innovated and wouldn’t return

the favor. Some farms might decide to cooperate and share this new plough technology, they would then become like Bi teams instead of B competitors.

The Bi areas in the diagram are approximately at right angles to the B lines and try to fill in the less fertile areas between the roots shapes, they work as a team and average out the yield from farms and mines which gives them a normalized profit. In the case of the plough innovator they might form a Bi cooperative making less money from selling ploughs than keeping the plough for themselves, however they can average out their incomes by reducing the chance of rival plough makers starting up.

The Bi areas can also be where Bi people join together to form larger communities to live and watch over each other's properties against Roy criminals, they want less room between the houses because they cooperate as a team. B homes might be set further apart or have higher fences to get more privacy and stop competitors spying on them, they tend to pick the low hanging

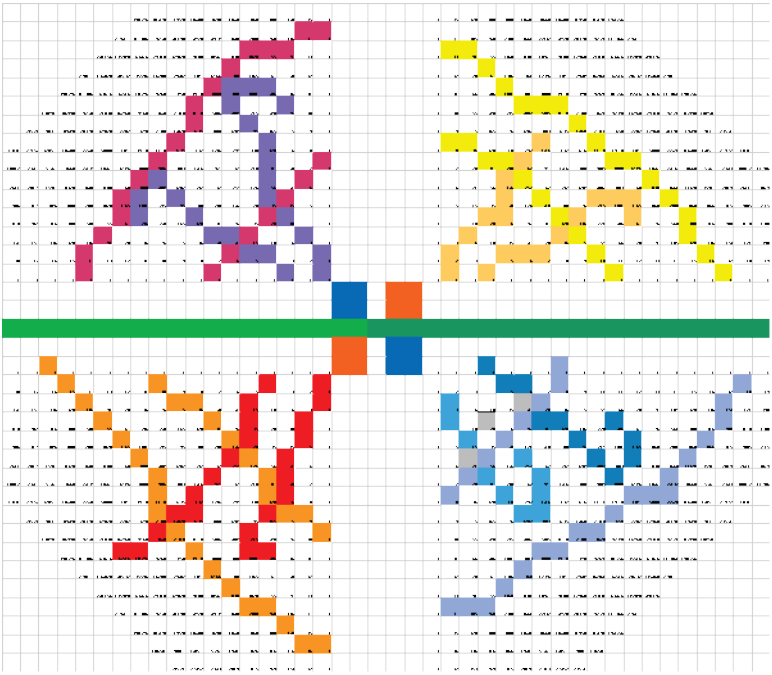
fruit so instead of living side by side as Bi each might live further apart on better pieces of Gb land. For example in a modern town some people live in V or Bi areas side by side, others tend to pick the best land such as with views or by rivers as Iv and B people that have been more successful.

The Bi-B farmers after harvesting their crops according to their B competitive or Bi cooperative strategies would then take their farm produce to the I-O market in the center of Oneville to sell to the V-Iv quadrant for further refining and improvements, they can also trade with each other. For example Bi-B workers might sell wheat and berries to each other to make their own food, if they sold it in the I-O market then the berries might be used to make wine and jam which is then resold back to the Bi-B workers. The workers in the Bi-B quadrant can then concentrate on what they do best in exploiting these Gb resources, they can also go to the I-O market to buy goods and services.

If some Bi-B people are better at refining and improving these goods and services, for example a B farmer might have a talent for making bread, then he might move to the V-Iv quadrant where he can learn from other people how to make better bread. In effect then the chaotic B farmer becomes an Iv agent. Sometimes the opposite might happen, a member of a V cartel making jam might decide he is a better farmer and goes to join a Bi cooperative growing berries. This is a common process, many families have offspring with different abilities such as a B farmer having a son better suited to being an Iv agent or being an Oy petty criminal.

In this case they usually move to where there are more opportunities for their color code. Sometimes these changes are forced on them by changes in the color ratios or G-Gb resources, for example technological counter revolutions by Iv agents in making steel might mean even good B salt miners might go and work in the V-Iv steelworks. With improving rainfall Roy areas might have more abundant Gb resources, members of Y gangs might find it is more profitable to run a V cartel of making bread than

to rob other people or run a Y drug factory selling heroin. This is a common occurrence with the Y mafia, for example in Russia after the fall of Ro-R communism many Y mafia called thieves by law found there was more money in running honest V-Iv businesses.



The same diagram is repeated above for convenience. The V-Iv quadrant on the upper left is where goods and services are refined and improved, for example to make bread from wheat

and eggs, wine from berries grown, steel from iron and coal, etc. The Iv agents tend to have their homes and businesses in branch shapes to specialize, the wine makes would tend to be near each other to monitor each other's counter innovations. This is like Oy predators watching each other to see if one finds prey, then they try to steal it from each other. Iv agents might send spies into each other's businesses to check prices otherwise they might have a sudden collapse in their business as customers go elsewhere. There can then be small movements in prices which are like a liquid boiling slowly, the bubbles are the rise and collapse of small innovations and price changes.

In Oneville this might cause the Iv and B areas to grow in size as the B farmers and miners take advantage of higher prices to expand their businesses. At the same time the Iv agents see these higher prices as a boom in demand, they also increase the length of their branches so Iv suburbs grow rapidly. When the V and Bi areas see this rapid expansion they assume profits are to be made and so they loan money as well as goods, this also helps them because if they make

profits from investment it protects them to some degree from the chaotic disruptions from this Iv-B growth. Usually then this Iv-B growth hits a ceiling where prices cannot go higher, the momentum of businesses then run in effect into a brick wall which causes many to go broke. Other realizing this are like cars in the back of a pile up, they desperately try to reverse which represents a selloff and collapse in prices.

The Iv-B area then collapse in size while V-Bi areas that invested in this Iv-B industry lose some or all of their investments and a recession can occur. However this process is also partly natural, plants do the same with a growth phase of Iv-B and then collapse or death to seed for regrowth. In the Roy animal kingdom animals grow more when they are young as Oy-R, Iv-B being an overtone of Oy-R. Then this can lead to a collapse as they age and a regrowth of a new generation. To avoid this process being too dangerous as with the GFC a strong I-O center is needed, this prevents the Iv-B excess growth by insisting on enough price discovery which breaks up the deception bidding up of prices. For example if there was a boom in the price of B berries and Iv jam then the I-O

government might order an enquiry to find out why, if it is caused by deception or too much secrecy causing a misallocation of resources then exposing this can burst the Iv-B bubble before it becomes systemically dangerous.

Often however Iv gets around this I-O policing and forms too much business with B farmers and miners, because each tries to deceive the other this results in larger and more chaotic booms and busts. This happens when too many bypass the I-O markets and so the I-O police don‘t realize these secret deals are happening or the participants also deceive the government. In this case there is little price discovery from the V and Bi teams because they are shut out of the Iv-B boom except to blindly invest, it becomes like a poker game of bluff and deception where prices rise and collapse like the pots in poker and V-Bi investors are trying to invest in winning something out of the game.

In modern cities there is a similar specialization in Iv branches as with how plants grow their own branches, for example doctors might be in certain areas with various specializations of surgeons,

obstetricians, etc around them. Restaurants might have suppliers of refined goods such as cakes and breads, different coffee blends, wine makers, etc clustered around each other and near the restaurants, cafes, etc.

It can be similar to a perfectly competitive market in economics where each must watch the other prices to remain competitive as well as to watch for booms and busts in their goods and services. This market can be different from the perfectly competitive market in economics because it refers mainly to Iv-B where competition often slashes profits to where a business is just viable or going bankrupt. For example when prices of goods and services are inelastic a Gb company might lose all its customers if it has to raise its prices more than its Iv or B competitors, it might then go broke and become G abandoned.

Some Iv-B businesses can be close to the G-Gb fence shown in the diamond graph as a horizontal line of G green and Gb green-blue. If resources are abundant then this perfectly competitive Iv-B market might have few businesses that are

abandoned as G, instead they have some losses which are paid for out of savings or loans from V-Bi investors and then rebound with profits from new innovations.

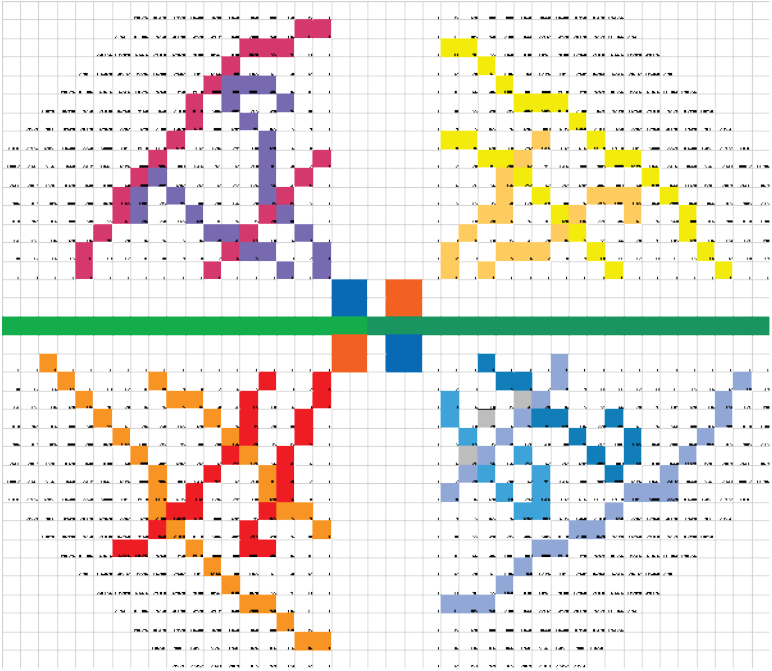
This G-Gb line then represents whether a business can survive in Biv or it becomes Roy, for example a marginally productive area might try to establish B wheat farming in a perfectly competitive market but cannot sell their wheat as cheaply as B farmers from more fertile areas so this can restrict crops to the most fertile areas only. Customers have little loyalty, if the price is 1% higher than others then the marginal farmers cannot cover their costs and either sell at a loss or keep their wheat. Often then they might work for no profit just to keep going and look for innovations to lower their prices, if not successful they might have to go back to sell in the Roy areas as R.

The opportunity cost here is in effect zero, if they don’t succeed then they have no other Biv business to replace it with. If they are instead successful B berry farmers then they can in some cases have this problem of price elasticity if their

opportunity costs are taken into account. For example they might make profits selling berries in this inelastic market but could still make just as much growing wheat, a lesser profit might then make them abandon berry production and then become a wheat farmer. In a Roy area the opportunity cost can also become negative or irrelevant, the R farmers might try to minimize costs and losses in keeping chickens and selling eggs to survive, often though they are just losing less money than if they changed business and herded cattle and sheep instead.

With an inelastic market people might not be able to afford to buy eggs at a high enough price and so the Ro-R farmers might find they need to switch to looking for gold nuggets while others switch to sheep herding to minimize their losses. If the gold prospectors are lucky and find enough they might cross the G-Gb fence by paying for a mining claim to sell their gold to maximize profits rather than minimize losses with selling eggs. The R sheep herders might then have to compare their opportunity benefits of sheep versus eggs, there is no opportunity cost or it is negative because eggs are not a viable business. Instead then they assess

the opportunity benefits in this case of sheep herding or they might have to switch to something else again in this perfectly competitive Oy-R market.



With this perfect competition in Iv-B or Oy-R then businesses sometimes grow quickly as find some new resources or innovations, at other times they collapse where they need to endure Roy losses or change their business. Usually these Iv-B businesses form boom and bust cycles where the

momentum builds as each tries to get ahead of their competitors in the cycle, for example a scarcity of berries might lead to prices of wine going up so those who understand this can hold back wine to sell later for more.

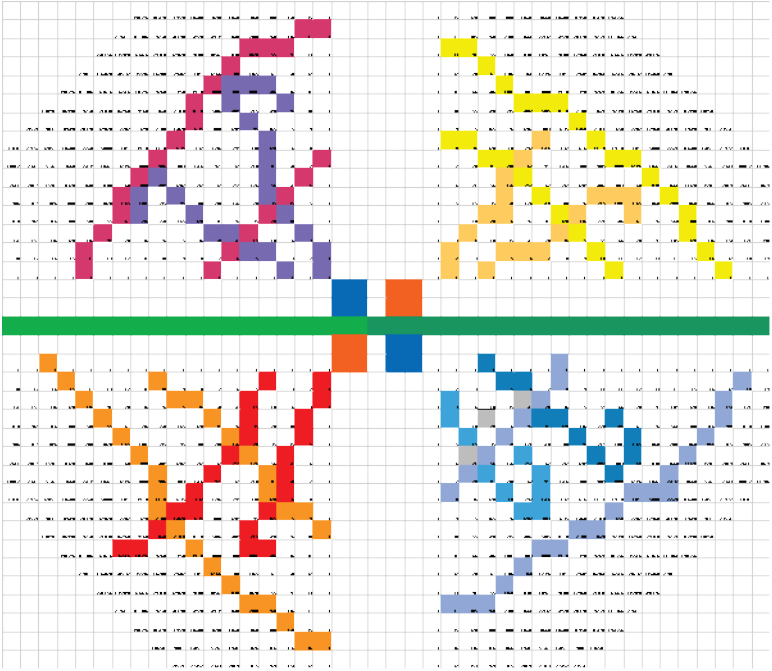
This exacerbates the boom in wine prices, those who don't maximize their profits at this stage by selling the right amount might go bust when prices crash later with more berries rushed to market to take advantage of the boom in berry prices. The idea then is to hoard enough wine to sell at higher prices but not so much as to get caught with it when prices crash, in a market of deception and bluff each tries to cause their competitors to make mistakes to send them broke. So these Iv branches would tend to grow outwards like on a tree, with a boom in prices they grow like weeds and can collapse back to smaller branches in a bust.

The V lines are where some Iv agents form cartels, they cooperate to stabilize their prices and share their profits. Some doctors do this, for example Iv specialized doctors might join together into a

large practice to share their costs. Iv wine makers might amalgamate into a V cartel and charge similar prices for wine. For example when the price of wine and berries is booming then the Iv agents and B farmers might try to hoard the right amount of stock while other competitors try to trick them into bankruptcy, alternatively they might join together as a V or Bi team to cooperate with each other. Then they make less in the boom but risk losing less in the bust as well.

As Oneville prospers there can be more Gb land for private parks such as companies owning land for their customers and employees around their restaurants, toll roads, private railroads, and so on. This Gb parkland might become so extensive that G parkland seems unnecessary, it can also be donated by wealthier businesses so anyone can use them. This would be like the G-Gb line in the center of the diagram below moving to the left, also there can appear more Gb vacant areas in Biv representing private parks. In Biv areas leaving Gb land unused as parkland can be a sign of abundance, that all the land need not be cultivated or mined. In Roy areas G parkland can be a sign of scarcity, that the land is worthless for

farming and mining so it might as well be parkland.



In the Ro-R and Y-Oy quadrants resources are much more scarce, the farmers and miners can find fewer viable resources so they are not worth owning as Gb private property. If some Roy areas are found to have enough rich soil and minerals then the Gb fences might encroach into here, some land then would become privately owned and is how the diagram might evolve into a

different shape. The G land here might have some Ro-R farmers growing crops on public land by cutting down forests and then leaving them to recover when the soil is exhausted as happens in many third world economies, some sheep and cattle herds might feed on this public land as well.

Miners might fossick for gold nuggets in public streams or veins of low grade iron ore but they could be so rare that a Gb mining lease is not worth the cost of applying for. It might then be left for nomadic Ro-R miners or the government might nationalize it as a state owned mine. For example they might use prisoners to work a low grade salt mine or create government work in a depression as happened with the US in the Great Depression under the New Deal.

The R farmers and miners then would form a similar root pattern to B but more like with R prey animals in nature looking for isolated patches of fodder to eat. Because R people are poor here they must also watch out for Oy thieves trying to steal what they find, if this happens they might report it to the O police in the center of Oneville

or more usually try to hide their assets more carefully. This Oy-R interactions can be like an Oy cat versus R mice, there can also be a boom and bust situation like with Iv-B, in nature Oy cats might multiply with an exponentially growing plague of R mice. Then the numbers of R mice might bust for lack of food or too many cats, this leaves many Oy cats starving.

In the Roy areas a discovery of low grade gold in some streams might bring a plague like number of R miners along with Oy thieves and conmen trying to profit from them. The numbers of both might grow as deceptive stories circulate, Oy conmen might spread rumors of gold to get more R miners to rip off. They could be like Iv agents trying to persuade more B farmers to grow berries to maximize their profits in making wine. When the gold suddenly runs out like food for the R mice then the Oy conmen suddenly have no income as well, they are like the Iv agents trying to hold back wine to sell for higher prices and getting caught when prices crash.

The R people then would tend to be nomadic like R animals in nature such as gazelles, they can also be homeless people or those in public housing and shelters that have to move regularly according to the rules of the Roy government. For example a homeless shelter might make people leave during the day and public housing might be limited to dire emergencies and short term accommodation. G medical facilities might also not allow people to stay for long periods to recuperate or malinger, welfare might be for a limited time and G food banks have a limited amount of food people can get per week.

The Ro gangs and teams however tend to move more as a herd rather than as R loners, when farmers they might look for wild berries similar to R but instead of just quickly getting the low hanging fruit they could average out the high and low yields to get more berries out of the land. They can also be violent such as with a Ro neighborhood watch looking out for Y-Oy criminals and Ro gangs selling drugs and stolen goods in Ro-R. They might also charge protection like a kind of Ro police, R people might be free to

farm and mine if they pay some of their proceeds to the gang.

Their neighborhoods then tend to be more cohesive even when they still move around nomadically, for example gangs in poorer US ghettoes might dominate an area to sell drugs but also protect it to some degree by punishing Y-Oy criminals like a kind of neighborhood watch. Any R honest businessmen or criminals such as prostitutes and thieves in this ghetto might have to pay a tax to the gang, in exchange they are protected from Y-Oy predatory criminals. People might move nomadically with homeless shelters, living in cars, squatting in vacant homes, setting up crack houses and being evicted over and over, etc. The Ro colors can then represent different gang areas, some might be affiliated like with Bi unions to support each other while others might have wars of attrition over territory. For example on the edges of their territories they might sometimes lose members in gunfights over controlling some streets.

This is like in the Roy animal kingdom where rival Ro herds of animals might try to control G grasslands and waterholes, pushing each other away. For example herds of buffalo, elephants, zebras, etc might share territory to some degree but jostle each other to get to a waterhole even though their main enemies are the Y-Oy predators.

The Y-Oy quadrant tends to form Oy petty criminals such as pickpockets, conmen, purse snatchers, stealing from homes, stealing cars, etc. They can also be refiners and improvers of some goods and services such as selling better quality drugs in opposition to the Ro gangs. They might then try to infiltrate Ro areas to make sales and be beaten up when caught, the fights between Oy and Ro however are usually moderated by the O police just as deals between Iv agents and Bi teams are usually civilly moderated in the I markets.

Oy can also deal in more honest goods and services, for example they buy wheat milk and eggs from R farmers and sell bread in return,

instead of fixed Gb shops they might be more like nomadic travelling salesmen trying to defend a G territory against other Oy competitors. This was like Oy and Iv traders along the Silk Road between China and Europe, they might buy scarce raw materials like silk and spices then try to pay for them with refined goods such as rugs or pottery.

Oy traders like these often work for Y cartels and gangs, they can be like a mafia that defends Oy petty criminals in exchange for the lion's share of their loot. They can also be similar to V cartels making refined drugs such as heroin out of poppies, wine out of berries bought or stolen from R farmers, and bread, etc to sell to the Oy travelling salesmen while waging wars of attrition against other V gangs doing similar business.

Because the Roy areas are dominated by G public property then G public parks are needed for children to play in as they cannot afford large yards at their homes, nor can businesses afford to provide parks for customers. People also cannot afford Gb toll roads so roadways are usually paid

for from public taxes as are water and power supplies.

Oneville would tend to evolve in much more complex ways than in the simple diagram, for example the Roy areas might become like a patchwork quilt of Gb private property where resources were abundant enough such as farms near waterholes or occasional veins of rich ore to mine. Some Roy areas might become enclosed as ghettoes, for example the Biv quadrants of Bi-B and V-Iv might curve around and enclose some of the Roy areas completely if these areas of scarce G resources were surrounded by rich Gb resources. For example there might be a G area where rain does not often fall because of a rain shadow from mountains, all around it however the land is fertile enough to be privately owned. In these poorer Roy areas then they might be surrounded by Biv farms and mines, they then trade in effect across the G-Gb fence dividing the two areas.

This has often occurred in the global economy, for example Ro-R communist economies in the past

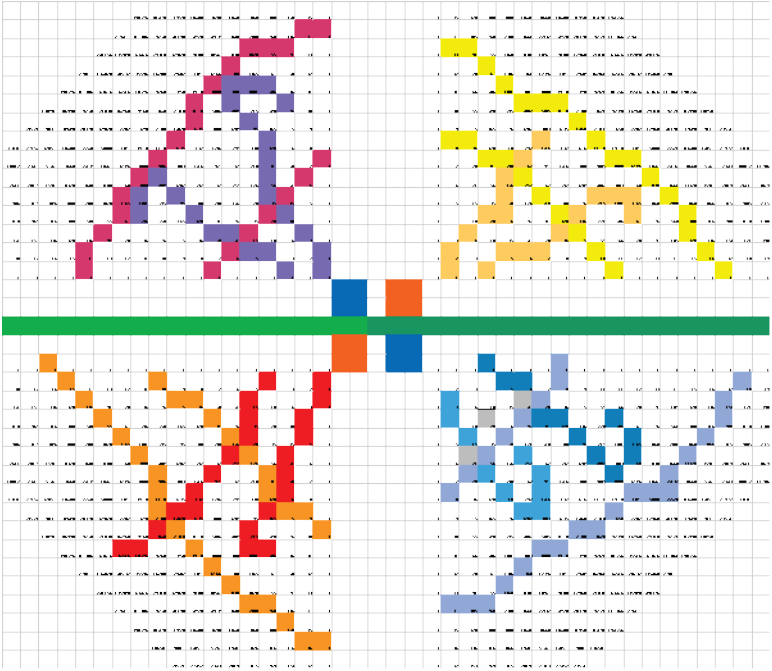
traded some goods with Biv capitalist economies such as Russia selling oil to the West in exchange for wheat. Roy dictatorships in Africa have sold blood diamonds mined by Ro-R slave labor to the West in exchange for weapons to continue enslaving people. Communist China as of 2012 still uses some prison labor to make goods to sell to the Biv capitalist economies. In effect as technology has made many G areas with scarce resources use them more efficiently or helped them discover more minerals they have become Gb based Biv economies. This has left some Roy economies encircled with the numbers of dictators going down, for example North Korea as its neighbors Russia and China have become more Biv because of technology. As explained in my other Aperiomics books this may be temporary, future shortages of food and minerals may cause much of the world economy to become Roy again with a rise in the numbers of dictators.

The aim of a Biv society is usually to grow and turn neighboring the Roy quadrants into Biv as well, for example they might provide aid and help to build dams for water, offer jobs for Ro-R workers to move or travel to Bi-B areas, and so on. This is like

a Biv forest trying to expand into less fertile areas around it, often this results in enormous waste as trees grow and then die from a lack of nutrients and water. In the same way the attempts of the Biv advanced economies to establish wealthy societies in the third world has often wasted large amounts of aid with few results.

The V-Iv quadrant might see the Y-Oy businesses also making bread and wine, they could offer to invest in them with an attempt to make them profitable enough to become Gb private property. This was also seen when Russia was attempting to rapidly privatize its assets to Gb after the fall of communism, the Biv advanced economies would see G public enterprises often dominated by Y mafia control. When attempting to do business there they often had to pay protection to this Y mafia, as this Gb privatization went forward prematurely much of it collapsed because Biv economies cannot work efficiently when resources are scarce. These Biv companies often lost money, however some parts of the Russian economy became controlled by the Y mafia who became V businessmen as it became prosperous

enough for Biv businesses to thrive like a growing forest.



If resources in Oneville are dwindling then the Biv areas might start to become abandoned as their Gb resource are not worth owning, then they become more G public property and perhaps nationalized by the I-O government. This has been occurring in Europe since the GFC where the governments have nationalized many banks and run up large sovereign debts where before there

was private Gb consumer debt. Where before Gb private farms were run by Bi-B workers the increasing scarcity of resources would make more of Oneville dominated by nomadic farmers and cattle herders.

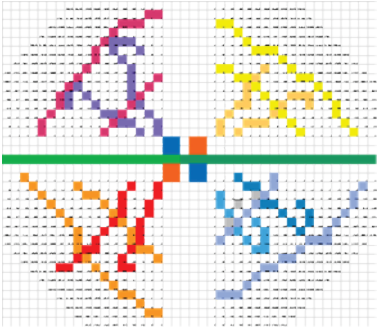
The Bi teams might become more like Ro gangs as increased crime makes them act more like vigilantes and neighborhood watch to protect their communities. As the I markets begin to fail through scarcity of goods and services the O part of the government might ration more goods and nationalize farms and mines as a more just solution than letting people starve, where before I civil fines and courts were sufficient to settle most disputes the O criminal police would be needed to jail and sometimes execute people to reduce crime, corruption, and keep the peace.

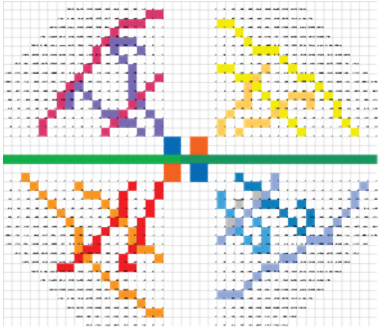
This has happened to a large degree since the GFC in Europe and the US, for example Y mafia gangs in Italy have used violence and the lure of available cash to take over V-Iv businesses short of capital as business has remained weak. There has also been an increase in Y-Oy loan sharking to

Bi-B areas with high unemployment, before these people were able to borrow money from V-Iv banks. Insurance can also start to fail, to protect their shops from Oy criminals they might have to pay protection to the Y mafia whereas before they would pay premiums to V insurance companies to cover smaller amounts of Oy shoplifting. Also R people have to pay protection to Ro gang in some US ghettoes to operate a business, for example prostitution but even car cleaning and doing laundry.

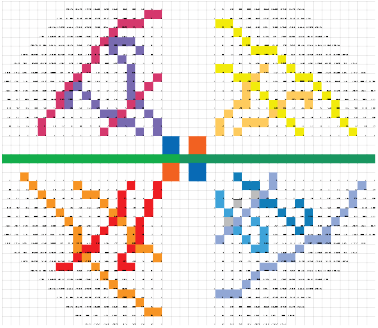
The situation can become more complex when there are multiple diamond graphs, as mentioned earlier there might be trade and war between the towns of Oneville and Onely in the country of Onia, they would have similar problems and opportunities with overseas Twoia and its cities of Twoville and Twoly. In the diagram below these four cities are shown.

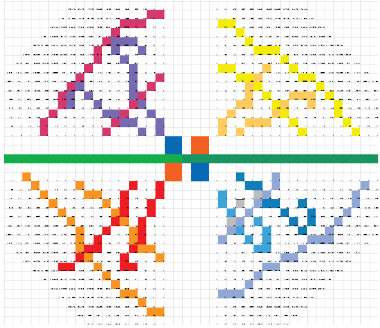
Oneville Onely





Twoville Twoly

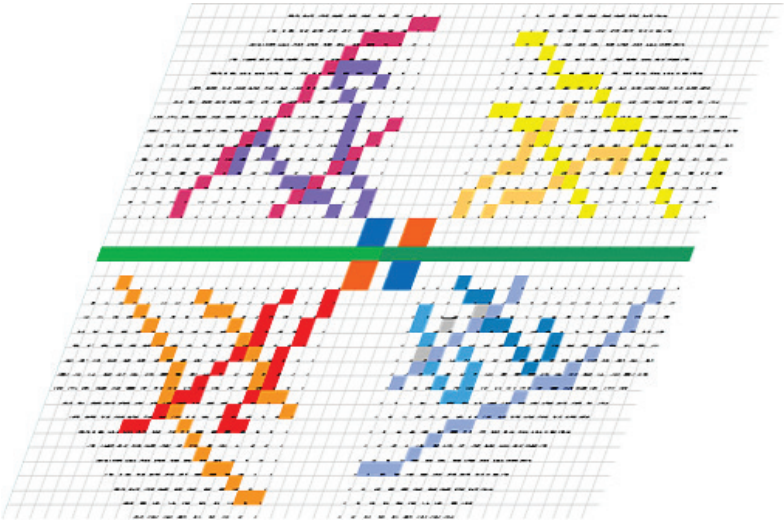




For example while Oneville is declining with a scarcity of resources Onely might be becoming more wealthy with improved rainfall as well as the discovery of some new mines. This could become like the cold war where Oneville would become mainly Roy and no longer democratic, because they have scarce G resources they would covet

those of Onely and want to invade or steal from them. Onely would want to convert Oneville back to a Biv economy, they might then try giving aid which might help them enough to restore their Biv economy.

At the same time this might be happening in Twoia, Twoville is also becoming poorer and more Roy while Twoly is become wealthier and more Biv. They also have a similar relationship except that Twoville also covets the resources of Biv Onely as well as Twoly, they might also want to form an alliance with Oneville in war. In Roy systems war is more common because of the negative sum game of minimizing losses with Y-Oy predator and Ro-R prey in it with animals, in Biv trade is more a positive sum game of maximizing profits. Like with the cold war then Roy economies tend to be talking war while Biv economies tend to be talking peace and trade.

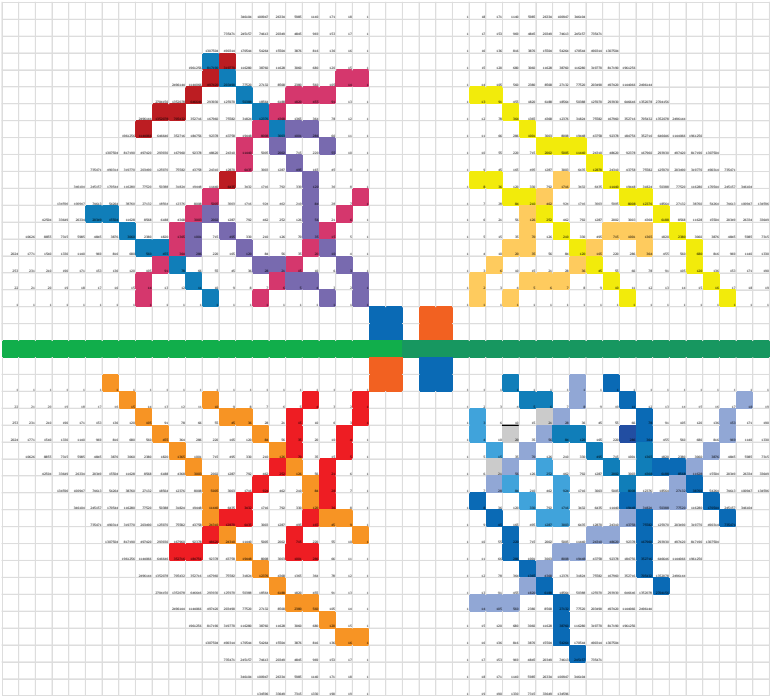


In the diagram above the Bi-B and V-Iv quadrants are larger, this indicates that more of the Roy resources have become economical to become Gb private property. At the same time the Roy quadrants have shrunk, G-Gb being a zero sum game more Gb private property means less G public property. This might be like Russia after the fall of communism, over time there was less Ro-R communism and Y-Oy mafia and oligarchs, these were replaced by more Bi-B workers owning private property while the Y-Oy oligarchs have become more legitimate V-Iv businessmen.

Skewing the shape of the diamond graph has some advantages, however it could also make some calculations in the individual cells more difficult. An equivalent way should be for the graph to remain undistorted and the quadrants to grow or decline in size, for example the Roy quadrants represent Iv-B and V-Bi colors doing business. If these increase in size then corresponding Oy-R and Y-Ro colors can decrease in size to represent any change of ratios between the quadrants. This allows the graphs to be calculated more easily on a spreadsheet such as Excel, however to illustrate the changes here distorting the quadrants can represent how some colors might take over areas from others. For example the distorted graphs can be seen as the Bi-B and V-Iv quadrants growing as they take over former G public land to make Gb private property.

If the Biv areas grew 10% this way and the Roy areas shrank 10% then this could be illustrated by distorting the graph or changing the numbers by 10% in an undistorted graph. In the diagram below the Iv-B and V colors might be growing more than the other colors, this was more common before the GFC in the advanced

economies. The Iv-B economy is fuelling much of the growth by bidding subprime loans and housing prices between the deceptive Iv agents and B workers. The V banks here are being tricked by their Iv agents into loaning too much into this deceptive market, the Bi lines are not growing. This indicates a lack of cohesiveness and cooperation amongst workers to shore up wages and talk to each other about subprime fraud, also to understand as a community the dangers of the housing bubble.



For many reasons Roy and Biv economies and ideologies have considered their system more preferable and have tried to change the other. For example Karl Marx saw the Ro-R system becoming a Bi-B worker's paradise and thought this needed the Y-Oy and V-Iv quadrants to shrink or even disappear. At first though Stalin took over countries in Eastern Europe that formerly had a Biv economic system to make them Roy.

Y-Oy Nazis saw its system of state ownership as superior to the capitalist West or even the rest of Europe, its conquest of Europe then was an imposition of a Roy system over a formerly free market Biv France and others. Often then Ro-R and Y-Oy systems can break out into Y-Ro open warfare as in large tank battles in World War Two. They can also have wars of deception as Oy-R espionage like between the British and Germans in trying to break each other's codes.

This occurred because of weak international I-O policing, the US was unwilling at that time to act as global policemen so the pact between the Ro-R

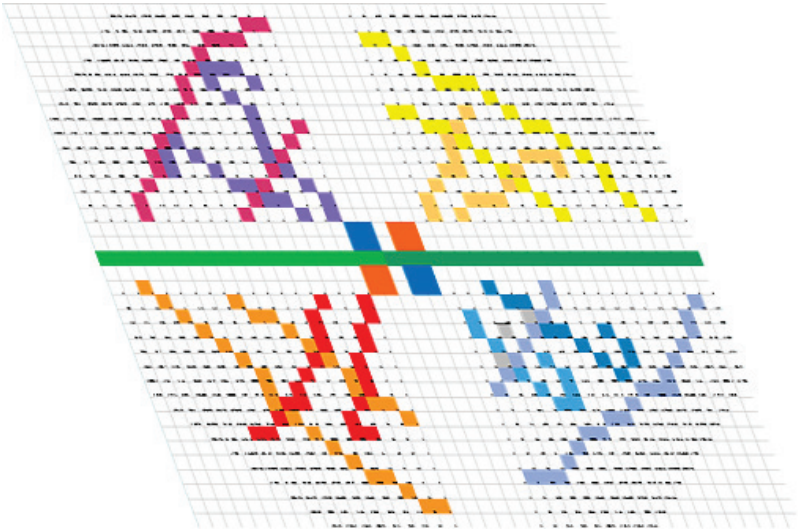
communist under Stalin and Y-Oy Nazis under Hitler soon broke down. Other I neutral countries such as Switzerland were not strong enough to police the war but often acted as brokers and a market open to both sides.

In the same way the Biv economies want to convert all Roy economies to their system, this means extending democracy to all and ending dictatorships, privatizing as much of these economies as possible, and allowing more foreign ownership of their assets. The results of this policy have been mixed, much of the investments in newly Biv Russia and Eastern Europe have been wasted while loans in the Southern Eurozone are increasingly being defaulted on. These economies are traditionally Roy with extensive public ownership and little democracy, often their economies work more efficiently in Roy than Biv because resources are so scarce.

The surge of Biv economics has in large part occurred because of technological progress making some resources seem more abundant, however this technology has had little effect on

the abundance of resources for poorer people in these countries. Instead Biv has increased in some areas that have become rich while other areas remain even poorer than under Roy systems. For example as of 2012 much of Russia and Eastern Europe is yet to surpass the living standards they enjoyed before the fall of communism in many ways. Aperiomics however is not about judging one system over another but examining the consequences of color codes as they change and interact.

If this process occurs because of ideological reasons, such as a rush to join the advanced Biv economies, rather than an increase in Gb resources then the economy might snap back to its previous balance of G-Gb or even become worse as the Biv economy wastes resources and collapses. This was like the aid spent on Iraq and Afghanistan which threatens to become wasted if these economies go back to Roy.

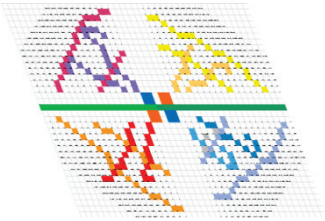


In the diagram this can be the result of too fast a conversion to a Biv economy, here much of the Biv quadrants have collapsed causing the government to nationalize much of the economy into Roy. This is the situation in much of Europe and the US after the GFC, much of the banking system overinvested subprime loans into Roy areas of the US economy to try to make them prosperous Biv areas. This happened to some degree as long as they were subsidized by this loan money, for example it created a construction and real estate boom. However once this Iv-B and often Oy-R boom ended much of this capital was wasted as these areas reverted to Roy ghettoes

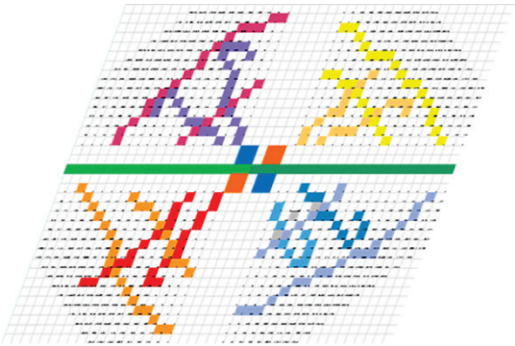
much like some aid in third world economies is wasted.

In Onia then there can develop problems between Oneville which has become more Roy, and Onely which has become more Biv. To illustrate this I will put the two graphs together. To add some more complexity one is larger than the other, this represents a disparity between the size of their local economies.

Oneville



Onely



In this case the economy of Oneville would have shrunk as its Gb resources dwindled, Onely has grown as some people moved to there from Oneville. They can also represent two ecosystems, Oneville is like a formerly thick Biv forest that has thinned out from a drought, the vegetation has collapsed in some areas and hungry animals have accelerated this process by overeating and knocking down trees. This is like some Biv economies after the GFC where the Roy economy has nationalized some banks, the O criminal police are being used more to control Y-Oy predatory business, other companies are collapsing under the weight of debt, taxes, and the lack of profits like nutrients to a tree.

Onely here is like China where the Roy communist economy is shrinking while the Biv private sector is growing, however it is in part doing this by exporting to Oneville and providing credit for these exports. In Oneville the Iv-B parts of the economy can draw in loan monies from V-Bi parts of Onely, this is like the US and Europe borrowing from China to try to grow and innovate their way out of trouble. The result however can be a weed

like economy, Iv-B tends to grow in a boom and then bust when the resources are exhausted. In its drive for innovations it also creates many wasteful mutations of products that fail, the result often being that the Iv-B economy constantly crashes leaving local V-Bi stagnation. Part of this process is deception and momentum, the Iv-B economies of Europe and the US then try to grow with some momentum while trying to generate false confidence as a placebo to V-Bi investors like poker players looking to borrow funds for their game.

Central planning and markets

Markets are often very efficient, this is because they work in a similar way to a Biv tree and some plants can be very efficient in nature. The B roots of a tree gather nutrients and these are synthesized together into organic compounds and distributed up the different branches to the leaves. In the same way Biv market economies establish roots and branches to transfer goods and services, to split them into various specialties and to combine different specialist goods into a more general one.

Plants can combine a form of central planning as well as chaotic growth, for example they usually time when they will blossom and create seeds, they have a typical lifespan, and so on. Other plants exhibit very little central planning, for example Iv-B desert plants might be ready to sprout at the first rain and seed as fast as they can because of the unreliable conditions. Contrast this to a V-Bi oak tree growing in a stable environment, it has the time to plan its shape steadily and has a long life. If it encounters an accident it often has seeds under it ready to sprout upwards when there is enough daylight.

There is a third kind that combines chaos and randomness into a balance, it grows frantically at some stages to avoid being overshadowed by other saplings but it also plans to have a mature stage where it protects against disasters. This is a balanced Biv tree, by this it avoids many of the pitfalls of Iv-B and V-Bi plants. For example Iv-B weeds try to grow quickly and chaotically, grabbing any available nutrients like with the low hanging fruit principle. If they run into too many

other weeds they can strangle each other's growth.

V-Bi trees use far more planning, however they have the disadvantage of often becoming stagnant and can be overtaken by Iv-B plants such as with a strangler vine killing a tree. In most ecosystems we don't see either of these dominate, for example a typical grasslands might have some Iv-B weeds that spring up faster than other plants so they can often seed first. However they are so unstable that more balanced Biv plants like grass catch up and overshadow it, this is like in an economy where Iv-B seems better for growth and innovation but as the GFC showed after a wasteful collapse much of the benefits are lost like with the weeds.

In the same way we don't see many V-Bi plants in a natural ecosystem either, these are ancient trees such as Gingko that sometimes manage to survive but usually a tree that doesn't evolve eventually gets overshadowed by those that learn its weaknesses. However many of these stagnant trees were either Iv-B or balanced Bi at some

stage, they then fell into stagnation as their genes could not come up with useful mutations. In the same way an economy can fall into V-Bi stagnation when the Iv and B people in the economy cannot innovate effectively.

In the same way then an economy can be one of three kinds just as there are three kinds of plants. Neither is better than the other, they just have different consequences.

In Roy societies there are also three kinds, Oy-R which is like Iv-B growing chaotically and collapsing, Y-Ro which is stable and stagnant like V-Bi, and balanced Roy where the middle of the food chain is stable but Y-Ro and Oy-R animals still thrive. We see these kinds of societies in poor countries but also when economic conditions are bad such as a recession or depression.

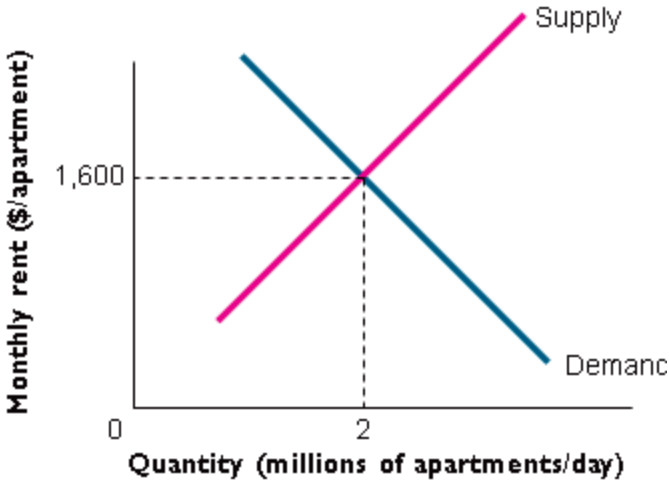
When confronted by poverty Roy societies as with many economies after the GFC usually try a Y-Ro or Oy-R strategy, often they alternate indecisively and destructively between both. The central

planning approach is Y-Ro like where large teams of animals plan their lives by protecting against chaos, for example Ro buffalo and wildebeest are not affected much by chaotic events such as droughts and predator attacks because they can protect each other or survive through prudent water and food management.

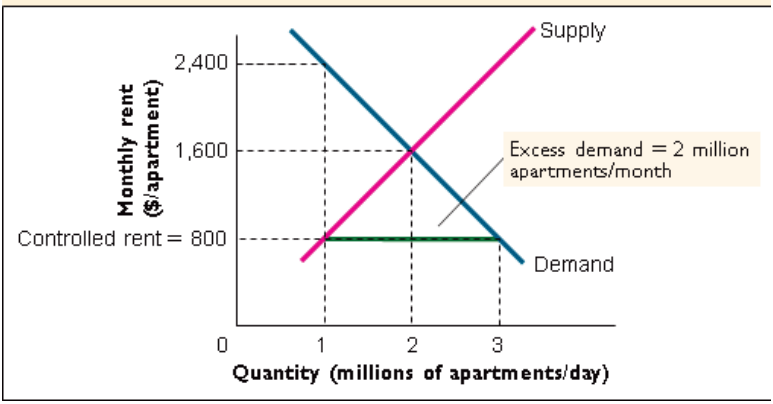
In the same way Ro economies such as communism over-planned to eliminate chaos but became stagnant as a result. Y societies tried a similar kind of central planning but in a more predatory way where they could attack other economies or occupy them. This was like the Nazis and Fascists in World War Two, however Franco's Spain was also like this except it controlled its own Ro population as a prey for the fascist elite.

Systems like these usually collapse because they fail to innovate, Europe after the GFC has fallen into a similar trap where the economy has become stagnant after Iv-B innovation collapsed.

Y-Ro and V-Bi societies have had a bad reputation for a long time, even throughout history their stability has eventually led to stagnation and decay such as with the Roman Empire. Usually there are Oy-R and Iv-B people against this central planning, however they go to the opposite extreme of claiming all planning is bad and all collectivism leads to despotism. Friedrich Hayek and Milton Friedman are examples of this other approach, it enjoys success when economies are over-planned because they force a movement back to balanced Roy and Biv economies. With not enough planning however economies become chaotic and follow the boom and bust cycle, resources are wasted just as people who fail to plan and wing it through life sometimes get lucky as an innovator but also sometimes fail disastrously.



In the diagram above there are two curves, supply and demand. If this was an Aperiomics diamond graph the red line would be chaotic and the blue line random, in conventional economics however both of these lines are chaotic. This is because as the price of apartments decline the demand would keep going up but in the diamond graph people tend to a normal Bi usage of apartments even if they keep getting cheaper. For example people can only live in one apartment even if they halve in price and they still have to find jobs nearby, this limits the amount of migration rent reductions can cause.



In the diagram above rent controls keep apartments artificially cheap in new York, this can give a pent up demand because more people want apartments than developers are willing to build for those rents. In the same way keeping prices artificially high will depress demand while increasing the supply of apartments. This graph can represent the I-O market, the red line can be Iv agents competitively renting apartments and the blue line Bi consumers acting as a team rent them.

The Bi consumers tend to have a normal price they will pay, rent controls around this price will then have little economic impact but might reduce chaotic swings in price. It can also make a

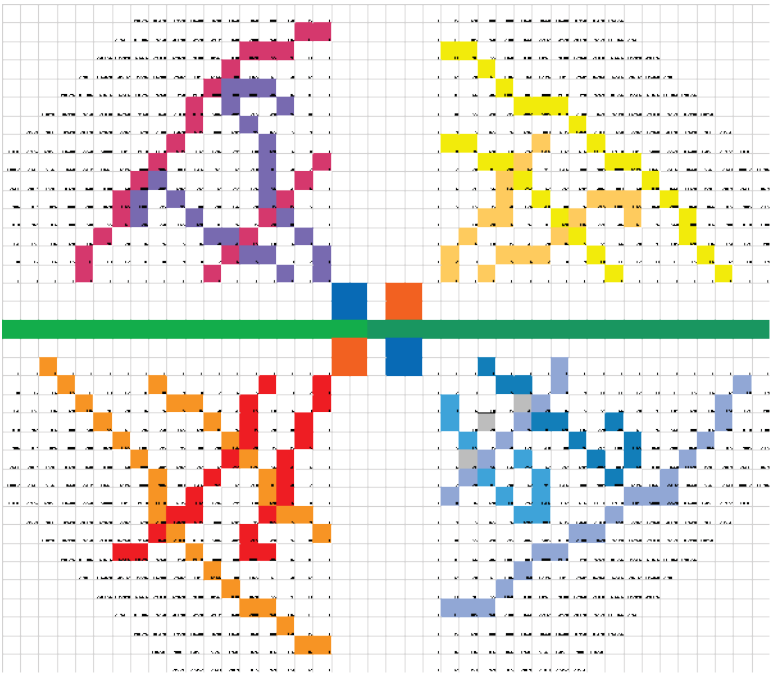
market stagnant because Iv counter innovations are reduced, for example some developers might make apartments that are more expensive at first but come down in price with mass production. The rent controls can prevent this initial boom in prices, without them Bi consumers would tend to pay a little more on the average for new apartments just like they would for new products at the supermarket.

However they expect these prices to come down, if they don't return to a normal price then they might be boycotted and collapse. The dead weight loss from rent controls is more because of distorting the color ratios so they try to find ways around this, it can also be caused by weak I-O police and markets. For example if Iv agents are dishonest and taking many offers on apartments to push up rents like an auction then there can be a Bi consumer backlash to this. They might boycott some Iv agents caught doing this, they can also vote for a government that tries to solve this with Bi rent controls.

This is then a Bi solution to the problem, V-Bi are planned colors and so if the controls are set at a normal price then they get more of what they want. If the rent controls are away from this normal price there can be a war of attrition and resistance to it, for example V developers might be regularly lobbying for changes to the law or refusing to do maintenance like a kind of boycott. Because a Bi solution is not a neutral police and market solution then Iv agents are left out, hence they try to overcome this by deception. For example they might look for B renters that will pay extra for other services such as expensive maintenance.

Bi price controls then will result in Iv deceptions to get around them and find B consumers also willing to be deceptive. V price controls such as collusion between companies can lead to Bi consumer resistance and boycotts, they can then use more Iv agents to try to find ways around these high V prices. For example Iv agents might buy cheap V stock that is unsold because of the boycott and sell it in discrete ways so the V companies don’t lose face.

Instead of Bi price controls or Iv agents getting away with deception the I-O market should in a neutral and strong way resolve these disputes. For example deceptive tricks by Iv agents to raise rents can be illegal as fraud. However organized boycotts of buildings with high prices are a kind of rent control and like union boycotts might be illegal or regulated. The needed balance is for Iv-B innovative apartment building to be allowed to boom and bust without threatening the normal pricing of V apartment building and Bi rents.



In the diamond graph the V-Bi lines are similar to what we see in trees with the upper V line in the upper left quadrant looking like a leaf canopy, Bi can often be seen in the planned shape of many roots systems where roots store nutrients around their intersection to the trunk. In the Roy quadrants Y can represent packs of predatory animals moving to attacking the Ro lines of prey, they also look like opposing lines of armies waging a war of attrition such as trench warfare in World War One.

The Oy and R lines in terms of warfare are the other strategy often used, that of penetrating these trenches or lines of soldiers with a fast and deceptive Blitzkrieg often accompanies by new innovations in military hardware. These lines can be imagined as spears or columns of soldiers meant to pierce the Y-Ro walls of troops. As the Germans found in World War Two planning does not work well with Blitzkrieg, instead individual soldiers and lower ranked officers relied on chaotic tactics rather than a planned strategy. Sometimes deceptive prongs of Oy can be used in a Blitzkrieg attack to pierce the Ro armies and

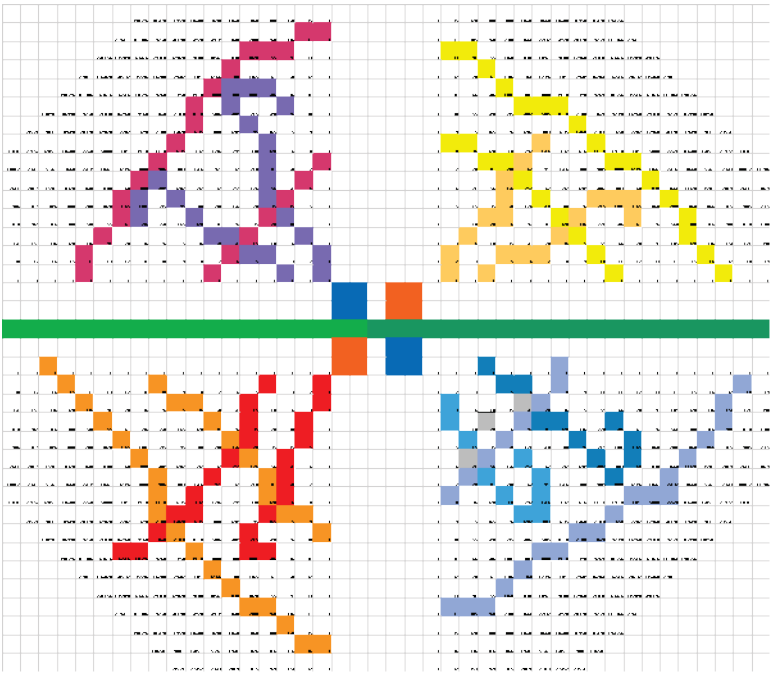
then envelop a piece of it like predators breaking up a herd.

Buyers and sellers

In Aperiomics there are goods and services that have been provided by the use of V-Bi or Y-Ro time, others are produced by Iv-B or Oy-R energy. In the diamond graph then B workers in a Biv society can use energy to extract minerals or grow crops, Iv agents then use energy to refine or improve these goods and services such as making jam or win from berries. The I-O market can then be where people who make products using energy can trade them with others using time.

Energy relates to momentum, in a Biv society there is then a tendency to build Iv-B momentum as people try to move goods and services faster. This can be seen on a typical freeway or supermarket, often the smallest delay will lead to frayed tempers. Stock exchanges and derivatives are now traded at near light speeds, delays of microseconds can lead to massive losses.

Looking at the diamond graph below the Iv and B workers are portrayed by lines radiating out from the center, they can grow quickly which in the cells of Pascal's Triangle means they make more profits. They can also quickly collapse like the roots and branches of weeds or desert plants that overuse their resources.



In an Iv-B economy then cheap energy, whether from labor eating cheap food or cheap oil and coal

running machinery can lead to higher productivity. For example B workers might mine iron ore with picks and shovels, they then learn to use coal to run more automated digging machinery which pays for the coal and makes a larger profit. Because they compete with high momentum they then make more profit by expending energy on faster trucks of ore to the market or their clients. In Iv-B lower energy goods are worth less money, for example iron ore on slower trucks is less likely to fetch a higher price as others race to get to the market first. They might then arrive when there is a glut of ore and get less money, even go broke.

A B cleaner might earn more money by working faster or have a faster car to drive between jobs, they might also speed up their cleaning with energy using vacuum cleaners, polishers, and so on. Generally then B wages and profits as well as the price of goods and services are based on the energy used and the cost of this. Sometimes this is even more direct, a computerized iron ore digger might earn money in relation to the fuel it consumes.

In the same way Iv agents use counter innovations that generate profits according to their energy used so these prices are also directly based on energy. Sometimes this can be from thinking, for example B workers might innovate after a lot of effort in trying different ideas. Iv counter innovators like Thomas Edison responded to the invention of electricity by spending a lot of energy in trialing variations of the light bulb.

Iv research companies today might work out how much they can pay scientists to expend mental energy on innovating, this research and development is then energy intensive. Faster computers might use more energy, reducing friction and wasted energy such as with heat is another way for Iv-B people to increase their profits with energy. In this way their energy costs are like any other waste in goods and services, the less waste there is the more of a competitive advantage and momentum they have against other Iv-B people.

Energy then is in many ways a currency and money represents what energy can be bought or

expended, for example a dollar might be valued in terms of what energy based goods and services you can buy with it. It can also be valued according to what energy you can buy, so much oil, electricity, natural gas, coal, solar energy, wind energy, food calories of different kinds, and so on. A workers might expend the equivalent of so many calories of food as a laborer, their wage then can be expressed not just as V-Bi time but as Iv-B in terms of the energy their muscles use up.

The V-Bi economy is based mainly on time, this is similar to Karl Marx's belief that a product is worth the time it takes to create it. Because V-Bi and Y-Ro are random and normal then time based money can work well, Bi unions might do about the same amount of work per hour and so goods and services can have normal correlations to the time taken to produce them. The V-Bi and Y-Ro lines in the diamond graph represent the time that teams of people take to produce goods and services, for example a V insurance company might work its business on time by collecting premiums for a long period to insure against short term chaotic events like theft or storms.

A V bank works in a similar way, it makes profits from long term loans while protecting against short term chaotic withdrawals of money by keeping reserves like an insurance company does. This is also like Marx's idea, loan money can cost a business according to the time it borrows it for. So house prices for example might have as a component this timed interest that the buyers had to pay as well as a normal amount of work per hour to build the houses. For example if it takes a thousand hours to build a normal home and twenty years of interest at 5% then when the house is resold they need to recoup these two time based costs.

A Bi team of iron ore miners can also take a long term view of making profits, they tend to not waste energy racing to market or working quickly to get the lowest hanging fruit first. Instead they average out the different kinds of ore so the energy used in processing it is not related as much as with the B miners. Instead they might process so much iron ore per hour and charge on this basis. This is different from the idea of marginal cost of goods increasing as more are made,

instead the average cost of making goods per hour of work can be used.

For example a factory has costs of workers of $X per hour and uses up $Y of raw materials per hour in making their goods, it might then charge people $X+Y plus a profit. This is common in government contracts where for example cleaners might calculate how many hours it would take to clean a building and price the job on that basis, it can lead to a Bi union running this cleaning industry as well.

In a V-Bi economy then money tends to buy the time it takes to produce goods and services, for example a dollar might buy so much time from a Bi union workers but has little relation to the amount of energy he expends. Usually these workers have a normal amount of production with deviations above and below this, someone buying the services of a Bi union plumber then might expect an average amount of work for this time they pay for. Lawyers and doctors work in V teams in their respective Law Society and Medical Associations, they charge a fixed price per hour and people receive a normal service for this with some random deviations above and below this.

This then is why an Iv-B economy has high momentum as well as booms and busts, the expenditure of energy as a currency creates this. A V-Bi economy is more stagnant with little energy or animal spirits available, things take longer to get done and there is less excitement in markets to create another boom. Energy tends to be easily wasted, for example a boiler might burst and release heated water losing energy. In the same way an Iv-B economy can build up energy and momentum, while this energy increases the value of goods and services it can be lost in an explosion so prices can then boom like a controlled explosion and then dissipate with the market cooling down suddenly as the energy value is lost.

For example prior to the GFC securities were often priced higher because the market was highly energetic and money moved much faster, extra value was being created by more being done with more energy in the same time. However after the GFC this energy is much more subdued and less business is being done in this same time, so there is less energy. Money can then be thought of as a

two sided coin or note with energy on one side and time on the other.

In the center of the diamond graph is the I-O market where goods and services are often traded, here then the energy based Iv agents try to deal with time based Bi consumers and workers. As in physics this gives rise to a fundamental time energy uncertainty, this is because there is no exact way to relate the time of producing goods and services to the energy in doing this. This can also be regarded as a position versus momentum uncertainty, the Iv-B economy creates momentum from this energy which means they want to sell goods and services quickly. If they don't then this creates a glut or pile up of these products and so they need to be sold at low prices to clear the system for new stock.

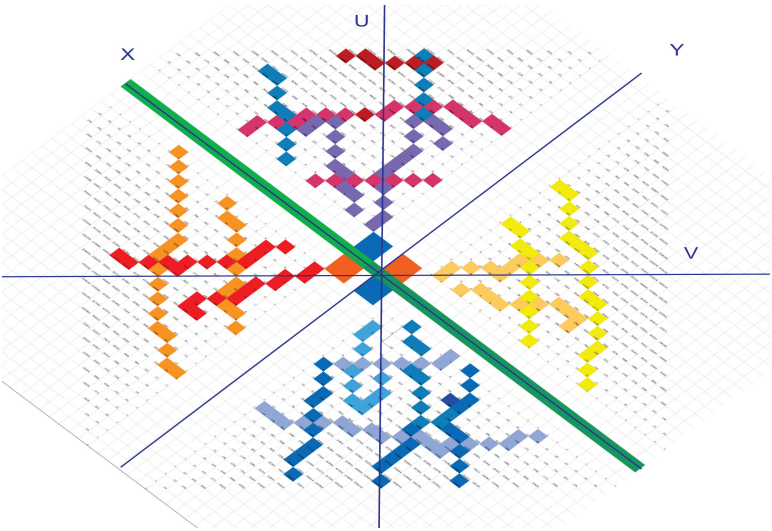
The V-Bi people take advantage of this need to maintain momentum by their positional strategy which comes from having more time to make decisions, this gives the position momentum uncertainty like the time energy uncertainty. For example a Bi consumer might be shopping for

new steel pots and pans, these might be made from new kinds of steel as counter innovations to finding new minerals such as nickel. The Iv agents needs to sell their stock quickly to stay ahead of their competitors, however they can run up against the Bi consumers that don't need to buy new pots and pans as their current position is ok and they already have a normal set of cookware.

So the two must negotiate in the I-O market, the Bi consumer gets a discount to motivate or energize him while the Iv agents take some losses because the time to clear their stock is increasing, they need then to move stock at a lower price because of the low energy of enthusiasm of Bi consumers and high time they take in making decisions. So the low energy and high time depresses energy based prices potentially causing them to crash. Sometimes though the Bi consumers become energized by Iv innovations and start buying in a high energy and short time way, they rush to sales and compete more than cooperate with each other. The Iv prices can then increase because the energy based pricing is increasing chaotically.

In this process money becomes a measure of both time and energy, a dollar can represent how much energy goes into the manufacture of these pots and pans as well as the energy of innovation, speed in getting to market, and so on. The dollar is also valued according to the time component of these pots and pans, because people can take their time in upgrading this prevents a boom in their prices. When there is little time pressure then money can be mainly valued in the time taken to provide goods and services. When there is time pressure then people are paying more for momentum, velocity, and hence energy.

To illustrate the time energy uncertainty in markets the diamond graph needs to be modified, it is rotated by 45 degrees clockwise and new axes are also added at the same angles. The old axes can remain X and Y, the new axes can then become U and V. This allows a third axis to be added later for both making X, Y, and Z as well as U, V, and W.



Chaos Space

Now the Iv-B economy tends to grow along the u axis while the Oy-R economy grows along the V axis. I call this chaos space because these new axes of U and V measure chaotic growth and collapses while the random colors of V-Bi and Y-Ro need not be measured here.

Both Iv-B and Oy-R are then energy based economies, people survive and prosper according to how fast they are and how much momentum they have. In Biv this is a positive sum game where people compete to maximize profits and in

Roy it is a negative sum game to minimize losses. When prices are defined in the U and V coordinates then vectors between them can indicate the momentum of prices growing and collapsing.

Chaos space can represent many theories in economics such as competitive markets and Austrian ideas. Each transaction is assumed to be competitive without any cooperation, people are acting in their own self-interest according to cost and benefit analysis, they can be secret and deceptive like in a poker game, they tend to build momentum towards ceilings and floors, they can reach tipping points and collapse or righting points where they recover from a collapse, and so on. In chaos space energy and momentum are measured on the U and V coordinates, here prices would be measured at least implicitly by the amount of energy used in creating and marketing goods and services. It can also be like a perfectly competitive market in economics.

A vertical or horizontal line can then show a growth or decline, in chaos space an oblique line

can also show growth or decline but the random interaction such as the resemblance to a normal curve are regarded as a skew on a growth curve. For example a Poisson Distribution here might be seen as a skewed exponential curve, this is like in statistics where chaos affecting a normal curve is often ignored. For example a Bi line in the Bi-B quadrant might also be chaotic in chaos space, however to avoid confusion only the chaotic colors of Iv-B and Oy-R would be used with the U and V coordinate system. V-Bi and Y-Ro would then be ignored as colors here.

In chaos space there are four kinds of economies that have little planning, instead they rely on individuals being free to do what they want even if this causes booms and busts. There might be a small economy with four quadrants like this, for example in Scarcia there might be just Oy-R interactions while Abundia has only Iv-B.

Oy can represent a kind of police state in Scarcia where the government spies on its citizens, people can easily disappear and propaganda is used to hide any government shortcoming. It can

be like a kleptocracy where like Oy predators such as hyena the government elite steals much of the wealth for themselves. It can also be like the government in the novel 1984. The system is designed to stir up hatred of R people who are regarded as a contagion, they need to be rooted out much like with the fear of R communists in Pinochet's Chile lead to disappearing people.

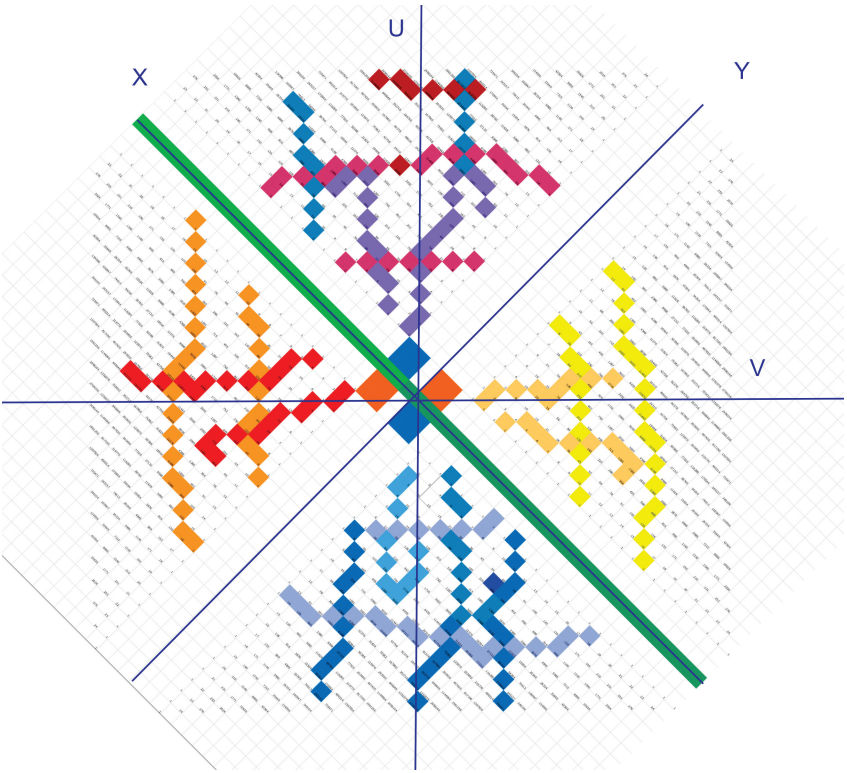
The R kind of government in another part of Scarcia is a secretive and deceptive form of communism such as in North Korea, propaganda is used extensively to hide the shortcoming of the regime and the fear of Oy spies and imperialism is used as an excuse to protect the R people from it. So Scarcia here might be a long and thin state with an Oy government at one end and R at the other. This could evolve in this way because of resources, for example R might be where people farm but the Oy areas have little farm land so they must survive by predatory raids and trickery.

The Iv kind of society at one end of Abundia is run by Iv agents and small companies, they can be highly deceptive and can represent the right wing

vision of libertarianism and laissez faire. The Iv agents want to be left along to make profits free of I-O regulation, Bi unions are seen as collectivism as is the V government association with capitalists. Ayn Rand was a proponent of some of these ideas where all collectivism or team action is bad, the individual's ability to innovate is consider superior.

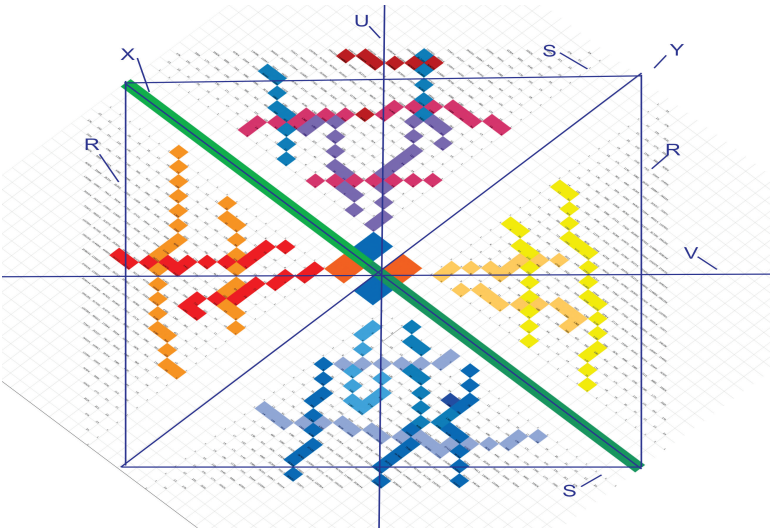
The B kind of society is far left wing at the other end of Abundia and can contain much anger against the deception and trickery of Iv agents, this can result in many conspiracy theories against the right wing. The result of this fear of the right is a kind of libertarianism as well where people want to be left alone and try to hide from this interference.

The diagram below can also be how Scarcia and Abundia evolved, each with an hourglass shape intersecting in the center.



Random Space

The time based economies of V-Bi and Y-Ro can be analyzed according to a different coordinate system called random space, in this a vertical or horizontal line always represents a normal curve.



Here I have added the R and S axes, easier to remember as random space coordinates. Here then each horizontal and vertical line can represent a normal curve slice through Pascal's triangle. Each oblique slice is like a skewed normal curve but in random space the chaotic aspects can be ignored like the random interaction in chaos space are ignored.

In this random space then V-Bi and Y-Ro interactions are assumed to be the only ones occurring, for example V management of companies might negotiate with Bi unions over wages but individuals are assumed to also be

acting randomly rather than deterministically as they would be in chaos space. In this random space time and position are measured, in a deal what a person or company's position is in regard to price is important as is the time they take or can wait in coming to a decision.

Random space can include planned economies such as where people have long term projects like five year plans where goals are fixed positions. For example the Nazis were a Y planned economy where they soaked up unemployment from the Great Depression in planned projects such as building the autobahns, their economy would have been measured by normalized plans and changing production in this R and S coordinate system.

The Ro communists under Stalin also had a planned economy and would be measured along the R axis as well, they had five year plans in the 1930s as well, it could be said that the Y Nazis and Ro communists planned their economies and then engaged in a Y-Ro war of attrition. The center of the R axis would be where it intersects the x axis,

this is like the center of a normal curve with standard deviations for example on either side. However because random space is assumed to have no chaos anywhere then teams of animals, plants, people, etc would all form normal curves with centers having different R and S coordinates.

Scarcia and Abundia are two states in the country of Onia as mentioned earlier, here they were portrayed in chaos space with the U and V coordinate system. Random space can be illustrated in the neighboring country of Twoia where Richia is a V-Bi state and Pooria is Y-Ro. Twoia might also have evolved in the shape of the diamond graph above, it looks like Onia except that only the V-Bi and Y-Ro lines are used in random space.

V at one end of Richia like a corporate state where property is largely privatized as Gb and smaller businesses cannot compete against their price fixing and influence over the government. Bi is like a union and cooperative dominated government at the other end of Richia and is similar to European socialism, it is also mainly based on Gb

private property but consumer rights and wages are the basis of this society's planning. In the 1920s much of the US was like V with a high concentration of wealth from the roaring 20s boom, many of the cities also had a wealthy class of Bi unionists as well as a cohesive Bi consumer society buying V goods. For example Henry Ford insisted on paying good wages to Bi people so they could afford to buy his V cars, wages and prices were then normalized but stagnant.

In Pooria there are two governments as well, Y at one end and Ro at the other. The Y government is authoritarian or sometimes a mafia state, it is controlled by teams of predatory businesses and organizations that cooperate with each other like the Cosa Nostra in the US. This is like the Nazi party, it can also be like in Germany where in the 1920s the economy was more like V as in America, then the Great Depression caused scarcity of G resources and the rise of Y politics.

At the other end of Pooria is a Ro state, this would have been like Germany in the 1930s where some areas were nearly taken over by Ro communists in

street battles. Pooria would be more like Y Germany and Italy facing off against the more distant Ro Russians, it might evolve this political polarization because of differences in resources as in Onia. For example Y might have more resources for refining goods like Germany had with the Ruhr making steel. Ro like Russia had much less industry and so was at first based on farming and mining with little refining capacity. Like Y Germany attacking Ro countries to its east because of their resources Y in Pooria might want to occupy Ro in a predatory way to get their resources without paying for them in trade. Both Y and Ro then can tend to be criminal states in the sense that they can attack each other or Richia, Roy wars like this are often seen as being criminal by Biv countries, for example the Nuremburg trials run by the Biv allies after World War Two.

I-O Space

The two kinds of space are combined in the diamond graph with X and Y axes, an oblique line then can have chaotic and random elements like a Bi team also innovating and competing within itself. So when a line or part of an economy has

chaotic and random elements, for example a Bi union where there is some competition between its members, then this can be in I-O space. However only in the center is I-O space neutral, moving to one side can represent bias in the police and markets as mentioned earlier. For example in the Bi-B quadrant a line might represent B workers who mainly compete but sometimes cooperate, however this market and justices system would be highly biased and inefficient as V-Iv interests would be more discriminated against.

Market equilibrium

In Aperiomics there is often no real market equilibrium, in the I-O market instead there is a mix of chaos and randomness. The random aspect of prices tends to go to a normal value which is like an equilibrium, people tend to consult with each other and so the price they will pay becomes a consensus. Some as deviates will pay more or less sometimes, this is often because of chaotic or high energy factors such as deceptive advertising, a short time available to get the goods or services, high pressure selling, and so on.

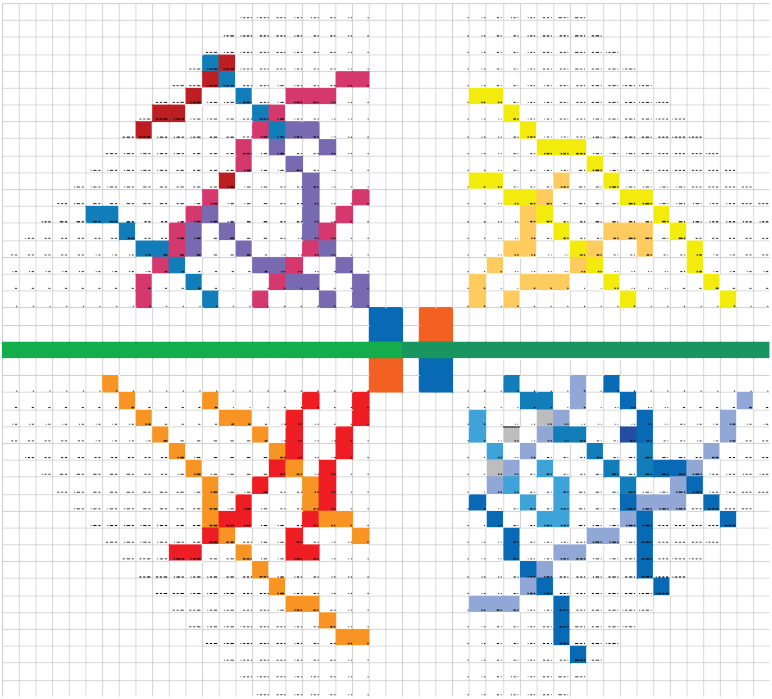
When random market forces dominate there is often a war of attrition between V companies and Bi workers or communities, this can also prevent a market equilibrium. For example a V company might have Bi consumers boycotting some of its products which prevents a stable price for them, instead the company has to take into account the losses from the boycott in setting its prices while the consumers have to sometimes buy more expensive goods instead. Usually a war of attrition ends with either side having to surrender, it can also be called off if both sides suffer unacceptable losses in a negative sum game. For example a long term strike might resolve itself when both sides decides they have lost enough from this war of attrition.

When chaotic factors are stronger there might be no normal or equilibrium price, instead it might fluctuate through booms and busts like some securities or commodities. For example in the Bi-B quadrant there are B wheat farmers that experience wild swings in prices from overproduction and then farmers abandoning wheat farming in the glut. There can also be Bi

farmers growing wheat but they could be in a war of attrition against a V baking cartel over the price for their wheat, they would then be selling their wheat more cheaply elsewhere or storing it while the bakers were paying more for other wheat or reducing bread production.

Generally in Aperiomics there is a compromise between truth and deception in a price discovery when chaos and randomness come together, this is usually in the I-O market where neutral laws give a level playing field. The resulting equilibrium is unstable such as is seen on stock exchanges, there can be a normalizing process to go to a particular price along with chaotic panics and greed and people rush to get away from losses or get profits before their competitors do.

In the diamond graph there is a different way of showing supply and demand, this is because there can be in the Bi-B quadrant for example B selling to B, Bi to Bi, or B to Bi.



For example when growing berries, wheat, lumber, as well as livestock and poultry a primitive Bi-B economy would naturally trade these goods as well as services like farming and mining workers between each other. This then gives supply and demand but in the usual economics graph chaos and randomness are not included. In the diamond graph the direction of the line typically representing demand represents random teams while the supply graph line is representing by chaotic B workers.

In this first example then this can show B workers selling to Bi teams as well as Bi teams selling to B workers, supply and demand can then be represented in each line but in the standard economics graph this is not true. In the diamond graph price can be the Y axis and Quantity the X axis, the B lines might represent different B suppliers in competition with each other. These lines can grow chaotically as typical supply curves, they tend to grow to supply larger quantities of for example wheat when prices are higher. When prices drop in a glut then these farmers reduce production or go broke causing the glut to disappear and prices to recover. In Aperiomics however there is no market equilibrium with this supply because the B workers will continue to race against each other and so cause overproduction over and over. If they cooperated with each other then they would become Bi teams.

In the typical economics graph of supply and demand these chaotic changes in supply are met with chaotic changes in demand, for example when prices rise consumers buy less which tends

to push the price back towards equilibrium. However this chaotic situation is represented in the B lines where each can be considered a buyer and a seller. For example the two B lines radiating out from the center could be a strawberry picker and a blueberry picker where each wants to pick a ratio of both kinds of berries rather than completely specializing in one kind. Each has to compete with each other in selling their berries to other B workers, there are also other strawberry and blueberry pickers in the market.

In some cases when blueberries are scarce the pickers will raise their prices to make profits and cover potential losses in a future glut, then some B consumers might shift their purchasing to strawberries placing a downward pressure on this price rise. However others will panic buy more blueberries expecting the price to rise and saving money for next week's berry eating. This is more common on a stock exchange where a rising share will cause some investors to think they are overprice and not buy, others will think if they continue to rise there are profits and so they will buy the share. For example they might think there is inside information driving the price increase, in

the same way strawberry pickers might think people on the inside know strawberries will be scarce such as from a fungus on them.

Generally though the demand for berries will be like a standard demand curve, when prices go down B workers will buy more of the berries they want but don't grow themselves. When the prices go up then they will buy less, one reason for this is giving more barter or money to other B workers helps a competitor so they would want to pay them as little as they can get away with. In this case then the B demand curve would always be pulling prices down while a B supply curve would always be trying to push a seller's prices up. These don't form an equilibrium though, they usually move between booms and busts.

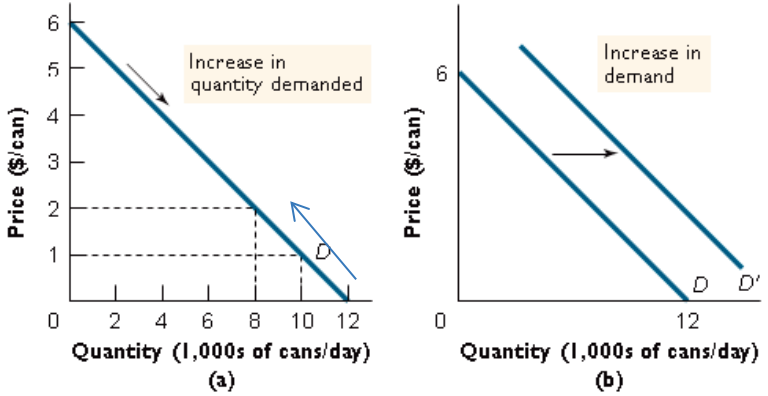
The result then with B-B supply and demand is a boom and bust in prices as well as some deception and racing to buy and sell before others. The B berry pickers then will have their supply curves move like roots of a tree, growing outward when there are opportunities and then shrinking or collapsing in scarcity. However the

same shape will describe the B buyers as they panic buy and sell to profit from the booms and busts. The reason is there is no normal price in chaotic colors, people have no idea what the real price should be because they deceive each other in the market, keep secret what they intend to do, and move with momentum with booms and busts in the price.

The idea of a normal price is like in a poker game where there might be a normal bet on a particular kind of hand, for example a pair of Aces. However in poker with bluffing and the momentum of bidding this is usually irrelevant, instead the Aces have a variable value depending on what other cards people have and how much deception there is. In the same way the price of strawberries and blueberries among B pickers is what they can get for them with deception and whether the market is booming or busting, in this situation there may be no standard price for berries at all.

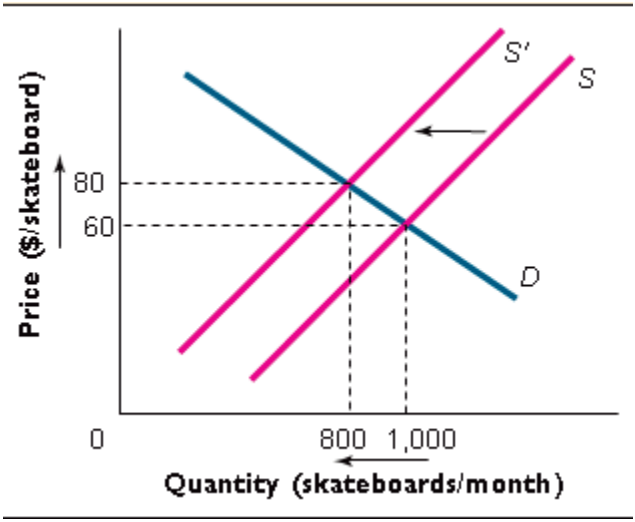
The demand curve in the direction usually shown in economics graphs instead acts like a Bi team in Aperiomics, people have a concept of a normal

price and so when it deviates from this then they buy more or less. In the left hand diagram below the blur demand curve shows an arrow pointing downward, this is like an elastic pressure for prices to go down because Bi consumers are demand less. However there is another arrow pointing up, this means that Bi consumers resist buying more when the price drops too much because they only have a normal consumption of the goods.



In the right hand diagram above the demand curve moves to the right, this is like a B chaotic change in Bi demand to a new normal. Here B workers might for example mutate a new kind of berry by cross breeding other berries, it becomes

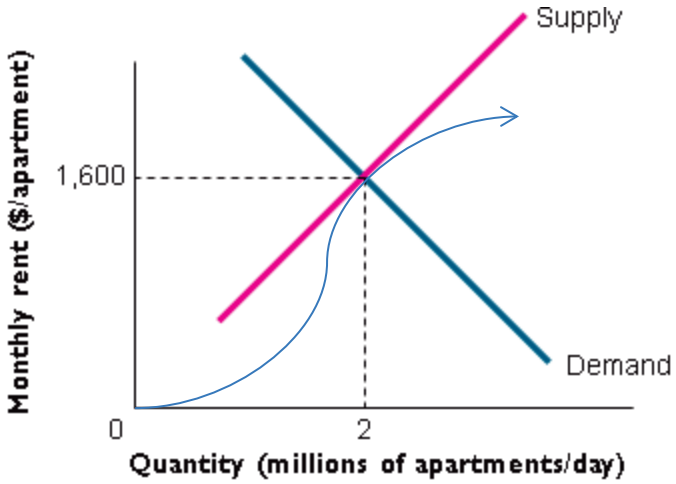
popular and so Bi consumers are willing to pay more for a given quantity. However this change can be unstable, for example they might get bored with the new flavor or it makes them ill. Then the demand line would crash chaotically back to the left again.



In the diagram above the supply curve moves to the left, this means that the Bi consumer line shown as D must pay more for their normal consumption. For example their children might break or change their skateboards once a year and the increased price might not change their consumption much because it fits in with a normal

lifestyle. There would however be some price resistance with an elastic tendency to snap back to the old price if a new supplier comes into the market. This new supply curve can be viewed as having moved upwards, this means that a more random team aspect could have been introduced. For example the price might have gone up because the suppliers were colluding as a Bi team themselves or more like the supply line would be a V team or cartel.

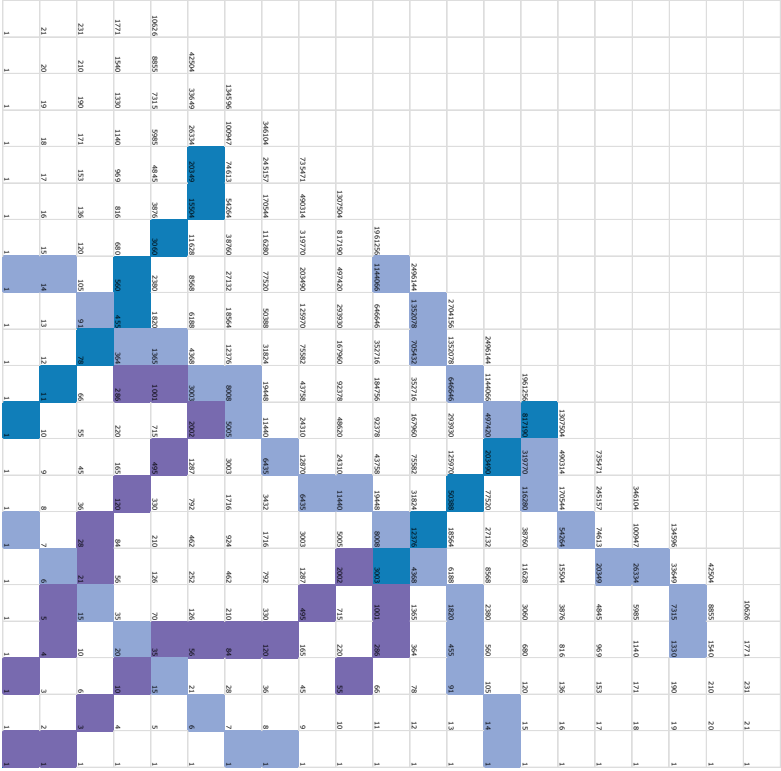
So a single B supply line, shown here as red in the diagram above, would grow and shrink chaotically like the added light blue line in the diagram below. When the whole line moves up or down then this is usually from team actions, for example if a B worker tries to unilaterally move the supply curve up then in a perfectly competitive Iv-B market other B workers will usually undercut him until he brings his prices down or goes broke. However if other B workers form a cooperative raising the supply line then there can be a war of attrition between them and the Bi consumers with boycotts of each other until one side gives up.



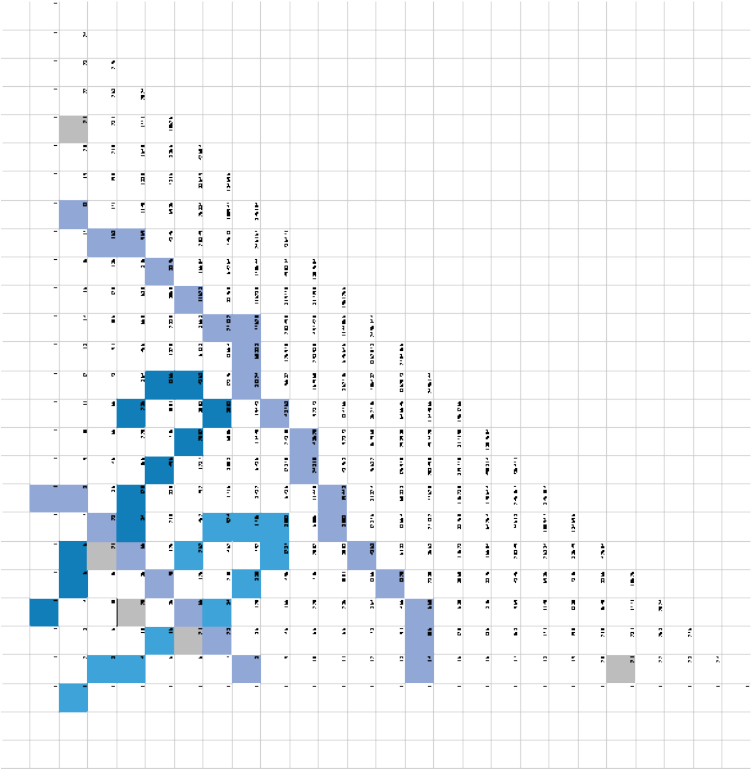
Chaos versus randomness in deals can also be shown in the I-O market by superimposing the Iv agent into a Bi consumer graph as shown in the diagram below, it then contains Iv agents and B workers as lines radiating out from the bottom left and three lines of Bi consumers approximately at right angles to them. When the supply fluctuates chaotically by either the B workers or Iv agents the Bi consumers have an idea of a normal price and buy more below that price and less above it. This then tends to bring the market back to a kind of equilibrium restraining the booms and busts to some degree. Iv versus Bi in the diagram is more stable than B versus Bi because they have different functions in the economy, Iv refines goods and resells them while B workers do the

same job as Bi but also try to break down the Bi teamwork.

The implication of this is that market equilibrium at a socially optimum level relies on a strong I-O police, which means an O criminal and I civil G of regulation. This is when the Iv agents represent the chaotic lines as in the diagram below and the Bi lines represent a random normalizing process. In between them a neutral and fair market will produce more efficient business.



In the diagram below there are two Bi lines pointing approximately NW, these might represent one team picking berries and other orchard fruits while another grows wheat along with raising chickens and milking cows. Both are then highly diversified against chaotic prices, if one price goes bust then it is likely other prices will insure them against collapsing from it.



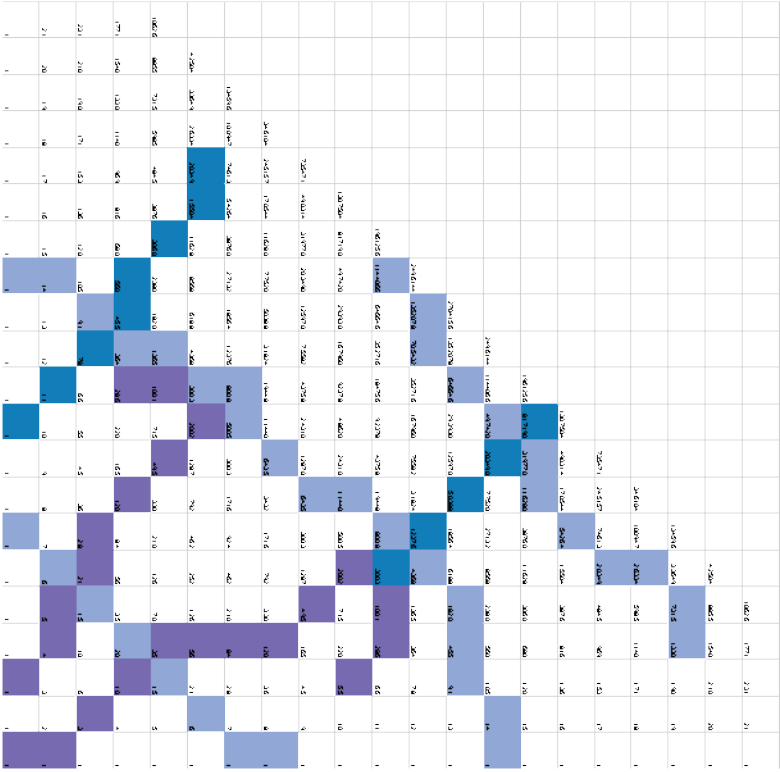
Because both are normal curves both teams have views on what a normal price is, this can work efficiently when they agree such as when both teams have the same normal price of berries in mind. However if it is different then there can be a war of attrition like the V management and Bi unions striking over wages. For example the Bi team with wheat might expect to trade a kilo of it for a kilo of berries but the Bi team picking the

berries expects two kilos of wheat for a kilo of berries.

Both can afford to not trade with the other for extended periods by saving up stocks of the other's goods, this is like the Bi workers having a strike fund and going on strike which should in time cause one or the other to give in on price. This depends like the unions on who can afford to lose the most in waiting out the other, it is however a different kind of market to the B versus B workers trading chaotically or the Bi randomness versus B chaotic trading.

All three of these interactions happen in stock market trading, Iv-B is where there are chaotic variations in stocks because of dependent variables. For example someone sells a stock because he sees others doing in and panic spreads like a contagion. Sometimes there is a V-Bi war of attrition between short sellers and a company, also there can be greenmail where a company buys stocks like laying siege to a company. The stock price however is usually a balanced I-O mix of these two when the I-O market and police are

neutral and fair, this gives an uncertain compromise between chaos and randomness because each is still unpredictable to a large degree. The diagram below can represent this mix, here Iv agents are looking to make profits for the V banks and hedge funds they work for, they try to profit from Bi institutional investors like union pension funds. This is the same interaction as Iv agents selling jam and wine in a previous example, however here they are looking for bargains in stocks to sell.



In effect here they look for arbitrage opportunities where chaotic panic or greed has caused a stock to overshoot upwards or downwards, this is also called momentum in stock analysis. They then compare this chaotic variation with the Law of the One Price which is a normal price for a stock trading randomly. If the stock has gone too high from chaotic greed, for example it might have gone up and others thought there was inside information pushing it up. That makes others

jump into the stock until it hits the Iv-B ceiling where the momentum cannot be sustained, then it usually reverses with a downward momentum of panic.

The Iv agents then try to buy in this chaotic market and can either profit from other momentum traders by being faster or being deceptive with inside information. Otherwise they can make a more stable I-O market by selling to Bi investors where there is a normal price the share usually returns to. When the market only contains deceptive Iv agents it can speed up with many false trades reneged on, this happens in high frequency trading where trades are made and then rescinded before they are accepted. The result can be many more reneged on trades than those that complete. Sometimes this market becomes even more deceptive by being traded in dark pools free from any I-O oversight.

Iv-B share movements then are the cause of booms and busts in the share market just as they are in the previous examples of selling berries and jam, when people are bidding against each other

deceptively like in poker the prices tend to move with momentum between a ceiling and floor. A healthy market moderates this chaos with randomness, for example when unexplained price movements occur the stock exchange might ask the company involved if they know why this is happening to moderate insider trading.

They can also watch individual traders for nonrandom buying and selling, this is the same way the O police in the Roy economy catch Oy predatory criminals by looking for patterns in their deceptions. Often these Iv traders in a Biv society make money for a bank or hedge fund and receive bonuses and commissions, this is like in a Roy society where petty criminals work for a Y mafia and receive a cut of what they steal. With these Iv traders the I civil police such as the SEC try to get them to snitch on their V employers to moderate this fraudulent trading. The more chaotic prices of a stock are the less likely random forces are behind it and the more likely it is happening from deception or booms and bust developing.

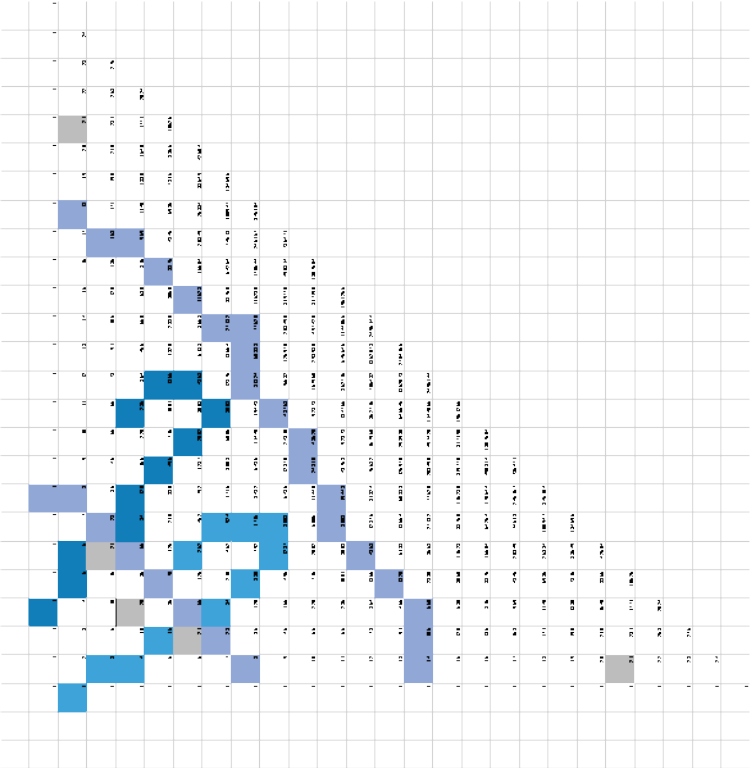
Cash on the table

In economics this represents where profits are available, usually someone will discover this opportunity and make these profits. This however is in a Biv society because there are abundant Gb resources, in a Roy society resources are scarce and so instead there are often no excess resources lying around waiting to be used. Instead there are bills or losses on the table, people have to watch out for loss creating situations such as staying away from criminals and bad neighborhoods, avoiding conmen in a market, spending money on goods to resell that instead create losses, and so on.

By avoiding or minimizing the bills on the table people might survive to some degree in this negative sum game, by comparison those who suffer these excessive losses might lose money, goods and services, their health, etc. This can also include people not paying their bills, in a Biv society they might do this as part of a positive sum game profit maximizing strategy. In this case I civil courts might compel them to pay these bills by seizing their property. In a Roy society the

negative sum game of minimizing losses is played, increasingly the I civil court option of seizing assets or garnisheeing wages does not work because people are so poor. Often then the O criminal police become involved such as historically with a debtor's prison or criminal penalties in bankruptcy for failure to disclose assets. Sometimes it can also be an I civil or O criminal offense for a person or company to trade while insolvent.

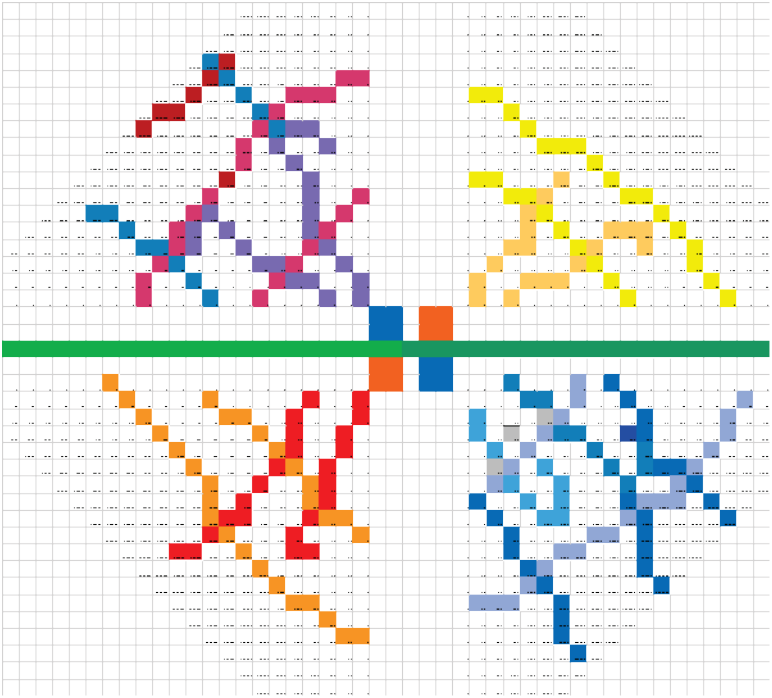
In the diagram below the cash on the table represents a jump from one cell to another, in B cash on the table is like a B root finding nutrients no other root has found, it then takes this and grows as a result. This can cause chaotic problems, for example people might get used to find cash or other Gb resources which makes them grow too fast as they compete to grab it all before other B people do. This creates a momentum driving towards a ceiling so when these resources run out or are not enough to sustain this momentum there is a crash as they hit this ceiling and then growth goes into reverse.



In the diagram below a Roy society in the lower left quadrant of the diamond graph can have bills on the table, the R lines represent people who manage to grow and prosper in this G scarcity according to how well they avoid these bills. For example some R poor people might become debt dodgers such as squatters and not pay rent until evicted.

The upper left quadrant is the V-Iv society where they also look for cash on the table, this is like plants growing to the sunlight by evading the overshadowing leaves of each other. When they find this sunlight it is like cash on the table to them because they make energy by photosynthesis. In effect then for a plant energy from the sun and nutrients from the soil are like this cash on the table, for desert plants the nutrients are more rare. They then have bills on the table in the sense that they are using up water, they need to minimize this use to survive. Other plants might be overshadowed by V trees and the cash on the table in terms of energy is low, instead they have to minimize their bills on the table of growing and surviving on this limited energy.

In an economy Iv agents look for cash on the table by making counter innovations or counter revolutions from B innovations and revolutions. Previously in an example Iv agents worked out that making jam and wine from berries was profitable because of new innovations in berry picking, this extra efficiency in picking berries was making a glut of berries on the market.



The upper right quadrant in the diagram above has bills on the table, this is like Oy predators where they have to find food to stay alive, in the same way an Oy petty thief might have to steal from others to pay their rent and feed their families. The bills on the table are their expenses which need to be paid whether they find food or money, for example Y lions use up energy and water in their metabolisms as bills on the table. If

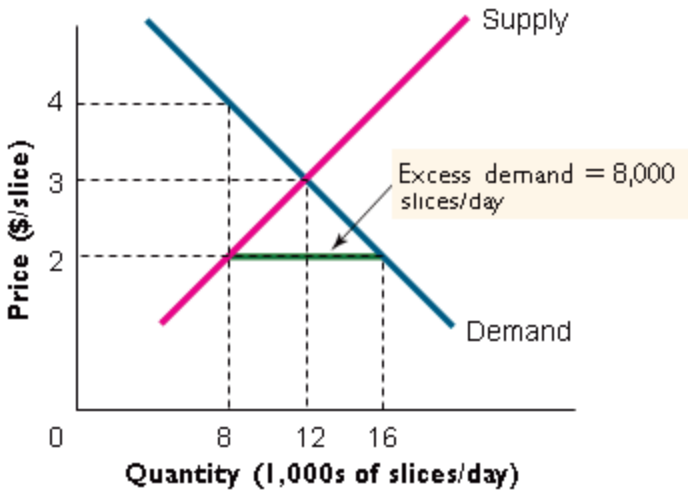
they don’t find food to pay these bills then they starve.

Currently after the GFC more people are in Roy where they have bills on the table they need to minimize or evade rather than cash on the table to maximize profits on. This Oy-R interaction of loss minimization would be like in poker where people play with money already earmarked for bills they owe, their objective is to dig themselves out of a hole rather than to make profits. This can be a common situation with gamblers where they need to win to recoup past losses or pay the rent. It is also like Oy predators such as hyena in a drought, they have a limited store of energy being used up and without food they will die. Sometimes they must gamble and bluff with these energy reserves to catch prey, if they are not fast and deceptive enough then as in poker they lose.

Because of this the bidding can be different in a Roy poker game, people are more likely to keep bidding on credit if there are no O penalties because they are often no worse off with more debt they cannot pay. Often then a game like this

might use Oy secret policing where players are threatened with violence if they cannot pay. For example there might be a poker game with Oy and R players, the R players are seen as prey and each is gambling with reserves they cannot afford to lose like animals in a drought. Without a violent O deterrence like the police both Oy and R players could just disappear moving somewhere else, I civil proceedings then would not work to recover this money.

In such a game there might be links to Ro gangs or a Y mafia to provide loans at high interest rates or to enforce payment, often people might have to commit other crimes to pay these gambling debts. In the same way if an Oy predator fails to catch an R prey it must find another prey to cover the energy used in the failed attempt. Situations like this happen all the time at casinos in poorer areas, people have bills on the table with few work prospects to pay them, they then try a deceptive game of chance at a casino to minimize their costs. They are usually not maximizing profits as in Biv because the main reason they are gambling is because of these bills.



In the diagram above prices are set at $2 a slice, they then sell out well before the demand is satisfied. This can indicate the Bi consumers on the blue line are getting less pizza than they would normally eat because of the limited supply, they might then buy more at $3 a slice leading to market equilibrium. However this also depends on what their normal consumption of pizza slices is, if it is $2.50 a slice in their budget then this demand will not be a straight line graph here. Conversely if the price of pizza slices went up to $4 a slice then demand might also not change on a linear slope but according to deviations on a normal curve.

Market efficiency and social optimum

Generally in Aperiomics markets are most efficient when there is a mix of chaos and randomness, this is because variables can then be either dependent or independent according to their true nature. For example in a V-Bi economy it can be highly stagnant like in Parkinson's Laws, they state that work expands to fill the time available and issues consume time in inverse proportion to their importance. In both these cases then energy is used up by time consuming work practices.

So a Bi union might react to more time to do a job by working slower as a way to make more profits on an hourly rate, this is also the problem with Karl Marx's idea of the price of goods being the time taken to make them. Because of Parkinson's Laws this can mean goods and services become more expensive or of lower quality, it becomes like a kind of inflation that may end up creating a Ro society where goods have to be rationed to minimize losses from this slow working and haggling over unimportant aspects of their production.

As mentioned earlier a V-Bi economy also has wars of attrition where resources are wasted on V businesses and Bi consumers trying to wait each other out in reaching a deal, for example with a V monopoly taking longer to supply goods unless people pay more for faster delivery as a way to pressure people into paying more. Bi consumers can take the reverse approach, waiting for some products to go on sale at a discount before they buy them.

This inefficiency can be measured by where growth becomes a deviation from a normal situation, instead of companies innovating to reduce unemployment they might hire some extra workers and then shed them later as business changes randomly. This is similar to after the GFC where Iv-B growth has slowed to nearly nothing in many parts of the economy leading to only small rises in GDP.

An Iv-B economy is also not efficient because of the large amounts of resources wasted when a bubble bursts, also people tend to innovate too

much in competing against each other leading to wasted resources in unwanted and disrupted goods and services. For example in a competition to produce better smartphones some companies have lost market share which results in wasted capital in factories and workers being laid off not being able to pay their bills. Sometimes innovation disrupts a viable industry and then fails to replace the damage it causes with additional value, for example subprime securitization disrupted traditional banking and caused them to lose market share but failed to create more value for those borrowing money.

In fast food companies might innovate by adding more sugar and salt to addict their customers, they play a positive sum game because the buyer and seller thinks they are gaining by buying this food. However it might lead to increased disease and chaotic collapses in health such as with diabetes and heart attacks. The I-O market and police have been working on these deceptions, for example in New York banning trans fats in fast food and reducing the sizes of carbonated beverages there.

An I-O based economy tends to have a neutral mix of chaos and randomness and this comes closer to a social optimum with a minimum level of uncertainty. Some social issues cannot be handled efficiently by a Biv economy because of the scarcity of resources, these are then made public as G where the O criminal police when neutral distribute these resources fairly. For example rationed goods in a natural disaster might be stolen if not administered by the O police, there might also be fraudulent charity organizations that would not be deterred by I fines. In Aperiomics the most efficient economy has a minimum uncertainty called h as in physics, this is minimized by the best balance of V-Bi and Iv-B in Biv and Oy-R and Y-Ro in Roy.

Reservation price

In economics the concept of a reservation price refers to the expected profits or losses on a transaction, in a Biv society this is a positive sum game where both sides expect to get more than their reservation price. This is like at an auction where the auctioneer might set a minimum price for his goods and anything over that represents

marginal profit. A buyer at this auction might have a reservation price of what he is prepared to pay, if he gets the product under his reservation price and over the auctioneer's reservation price then both make a profit. Both are also trying to maximize their profits in Biv, this can be a marginal profit in Iv-B and an average profit in V-Bi.

A buyer might also have a reserve price, for example there might be a kind of auction where a buyer agrees to pay a certain price for the goods he wants, he will then allow the sellers to compete for his business by undercutting each other so he gets the goods for less than this reservation price. This happens implicitly at malls, the Iv shopkeepers know that Bi consumers will buy at particular prices and then they might competitively discount below this to energize these consumers and make them buy sooner.

In Roy the reservation price is used to minimize losses, for example in an auction where the bidders are poor the reservation price might prevent their making too large a loss on the goods

such as accidentally selling a new car for a dollar. A buyer might set a reservation price of what they will pay to minimize losses as well, it might be known at this auction that a product will be passed in unless it can sell at or below this reservation price.

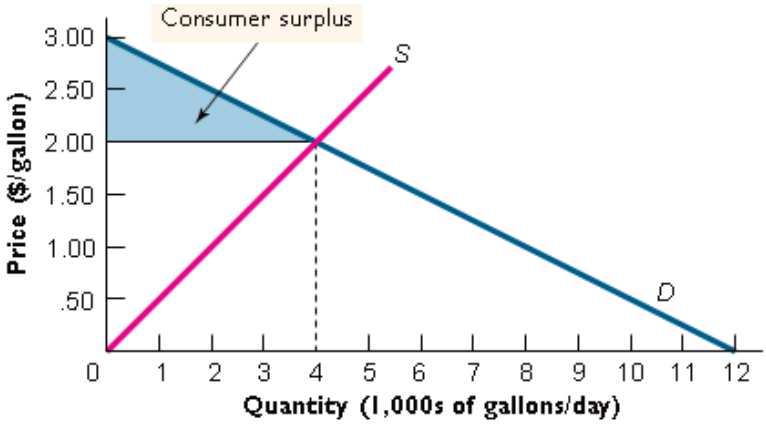
When businesses go bankrupt in Roy they are losing money, an auction then can be a means to minimize these losses by setting the reservation price. For example they might auction their office furniture at a loss, the reserve on the auction tries to minimize these losses. Sometimes there can be second hand dealers at this Roy auction that are also often losing money, however they need to keep buying stock or the rent and other expenses will quickly bankrupt them. So they are also setting reservation prices to minimize losses, for example in the off season of a tourist town all businesses might be losing money and only those best at minimizing their costs will survive until the next tourist season.

A Biv wealthy society then has little need for a reservation price to minimize losses, because

resources are abundant compare to costs most people would be offered more than they are prepared to accept because of there being enough demand. For example someone might be wealthy and willing to sell a second hand car at auction for a thousand dollars but competition for the car gives him more than he needs. The Roy society has little need for a reservation price to maximize profits because they rarely get offered even their cost of producing goods and services because resources are scarce.

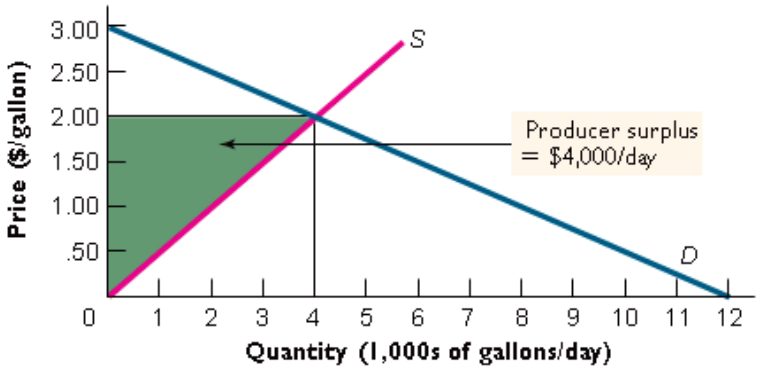
The G-Gb society is where the reservation price is the same as breaking even, if they cannot sell their goods and services for that price then they may as well abandon them or not bother producing them. For example a person might know where a second hand piece of furniture has been abandoned in a G public park. It might cost him X dollars to collect it as well as Y dollars in other profits he foregoes in getting the furniture. If he cannot get more than X plus Y dollars for this then the furniture remain abandoned as G public property rather than becoming owned by someone as Gb private property.

This often happens in the real world, for example someone might be moving house and can either sell some of their furniture or dump it. If the furniture is of marginal quality then it might be right on the fence, the second hand dealer might take it and pay expenses but make no economic profit. The owners of the furniture might only get enough to be better than leaving it on the sidewalk for someone to take for free.



In the diagram above the consumer surplus is where these Bi consumers on the blue line were willing to pay more than $2 a gallon for milk. On the diamond graph however this consumer surplus is not the same, if the normal price for the

Bi consumers is $1.50 a gallon then they will resist paying more or less than this. If the price is more than $1.50 then demand will go down but it will also resist going up if milk goes for $1 a gallon because they don't want to drink the extra milk.

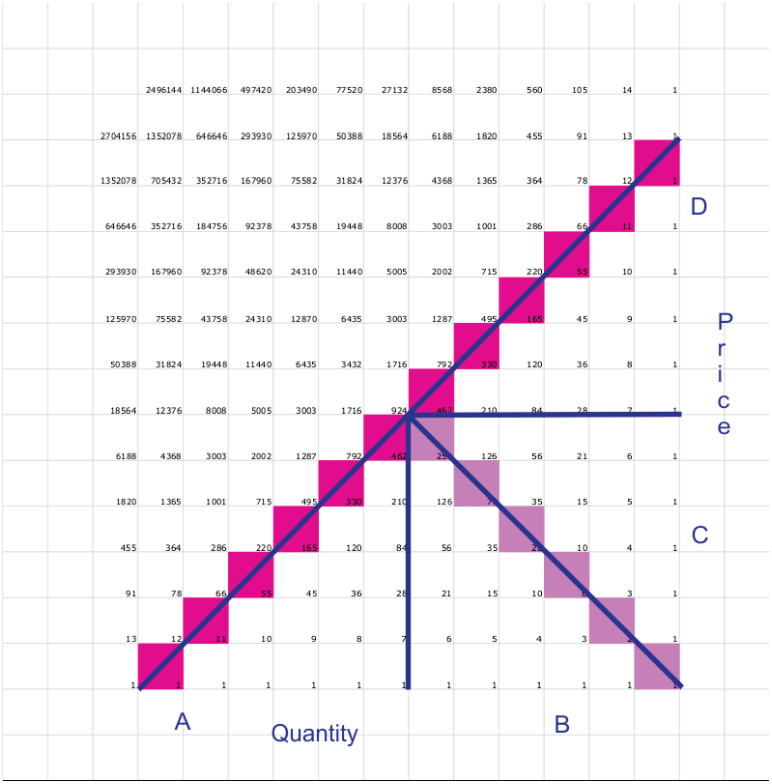


In the diagram above the producer has a surplus over his reservation price because he was willing to sell some milk for less than $2 a gallon. However assuming this is the I-O market the red line is chaotic and would represent Iv agents, the producer will exponentially grow his business as the price increases while the Bi consumer line will tend to be elastic around a particular price and quantity.

Comparing the two diagram above there are then two shaded triangles, one with a consumer surplus and one with a producer surplus. Instead of using these triangles the diamond graph uses the cell values of Pascal's Triangle, these shaded triangles in the V-Iv diagram below would represent a V cartel doing business with an Iv agent.

	2496144	1144066	497420	203490	77520	27132	8568	2380	560	105	14	1
2704156	1352078	646646	293930	125970	50388	18564	6188	1820	455	91	13	1
1352078	705432	352716	167960	75582	31824	12376	4368	1365	364	78	12	1
646646	352716	184756	92378	43758	19448	8008	3003	1001	286	66	11	1
293930	167960	92378	48620	24310	11440	5005	2002	715	220	55	10	1
125970	75582	43758	24310	12870	6435	3003	1287	495	165	45	9	1
50388	31824	19448	11440	6435	3432	1716	792	330	120	36	8	1
18564	12376	8008	5005	3003	1716	924	462	210	84	28	7	1
6188	4368	3003	2002	1287	792	462	252	126	56	21	6	1
1820	1365	1001	715	495	330	210	126	70	35	15	5	1
455	364	286	220	165	120	84	56	35	20	10	4	1
91	78	66	55	45	36	28	21	15	10	6	3	1
13	12	11	10	9	8	7	6	5	4	3	2	1
1	1	1	1	1	1	1	1	1	1	1	1	1

As can be seen in the diagram above each cell has a value, the area of the consumer and producer surplus then is different here. This is a more idealized diagram usually the Iv and V lines are more wavy indicating more real world values can be shown, also that Iv agents can have some randomness as well as V cartels some chaos. In the diagram below I have added lines to indicate consumer and producer surplus here. The Iv line pointing NW would be a producer and the V line pointing NE would be a consumer, for example Iv might be a strawberry jam maker selling to a V cartel such as a department store conglomerate.



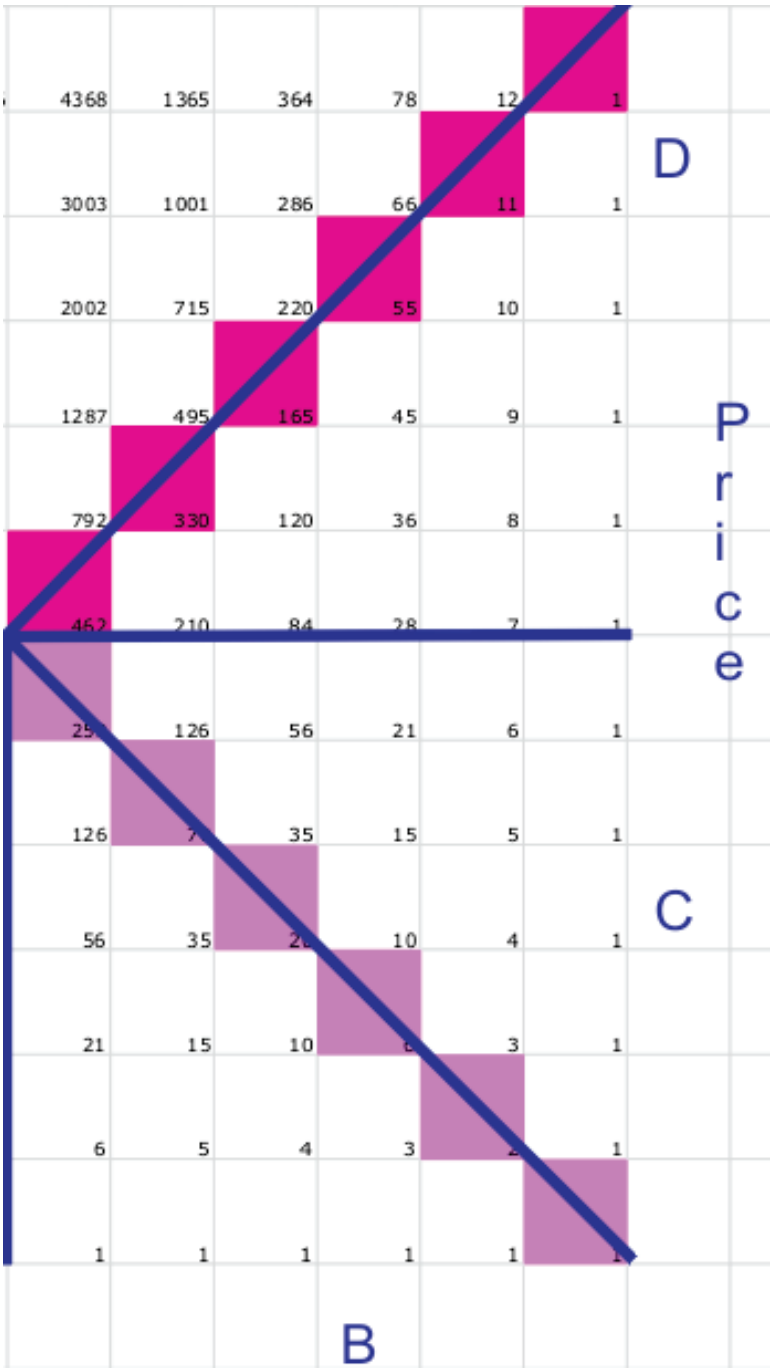
The prices and quantities are not important in this example, it might be $7 per kilo of jam to buy 7 kilos of jam a day for example at the equilibrium where V and Iv intersect in the diagram. Each cell has 1 on its edge along the X and Y axis, these can then be measures in dollars and kilos, the graph could also be 3D with the Z axis representing kilos sold per day or dollars of sales per day.

In the previous diagram showing conventional consumer and producer surplus C would be producer surplus and D would be consumer surplus. The values in the V cells represent a probability density function, as the triangle got bigger these values would approach a standard normal curve.

The values in the Iv line represent a growth function known as the central binomial coefficient numbers. This would indicate here that the Iv agent moves to higher values if possible. For example the V line like a normal curve means that V members tend to move towards the center, here that they would accept a deal of $7 for 1 kilos of jam rather than one further from the center of the normal curve. The values of the Iv line mean that the Iv agent would try to grow where possible to higher values but in a deterministic or chaotic fashion.

Both of these tendencies, to move to the center of the normal curve or to grow along the curve of the binomial coefficients, are followed in all the color codes but the V-Iv quadrant is used here as

an example. Other Iv lines in the V-Iv quadrant can be other coefficients in the binomial theorem or if they are at different angles they can be many other growth rates such as the triangular numbers, Catalan numbers, etc. This system then allows any kind of chaotic growth rate to be graphed as well as any kind of deformation in a normal curve to be directly related to chaotic or dependent variables.

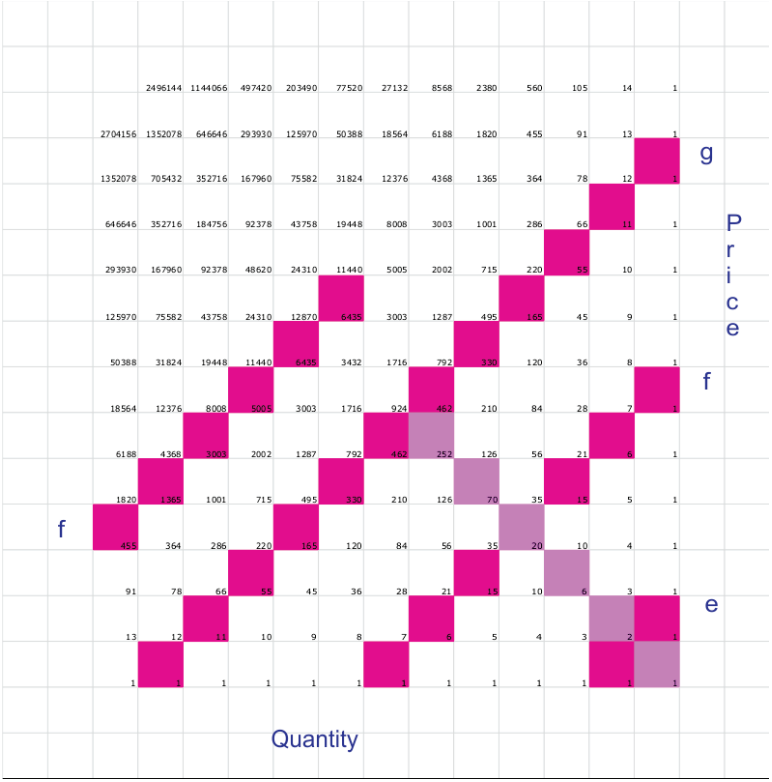

4368 1365 364 78 12 1
3003 1001 286 66 11 1
2002 715 220 55 10 1
1287 495 165 45 9 1
792 330 120 36 8 1
462 210 84 28 7 1
D
Price
126 56 21 6 1
126 35 15 5 1
56 35 10 4 1
21 15 10 3 1
6 5 4 3 1
1 1 1 1 1 1
C
B

In the diagram above the C and D triangles are easier to see. The D triangle is the consumer surplus can also be regarded as a smaller Pascal's Triangle with one side being 1,7,28,84,210,462. While the other side is 1,1,1,1,1,1,1. This triangle then is like the standard Pascal's Triangle growing from 1 in the NW direction until its bottom row becomes part of the V line with values 1,11,55,165,330,462. This can then be regarded as a growing V-Iv part of the economy, both Iv and V start off at 1 transaction then the numbers in the D triangle grow as the consumer surplus grows until it reaches the V line.

If the Iv agent grows until his line intersects the V line elsewhere than at the center then this is less likely because it is no longer the center of the normal curve. So this represents an elasticity with the demand of the V cartel, they are interested in the jam at $7 for a kilo. If the Iv line intersects elsewhere then there was more reluctance to make a deal, the price might be too high or if it is too low the quantity available might be more than V wants. These other scenarios would be modeled by more wavy lines as in the diamond graph,

however here a simplified situation shows the V team makes a deal in the center of what it normally wants. The D triangle or consumer surplus then represents the V cartel earlier getting jam at less than $7 a kilo and so this is better than their reservation price of $7.

However the deals between Iv and V can evolve over time so each price point is not only less than $7 but also has a relation to the V normal curve at that time which indicates the preference V has for that price at that time even if lower than $7, if this remains symmetrical then the growth of the Iv line and the movement of the V line indicates both would arrive at the final position in the diagram above. This is seen in the diagram below with successive V lines growing according to the cheaper prices of the Iv jam until V reaches their final position where they resist further growth because it would pressure them away from their normal price.



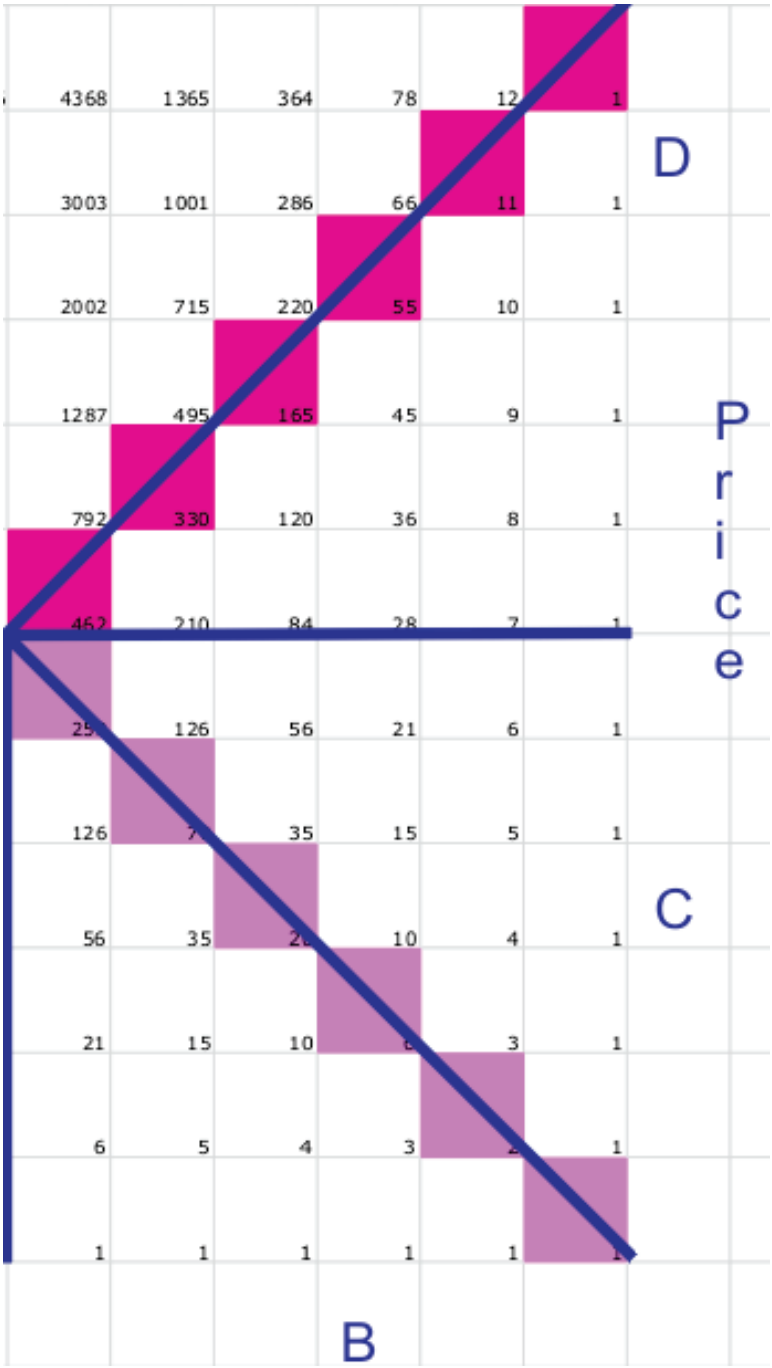
In the diagram above the V team starts at e where they buy jam cheaper at $2 a kilo and in smaller quantities, then they grow larger at f to buying at $4 a kilo. This price is normal for them at the time being in the center of their normal curve, it could be represented otherwise by different shapes of the curves. Then business arrives at a stable position at G where the price is $7 a kilo per day, if Iv tries to grow bigger with higher than $7 then the V curve grows weaker or disappears at these

higher prices. Indicating that V doesn't normally want to pay this.

For example in the diagram above a full V line would represent V will pay $11 a kilo with these higher quantities, the missing part of V means that this higher price is too high for the V cartel to average out and resell. So the growth of the Iv agent stops at this price and is relatively stable because of the normal purchases of V, this reduces the chance the Iv agent will collapse.

The consumer surplus in D then represents not just past profits compared to the equilibrium at $7 but the values in the Iv an V cells indicate a desire of both to grow their sales, because V grew in an NW chaotic direction this meant that V was being driven by the chaotic process of Iv cheap jam which could have threatened their V stability if this was a boom and bust market. For example the Iv line would usually grow in a NW direction and the V lines in the diagram above are shown as growing while expanding in that same direction.

The producer surplus in the triangle C also grows but this is driven in a random or normalized direction because their only client here is a V team. Their growth would then be in the NE direction.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462 210 84 28 7 1
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126 35 15 5 1
56 35 10 4 1
21 15 10 3 1
6 5 4 3 1
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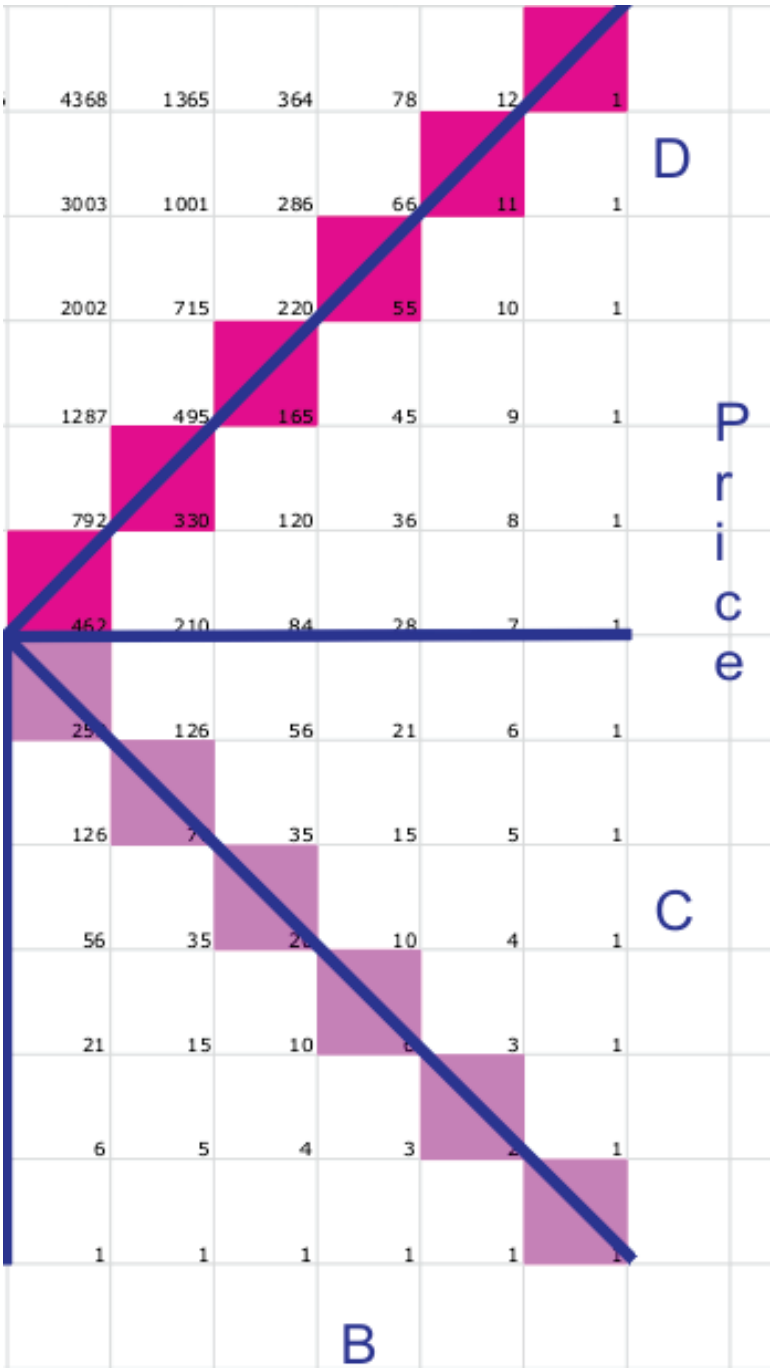
D
Price
C
B

C then can be regarded as a Pascal's Triangle with a vertex of 1 and a base of 1,2,6,20, 70,252. Triangle B is also significant here as another kind of producer surplus, C shows the output expanding as V pays a higher price so Iv has a producer surplus compared to what he was prepared to sell for at lower quantities. In the triangle B this shows the converse, that B has expanded his production facilities as the price grew and now has a factory which could switch to another supplier if V stopped buying his jam.

For example C shows Iv's profit compared to his reservation price, B shows his profit compared to his reservation quantities. Iv was happy with a smaller factory and the business from V expanded the quantity he could produce, during this process he would have added equipment and employees which made his jam more expensive until V resisted further price increases over $7. The difference between the factory size and quantity he could produce and his equilibrium production then is his profit in terms of production over his reservation quantity. The numbers are the same

in this example except that growth in C occurs in price while in B it occurs as quantity.

Triangle D then would be more accurately consumer price surplus, C would be producer price surplus, B would be producer quantity surplus, and A as will be seen is consumer quantity surplus. In Roy these surpluses can be deficits where people are trying to minimize costs and losses, shown later.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D
Price
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56 35 10 4 1
21 15 10 3 1
6 5 4 3 1
1 1 1 1 1 1
C
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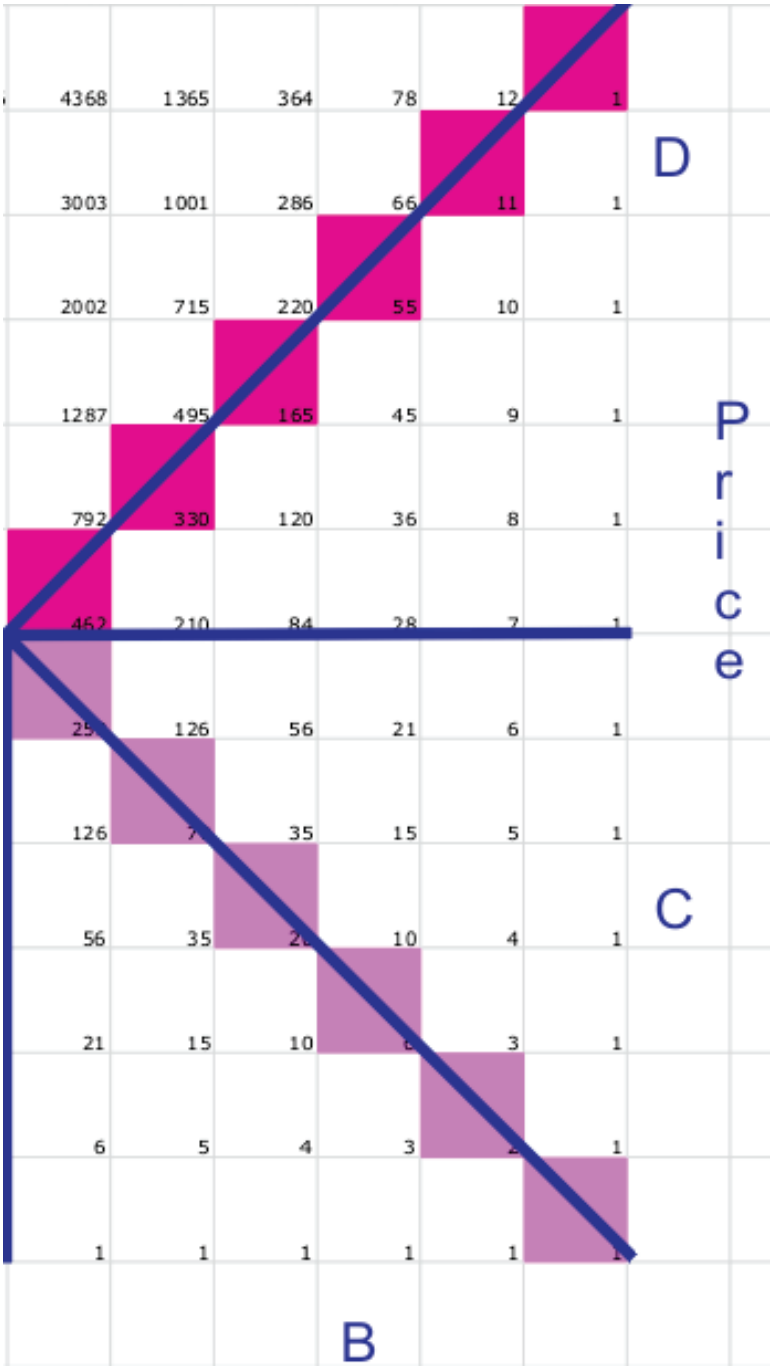
The diagram above is repeated for convenience, C then grows randomly towards the SW away from the NE because now its growth, shown as colored Iv cells, is being randomized by its sales to the V team or cartel. So here they start off against at a sale of a single kilo, as Iv grows it has a tendency to a growth curve of first 1,6 then 1,5,21. This does not mean they actually grew this way any more than the values of V mean they actually bought that much jam. It means that these were possible rather than probable growth curves, possible is a chaotic concept if possible choices in a deterministic way. Probable are choices which could be made in a random way with independent variables.

The next growth curve is 1,4,15,56 and then 1,3,10,35,126. Iv could have followed any of these idealized growth curves but they would have led to less jam sold because they would have been more abnormal sales for V. For example Iv might have decided to grow faster than the central Iv line, he picks 1,3,10,35,126 and ends up selling only 6 kilos of jam rather than 7 because this pressured V to grow abnormally.

Another way to view this is the numbers of the V line can be individuals in the V team, they vote on all purchases from Iv and do this randomly. 462 people vote to pay $7 a kilo and fewer vote to pay more or less than this so V sets its price this way. The V team has grown as the Iv line grew, this was shown earlier with multiple V lines, at each of these times the V team in adding members also voted as to what they would pay for Iv jam. Iv has also grown, its numbers in the cells might represent employees who can also vote.

They tend to vote more deterministically because higher prices and larger quantities are usually better, some might hold back however for slower growth. At the equilibrium price 252 would have voted to sell for $7 a kilo while 462 of V also voted for this price making a deal. If Iv is just one man these numbers might also represent his decision based on the odds because Pascal's Triangle also represents gaming odds such as in game theory. In the same way a V manager might come to the same decision if his calculation of the odds approaches a normal curve because the odds are also calculated this way in Pascal's Triangle.

So if Iv grows their employees so they vote like this: 1,3,10,35,126 then this when compared to the V votes of 210,120,45,10,1 means an equilibrium would have occurred at the less efficient 126 and 210 with less jam sold. So the central Iv line because it compromises more exactly with the normal V tendencies is more socially efficient maximizing price and quantity surplus for both sides.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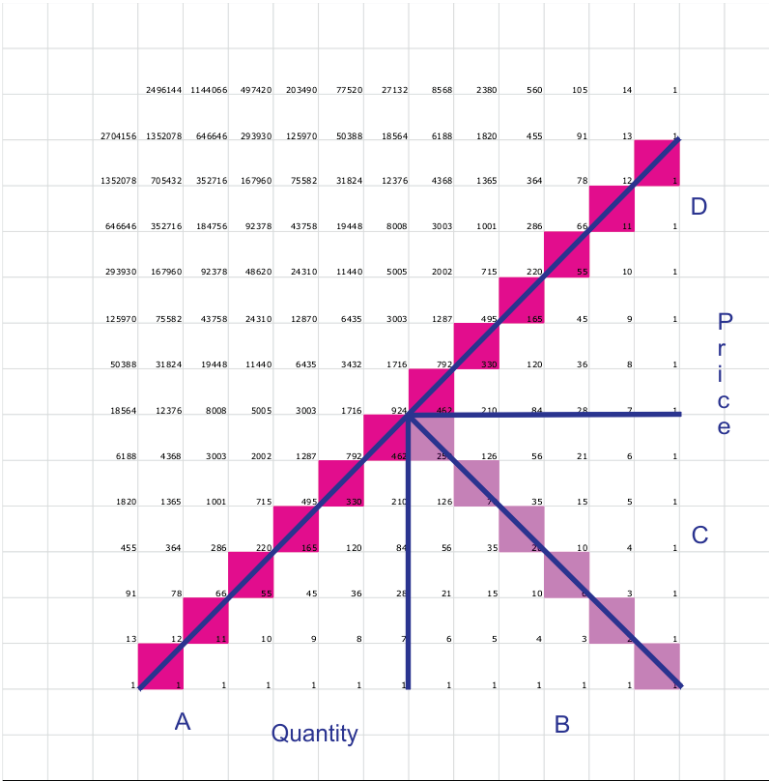
C
B

A similar inefficiency would have occurred if in triangle D if the normal decisions of prices and quantities had followed 1,8,36,120,330 instead of 1,7,28,84,210,462. This would have pushed Iv into a different growth curve so the final equilibrium would have been 5 kilos sold for $8 a kilo. This means that a better compromise between chaos and randomness leads to more social efficiency in an economy, of course this may be a very different of chaos and randomness in a real world economy. This then is why the graphs need not be straight lines, the triangles can show any kind of chaotic and normal curves.



Triangle A sold above is like triangle D except that V makes deals in terms of the quantity of jam purchased instead of price, the numbers are the same as in D. A also grows in the NW direction like D did, it starts off at 1 kilo of jam purchased. Its numbers mean that the normal tendency was to pay more for jam because as the rows of the A triangle, pointing NE grow to the NW then they can again be like voters in V who vote to pay more for jam. These two tendencies converse at the

price point of $7 a kilo buying 7 kilos where the Iv and V lines intercept, it means that the triangles A and D by normal voting get to this price. V is then elastic in the sense that it resists moving away from the center of this normal curve to pay more than $7 or buy more than kilos.

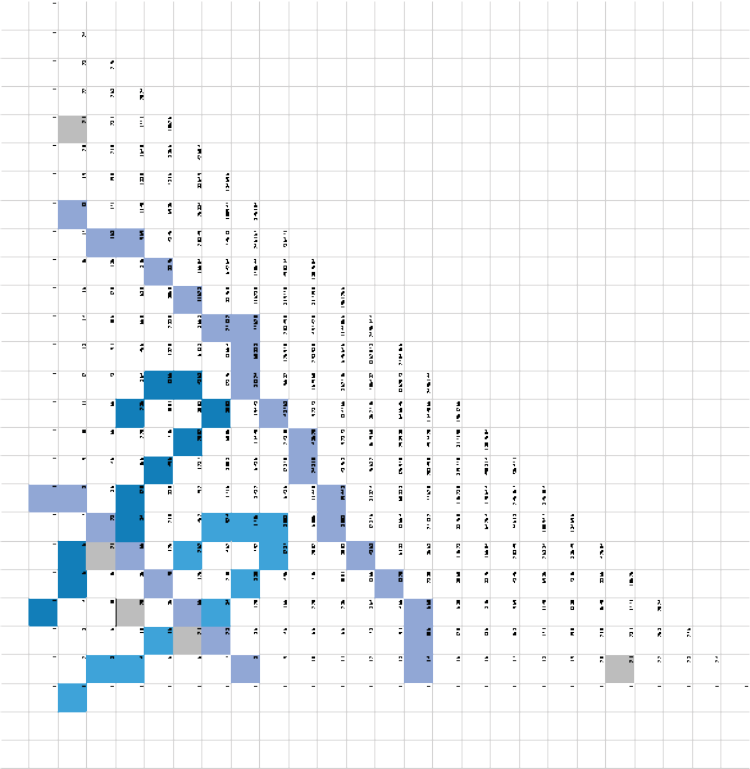
A represents consumer quantity surplus because V is progressively getting more jam than it was able to originally and its reservation quantity of jam it wanted to buy has grown. It might be reselling this jam in its stores so it is better off than when it could only get 1 kilo. It is then like triangle D with its consumer price surplus where its reservation price has grown from $1 to $7 but by comparison to $7 the $1 was a bargain. In the same way V is now buying 7 kilos per day and so its getting 1 kilo a day earlier was also a good deal.

Consumer and producer surplus can also be calculated in this way with chaos versus chaos and randomness versus randomness. For example there might be two Iv lines where one is a producer and the other a consumer, both then grow chaotically but they exacerbated each of

their tendencies to boom and bust. Also there might be two V lines where one is a producer and the other a consumer, both then tend to reinforce each other's tendency to move to normal decision. In Roy it is the same but where costs and losses are minimized, for example the V line in the previous diagram might have been Y and the Iv line Oy. Then they might come to the same deals in these different scenarios where the intersection of Oy and Y represents the most efficient outcome because it minimizes costs and so maximizes their chances for survival.

In the diagram below the cash on the table represents a jump from one cell to another, with B chaos cash on the table is like a B root finding nutrients no other root has found, it then takes this rather than leaving it for a root of another plant and grows as a result. This can cause chaotic problems, for example people might get used to finding cash or other Gb resources which makes them grow too fast as they compete to grab it all before other B people do. This creates a momentum driving towards a ceiling so when these resources run out or are not enough to

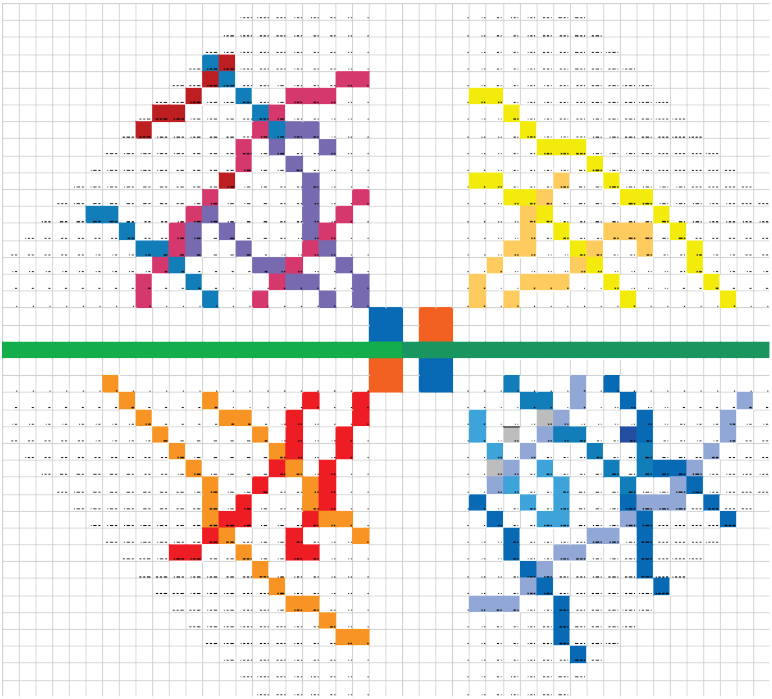
sustain this momentum there is a crash as they hit this ceiling and then growth goes into reverse.



In the diamond graph diagram below an Ro-R society in the lower left quadrant can have bills on the table, the R lines represent people who manage to grow and prosper in this G scarcity according to how well they avoid or minimize these bills, for example some R poor people might become debt dodgers such as squatters and not paying rent until evicted. This happened after the

GFC in the us where many former B house owners saved some money by squatting in their foreclosed homes as long as possible to save rent.

The upper left quadrant is the V-Iv society where they also look for cash on the table, this is like plants growing to the sunlight by evading the overshadowing leaves of each other. When they find this sunlight it is like cash on the table to them because they make energy by photosynthesis. In an economy Iv agents look for cash on the table by making counter innovations or counter revolutions from B innovations and revolutions. For example previously Iv agents worked out that making jam and wine from berries was profitable because of new innovations in berry picking was making a glut of berries on the market.



For example in the diagram above the Bi-B quadrant in the lower left represents workers, the B lines radiating out from the center are where they work competitively looking for the equivalent of cash on the table. In Biv this cash on the table is usually Gb resources exploited with farming and mining or some innovation from these. When a B worker contracting in an iron mine finds a new vein of iron ore then this is like cash on the table for him, his reservation price was where he expected to find nothing in that section of rock. His profits then would be the bonuses and

commissions paid as he mines this iron ore. This would lead to a chaotic jump in his B line, this is then like a B root of a plant finding some nutrients where its reservation price was to keep searching even if it found nothing.

In Iv-B and Oy-R then the reservation price is a marginal increase or decrease in resources, these can be found or even stolen from another person or company. This marginal change can be regarded as what they actually find or steal, for example the B miner's profit can be seen as his iron ore mined that day compared to yesterday. It can also be seen as how much iron ore he found compared to his expectation as a reserve price or how much in other opportunities he gave up to look for iron ore there as an opportunity cost.

The reservation price can include secrecy and deception because people's expectations can change according to these, for example in a game of poker someone with a full house might expect to win but then be bluffed into folding. They then made a loss where their reservation price was an expectation of winning the pot, this might be

much more than their actual loss of losing the amount of money they put into the pot. It can also be compared with their opportunity cost where they expected to win at poker compared to not going to work and earning a wage instead.

In the Oy-R economy this reservation price can vary wildly from the actual economic reality because of this secrecy and deception, this is like in a poker game where people commonly have a higher or lower expectation of profit or loss than what they end up with in the game. Because Iv-B tends to building momentum between a floor and ceiling of prices and quantities people don't know what the future prices will be, their competitors also gain an advantage by fooling each other about these prospects.

There are then three kinds of chaotic fluctuations here, the actual prices and quantities go up and down in a boom and bust, for example with subprime loan funds and repayments changing from being admired in the boom times to pariah status after the GFC. Then there is a chaotic fluctuation in reservation prices, this is like where

the subprime lenders as well as borrowers experienced a large difference between what they expected to get out of these loans as compared to what happened. The third is opportunity cost, many subprime Iv agents found they would have done better by staying in their previous occupation, also many B borrowers of subprime loans found they paid more in upfront fees than they expected and also didn't expect to have problems refinancing later. They would often have been better off not refinancing and postponing renovations instead.

In the V-Bi economy people also have a reservation price, however this is usually a normal price where the actual price paid is elsewhere on the normal curve. For example a team of Bi iron ore miners might expect an average price for iron ore as their reservation price, they also expect their efforts to be on the average more profitable than working on a neighboring wheat farm as their opportunity cost in mining iron ore. The third aspect is what actually happens in fluctuating iron ore prices.

In the V-Bi economy the V cartels would randomly change their demand for iron ore, because they act like a monopoly they can charge a normal price with some standard deviations to particular customers for higher quality steel or faster delivery. The Bi miners then can expect a normal price with some deviations from this, most of their other costs would also have a normal variation so their profits are approximately in line with their reservation price with some standard deviations from it. Their opportunity cost is also normalized, they normally do better mining iron ore than working at the neighboring wheat farm even though sometimes the price of iron ore dips and wheat goes up making it temporarily better to farm. However a Bi team would average out these changes rather than abandoning iron ore whenever this happens.

The same also happens in the V companies they have their normal profits and their opportunity costs also vary in a normal range, hence their reservation price for steel and other goods also fluctuates on the normal curve. Even when there is a war of attrition such as when Bi iron ore miners strike for higher prices they have a normal

reservation price of what they will pay, this might involve some negotiating or waiting out the other but these are just standard deviations from the normal business situations.

In Roy the Y-Ro interactions also have reservation prices but of minimizing losses, for example a Y mafia might feel relatively secure in keeping the O police at bay with some bribes and can commit an average level of crime with little interference. This success rate might fluctuate with some standard deviations, for example they might use their Oy predatory agents to loan shark and rob which brings in about what they expect in earnings. They have their opportunity benefits fluctuating normally as well, they are in this mafia because it benefits more than other endeavors on the average. Y can also be a business in a poor Roy economy where they can survive by minimizing their costs, they have a reservation price of making steel by avoiding these losses or averaging them out as random variations on a normal price.

In the same way Ro gangs might have a normal business dealing drugs to their neighborhood with

random deviations where sometimes people buy more and then less for a few days before returning. Some might die of drug overdoses or kick their habit while some others become drug users or relapse. Their reservation price of selling drugs might be an average markup with some random variations, this includes their costs which are also normal, their opportunity costs of being drug dealers is also normalized compared to other jobs in a Ro-R ghetto.

The reservation price can also deviate from the price actually received according to a mix of chaos and randomness, for example in the I market an Iv agent might often have a reservation price that is much higher or lower than what he gets. For example he might be trying to sell old strawberry jam nearing its expiry date from the V cartel, he then expects a 10% profit but depending on the number of clients or being beaten to market by other Iv agents he might sometimes double his money or fail to sell any before it becomes inedible. Sometimes the Iv reservation price might be above a chaotic ceiling and when the market collapses Iv must sell out before the momentum goes more against him, his reservation price then

must change according to new information even if it is also deceptive.

This chaos is moderated by the normal habits of Bi consumers, his reservation price of a 10% profit to cover his opportunity cost of selling bread instead is usually covered by their normal buying habits. However the actions of the other Iv jam salesmen complicate this, sometimes they have fresh jam cheaper and so the Bi consumers will pay randomly less according to deviations on a normal curve. At other times no one else has jam and the Bi consumers will pay a higher than normal price while some will wait for the jam prices to return to normal.

In the Roy society the O criminal police are needed much more to keep crime in check, the Iv petty thieves usually find their reservation price or reservation quantity of how much they can steal before leaving the scene of the crime varies chaotically. Sometimes they make more than they expect and keep more before paying off the Y mafia while at other times they make less and risk being punished by them, this is like Iv stock

traders sometimes making profits for a V bank and sometimes chaotic losses.

The Ro neighborhoods and their gangs try to normalize this crime by random patrols this moderates the chances of Oy thieves making larger amounts but also allows them to make smaller thefts by slipping in between the patrols with a known chance of success according to deviation on a normal curve. This then moderates the losses the Ro neighborhood has from crime, it also allows the Oy thieves to avoid some losses by being able to steal enough to keep the V mafia happy. Sometimes the opportunity costs of this are insufficient and some Oy thieves give up and get regular jobs, at other times crime surges in a wave and more Oy thieves try their luck.

Like in the Biv economy the Oy thieves and Ro neighborhoods have a reservation price or expectation of what their losses might be, Oy thieves find this varies with feast or famine like booms and busts. Ro finds these losses average out to a lower level if they can moderate these

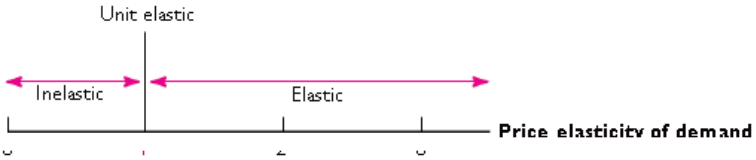
crime waves with random patrols so as to be unpredictable.

Elasticity

The concept of elasticity in economics is similar to that in physics, sometimes prices can fluctuate but get drawn back to a level much like an elastic piece of rubber or a spring which can be expanded or compressed. Other materials are inelastic and can instead crack or shatter chaotically, for example flexing a piece of iron will quickly cause metal fatigue unlike the spring steel.

In a V-Bi and Y-Ro economy elasticity is like rubber or spring steel, prices and quantities can have a normal value and when they deviate from this there is a tendency to spring back to the original value. For example with the Bi iron miners mentioned earlier they had a normal market price for their iron ore to the V cartels, if it went too low then strikes brought it back to normal. If it went up too much then boycotts from the V cartels brought it back down, there was little chance of a rupture or crack in this market like

with metal fatigue because of the V and Bi teams absorbing the stresses of this process with cooperation. For example some Bi miners might encounter financial distress in striking against low iron ore prices, they would heal this stress like annealing metal, with cooperation they would have a fund to loan to those in need to be repaid later after the strike. This is then like how insurance works, in the same way a V corporation might suspend dividends temporarily in a strike or issue more shares, then buy these back after the strike was over.



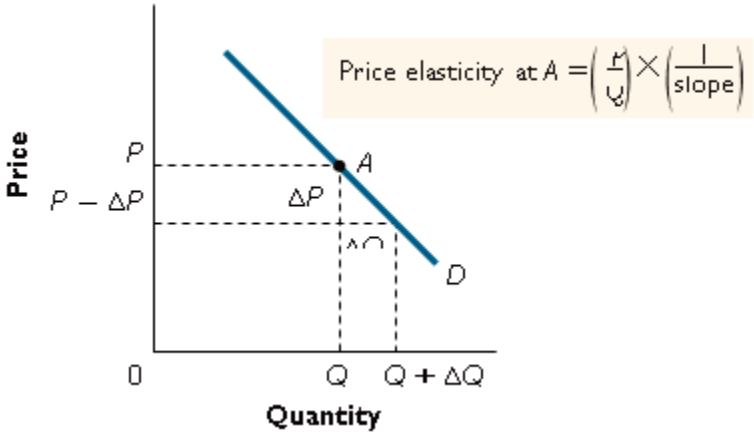
In the above diagram the price elasticity of demand only goes in one direction, Bi consumers for example might be elastic in sometimes paying extra for goods but this gets inelastic if the price goes too high. However in Aperiomics they are inelastic is the price goes too low because they only need so much of the product, the extra

discounts then start to not increase demand just like the higher prices reduced demand.

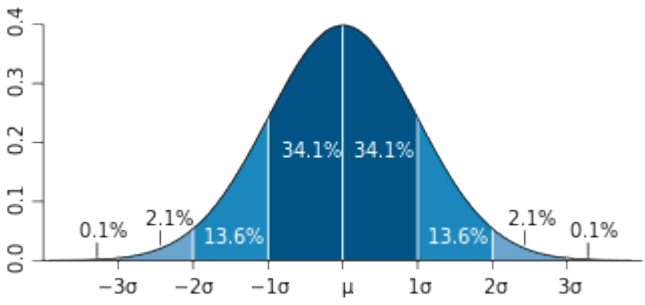
In the Roy economy Y-Ro is also elastic, for example a Y mafia might have a war of attrition against Ro gangs in the drug trade. While some might get killed or injured each tends to reduce these cracks in their defenses by cooperation, those in trouble get helped by the others to seal the breaches. Usually business gets back to normal, it might have been caused for example by Oy thieves in a crime wave so that Ro gangs responded with vigilante justice. This would create some reprisals from the Y mafia until things returned to normal elastically. It can also be caused by a perceived contagion of B people such as drug addicts stealing out of their neighborhoods, the Y mafia might make an example of some of them and start a Y-Ro war of attrition for a time.

This Y-Ro elasticity can also be like the V-Bi example with the miners, a Y state owned steel maker might have a strike by Ro union members for pay rises and lose some production until it

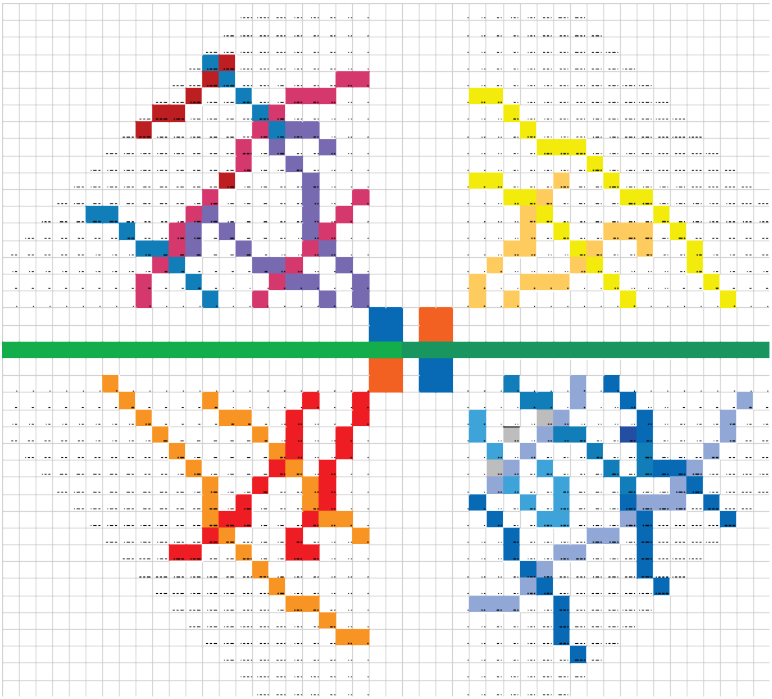
returns to normal after negotiating or each trying to outwait the other.



The diagram above shows the formula in economics for elasticity, however this would be more like the value of a cell on the Bi line in Aperiomics. This would then give a value that was largest in the center as more elastic and then a lower value towards the edges as less elastic. For example in the normal curve below the value at a given point can give the elasticity, this gives a standard value rather than Bi cells in the diamond graph which can vary with the economic situation.



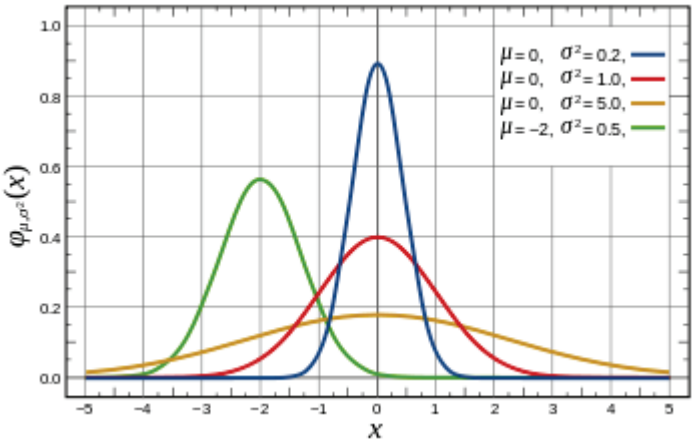
The Bi line would then be like a piece of elastic that stretched and became inelastic according to values on a normal curve rather than inversely as would usually happen. If the Bi line is more oblique then it would contain some random elastic and chaotic inelastic properties, the oblique normal curve was explained earlier in the book. In this case the elasticity would be asymmetric, for example a 10% price increase of Iv jam prices to a V cartel might reduce demand more than a 10% price reduction might raise it.



In the diamond graph then the V-Bi and Y-Ro lines are elastic, tending to a normal center with prices, quantities, unemployment, inflation, crime, war, and so on. The elasticity can then be measured according to standard statistics such as with standard deviations, when prices for example move by one standard deviation above or below their normal value then this can also refer to their elasticity value changing. When a piece of spring steel is stretched or compressed it becomes more inelastic until it can reach a cracking or tipping

point where chaos becomes stronger than its tendency to return to its normal shape.

To graph this then it is similar in economics, for example the Bi line can be seen as a demand curve while the B lines are suppliers. In the normal center of the Bi line this is where prices are most elastic, the further away from this center in economics prices become more inelastic but they do not change according to standard deviations and other characteristics of a normal curve. In effect then elasticity on the Bi line is like the odds of the inelastic price, quantity, etc returning to its normal and most elastic value. This is calculated from the area under the normal curve that the Bi line represents, it implies it is always more likely for the price, etc to move towards the normal and elastic center than to become more inelastic by moving further away. Statistics can be used to measure this, however it is often inaccurate and in Aperiomics this is because of chaotic effects.



In the diagram above there are three variations of this Bi normal curve which can relate to elasticity, the higher blue curve can mean the elasticity of demand is much less. Bi consumers then might be more inelastic or resistant to increases or decreases in prices, when the price goes up the sales drop off more quickly and when the price goes down too much the extra demand also quickly tapers off. For example Bi consumers might only eat a jar of jam a week and resist changing their diet because of price fluctuations.

The red curve is more elastic, these consumers might buy much more jam when it is cheap and much less when it is expensive. The green curve is

where the demand has shifted to a new normal usually because of chaotic effects, for example a new innovation in jam might have less calories and so people can eat two jars a week without putting on weight. The Pascal's Triangle can be changed to give different values, for example on one side instead of all ones being added there might be all twos or a higher number, this would skew the normal curve shape. Also a normal curve can be made taller by making it more concave so the values in the center are higher.

If the supply and demand lines are switched then the Bi line can be suppliers such as the Bi iron ore miners, they might also sell to B miners to supplement their ore when they fall short of what they find. For example the Bi team maintains an average price and sometimes it is worth the B miners buying from them or selling to them at a profit instead of taking the ore to the I-O market themselves, the Bi miners can then become more like egg and milk cooperatives in modern societies that act as intermediaries smoothing out price fluctuations for farmers. In this case then the demand of the B miners can change chaotically

with little elasticity, the B lines can grow and collapse on the margin with no normal center.

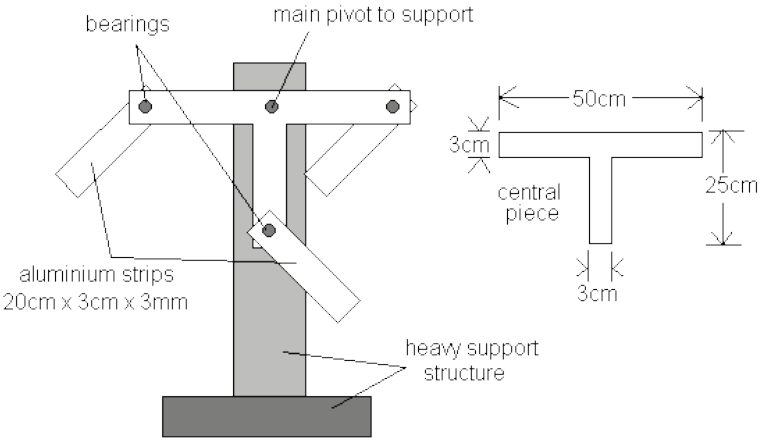
In effect the movements of Iv or B can be like an oscillator or pendulum, a boom in prices might increase in acceleration and momentum then slow as it reaches a ceiling and reverse back to a floor to repeat the cycle. In terms of physics people or goods and services can be thought of as being like molecules, in V-Bi they are more loosely connected and so any stretching will cause them to resume a normal shape when released from the economic pressures. A loose crowd of people might have a normal shape in a train station, then compress into a train only to rebound elastically at a second train station.

However when people are rushing for a train and then rushing to leave the station at the end of a journey this is again like a pendulum, people push together down a narrow walkway to get to the train and push on each other in a deterministic or brittle rather than an elastic way. This can cause chaos such as someone falling and getting trampled. At the end of the journey there might

be a rush to leave the station where people again push on each other, the cycle like a pendulum would repeat each day as people make journeys to and from work. A pendulum or oscillator here is not the same as being elastic because there is no tendency to go back to a normal center unless V-Bi friction dissipates too much energy, also a pendulum has a fixed time period though the energy can fluctuate. For example crowds at the train station may cause so many delays and loss of Iv-B energy that this pendulum effect gets bogged down, it is like Iv-B commuters on a freeway getting caught in V-Bi traffic jams.

If instead of a train station this was an auction room then a normal amount of people inside might give a normal range of prices, this can vary randomly where more people compress into the room elastically and give abnormally high auction prices. If the situation became chaotic at the auction then people might be pushing to get in which would cause prices to rise exponentially, then there would later be a similar pushing to get out at the end of the auction like people exiting a burning theatre. It need not be a regular oscillation, the more chaotic then the more

people are pushing and pulling in different areas making the total motion less predictable.



In the diagram above variations in the Iv-B motion of train passengers might be modeled with more pivots, for example people entering and leaving from more stations along the way. More randomness could be added by friction at the pivots like traffic congestion, the system then loses more energy by people bumping into each other instead of moving smoothly on and off the trains. In the same way an Iv-B economy can be buying and selling securities like pendulums with many pivots giving complex booms and busts, then sometimes these can synchronize to give a larger boom and bust. More friction in the

movements of money can grind the system to a halt in economic stagnation such as after the GFC, trying to add more energy to it with economic stimulus then gets wasted in inefficiencies.

In the Bi-B quadrant prices and quantities tend to oscillate like this between a floor and a ceiling, this oscillation is then moderated by the Bi team that are more elastic on prices and quantities. This could be modeled by the above diagram of pendulums having elastic connected in both directions of movement, this reduces their ability to move in extreme directions. If this model was frictionless then this would not lose energy overall, however the chaotic movements would become more randomized.

The I-O market also gives a balance between this oscillation and elasticity, when the V-Bi elasticity of prices and quantities is stronger the economy is more stagnant just like these oscillations are more difficult to sustain where rubber oscillators collide with each other. It would also be like with the chaotic pendulum movements if there was extra

play in the pivots or the pendulums could also bend elastically.

This elasticity then absorbs energy while increasing time and cools the economy because effort is wasted in randomness rather than being directed in growth. When Iv-B is stronger the economy oscillates between booms and busts with more energy but there is less ability to absorb shocks, the result is when an external shock such as the GFC occurs this is transmitted through more of the economic system and causes more damage. This is how an internal combustion engine works to avoid chaotic stress such as metal fatigue as with the chaotic movements of the pendulum arms. The bearings in these motors use oil so they can be loser and absorb more shocks, also metal such as camshaft rods might be more elastic so as to avoid cracking, they can also have a gap between them and the camshaft to allow some more play to reduce chaotic stress as well.

This is like people in the railway station having a distance between them by limiting overcrowding, this allows more chaotic movement without

increasing stress. However if the economy is chaotic then these people on the train might be competing with each other to get to work earlier and make more money or to be avoiding get fired, they would then start O come earlier and bunch up on the train recreating some chaos. Freeways avoid this problem to some degree by slowing down the entry points on the freeway so people cannot keep speeding up until there is congestion or crashes.

When there is too much oscillation and not enough elasticity then this can cause cracks and tipping points, for example an earthquake in brittle rock or in buildings. In the same way V-Bi team cooperative behavior creates elasticity in a society because people can loan and help each other to close and heal these cracks.

In the above image Haiti suffered chaotic damage because the materials used were brittle and had little play between the parts of the building. Often this happens because of strong Iv-B or Oy-R deceptive competition along with corrupted I-O building inspectors allowing dangerous building practices. By contrast modern buildings allow parts to sway with gaps between them so the result is more elastic as shown below.

In a Roy economy elasticity represents how flexible Y-Ro people are in minimizing losses instead of maximizing profits, for example a Ro team of iron ore miners might be more elastic in minimizing losses because they share food and prevent starvation of some of their members. R miners nearby might sometimes do well but other R people might reach a tipping point of such small profits that they become too weak to do any more mining.

The situation is highly inelastic or brittle and oscillates between a floor and a ceiling, for example a rumor of gold nuggets found in the area might draw in more R people who then find

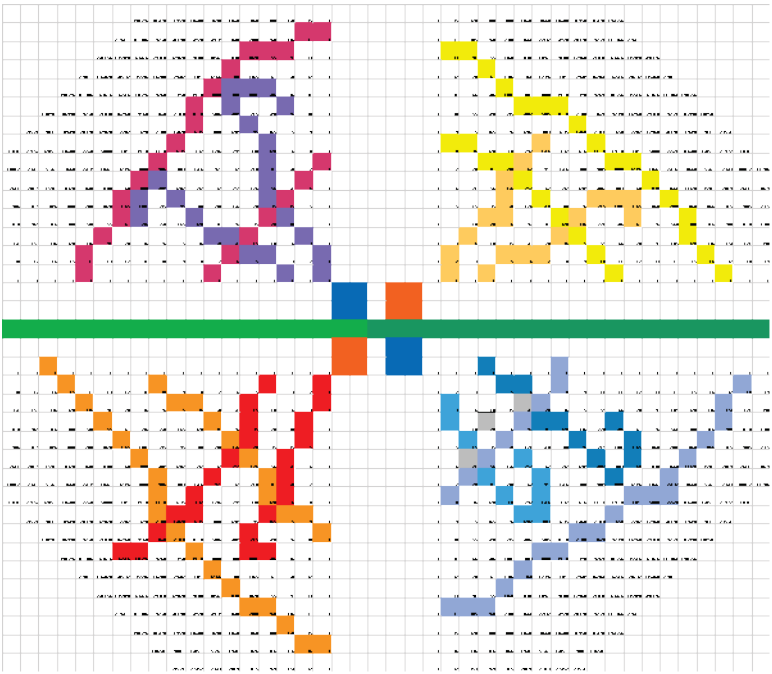
some gold. This however draws in so many people that there is not enough gold to go around, it becomes a negative sum game where those most frugal with expenses can survive while others will have to give up gold mining. This then is like the boom and bust in the Biv economy but instead of maximizing profits the winners here are those who minimize losses best.

The boom might also draw in Oy conmen who want to buy cheap gold to make jewelry, the ones who get in first are more likely to build a business and get cheap gold so there is also a rush to get in first like with the jam companies. With so many Oy predatory businessmen the ones who survive are again those who minimize losses more to survive the coming downturn. The price of gold can be brittle for them, if it becomes too expensive then their business fractures and collapses like inelastic buildings in an earthquake.

There can also be Y predatory businessmen who cooperate with each other, they can be more elastic with the prices they pay for gold because they cooperate to average out the profits and

losses. In the same way the Ro teams of gold miners average out the different prices they get for their gold, since both Y and Ro can be more elastic in what they supply and demand then they make a more elastic market.

Elasticity of supply and demand



There are four different variations of elasticity, two are V-Bi and two are Iv-B. In a V-Bi economy the elasticity might vary but it still has a tendency

to rebound to a normal pattern. The V-Bi and Y-Ro lines in the diamond graph above then are like an elastic bar of rubber, try to compress or stretch them and they tend to return to their original shape. This represents the tendency for a normal curve distribution to resume its shape after distortions change it.

A Ro herd of buffalo might have a normal distribution where they are more closely packed in the center, when attacked by a team of Y predators this pattern might be perturbed but will return to normal when the predators are gone. An R school of fish might be highly brittle, it can scatter when attacked and then reform in a new shape. These fish are not working as a team, they instead use the tactic of staying about the same distance from other fish like them and then moving with them. This is a competitive tactic because when they see another fish react in fear then they free ride on each other to use those warnings to scatter.

A Bi team of unionists might have a normal shaped variation of skills in iron ore mining. With

B chaotic influences they might have to work harder which would cause the normal curve to skew to the right representing an overall increase in skill levels of the unionists, it can then become an oblique normal curve like an angled slice through Pascal's Triangle.

However this would introduce more chaos to the Bi union, some would be unable to handle the extra work and collapse or be injured from the strain, this is like chaotic cracks and tipping points being introduced into their performance. If the influence of the B workers lessened then the Bi unionists would tend to resume the normal distribution of skill levels, those who were working harder and getting injured more would slow down allowing some of them to regain their health. A Bi union or cooperative then has some elasticity in response to external events like trying to stretch or compress the rubber bar. This can also apply to what they buy as well as the goods and services they sell.

For example people might have a normal consumption of bread of a loaf a week, a more

elastic market would mean they might eat more bread if the price was lower. They would be uncomfortable with this however, it would seem to be too much bread and with a price rise they would rebound back to the normal loaf a week. The significance of this elasticity is not really on the margin but on the average, people might buy more bread as the price declines marginally but they are doing this because of a normal diet being moved temporarily by changing prices.

These marginal changes are then more like standard deviations as a result of random behavior rather than people abandoning their old ideas of normality. This would give a wider normal curve than usual as a demand curve rather than an exponentially growing demand. If the market was more inelastic then people would change little from their normal consumption of a loaf per week with price drops, again this is not changing at the margin but because the average person doesn’t need to eat more bread.

This elasticity also changes according to how much people are stretched away from this

average behavior, for example cheap bread might make some people eat more that normally would never consider it. Also elastic V-Bi and Y-Ro demand can under prolonged stress move to a new normal or become brittle, for example a piece of rubber being stretched might eventually move to a new shape while retaining elasticity. A piece of spring steel being flexed too much might become brittle because of many small cracks formed by metal fatigue.

This can also happen in an economy, low prices for bread might eventually make V-Bi and Y-Ro move to a new normal of eating two loaves a week instead of one. It can also create stress fractures that like metal fatigue might split up their teams, for example rapid changes in bread prices will eventually separate those willing to vary their diet from those who insist on eating the same amount of bread every week. When these people come together socially this puts a wedge between them, some insist on eating different foods instead of their having a normal traditional diet which binds them together with traditions.

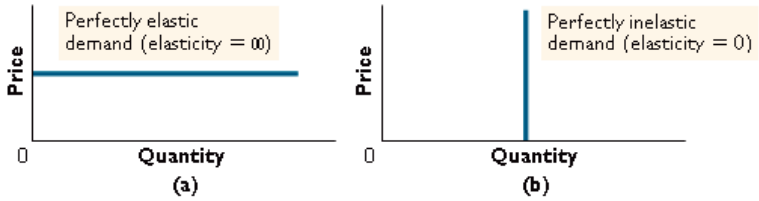
There are two kinds of brittleness in an Iv-B or Oy-R economy with both not having a normal pattern, these people change their demand on the margin according to price or other changes in goods and services. A V-Bi or Y-Ro economy then can have a high or low level of elasticity but still tends to rebound back to a normal shape, if the stresses on it are too strong however then this inelasticity starts to become brittle.

The difference is that an inelastic bar can rebound to a normal shape while a brittle bar might not, for example it might bend into a new shape or shatter. There can then be two kinds of tipping points in Iv-B and Oy-R just like there are two levels of elasticity. The first is a bending point where a bar might permanently bend rather than spring back elastically like spring steel, the second is a shattering point where a bar of iron might crack rather than bend.

This occurred in the global economy during the GFC, the economies had bent away from a normal V-Bi financial system with the rise of subprime and securitization. Then as this additional bending

introduced cracks into the Iv-B economy like with metal fatigue this caused the economy to shatter. For example the Bi communities usually supported each other and so the number of foreclosures were low, subprime refinancing created more B cracks in these communities with more people struggling with repayments.

When the costs of these payments were large enough then the Bi community stopped supporting them as their cooperative behavior had an elastic limit, the result was instead small Bi communities split by foreclosed homes. In some areas the B foreclosures were so common the Bi communities broke up completely into mutual suspicion and R competition to survive.



In the diagram above elastic demand is represented by a horizontal line and inelastic by a vertical line. Elastic demand here is where people can more easily increase or decrease their demand according to a change in price, inelastic demand is where this demand changes little according to price. When the two graphs are combined however then demand might be elastic until it reaches a cliff or tipping point in the second graph and then demand becomes inelastic or brittle. For example Bi consumers might be flexible in how much bread they buy according to price as long as it averages a loaf a weeks, when the price rises too much it might become inelastic or brittle where they must buy this bread and start to give up other purchases instead.

This change can happen suddenly at the edges of elastic demand, like a rubber band stretched too much suddenly snapping. Once demand becomes inelastic or brittle then it is more difficult for it to return to elasticity because of lost energy. This is like the potential energy of a vase on the table of elastic demand in the left graph, when it moves to the right it falls and then lost energy is needed to

restore it to the elastic situation. This is like after the GFC where wasted energy in the collapse led to prolonged stagnation. When people had to buy bread with inelastic demand they might sell off some furniture, then when prices come down they have to replace these sold goods which ends up costing more.

The right hand graph can also represent a bending point where instead of shattering their personal finances to buy bread they might bend into a new diet, this is like a vase that bends when it hits the floor. It can still require lost energy be replaced to go back to the old bread diet, however the new diet might become a new normal and be elastic around the new foods. For example when wheat gets too expensive people might bend to eating rice, then id wheat prices come down the economy has lost energy in bending to rice production and farming which is expensive to restore to wheat.

With Iv-B bread supply and demand there might be no normal bread consumption and so people are happy to give up bread when it is too

expensive, this is a highly bendable market where bread consumption might drop when the price doubled. It can also be brittle because the price of bread and demand are dependent variables, Iv-B people generally eat more bread as the price drops rather than resisting this because they want a normal level of bread in the diet. This can make their diet unhealthy leaving them prone to chaotic health collapse such as with diabetes.

The market might be brittle and either bend or shatter if bread consumption plummeted when the price doubled but many people still ate some bread. This is like with a piece of iron, if it is quickly cooled it might be highly brittle and break easily under strain, it might be more bendable if annealed by slower cooling and so be less brittle. People then have slightly different circumstances and they are different in terms of their personal financial elasticity or brittleness. One piece of iron might shatter while a similar piece bends, one family might be able to elastically change their bread diet while averaging a loaf a week while another shatters and starves or bends to eating rice.

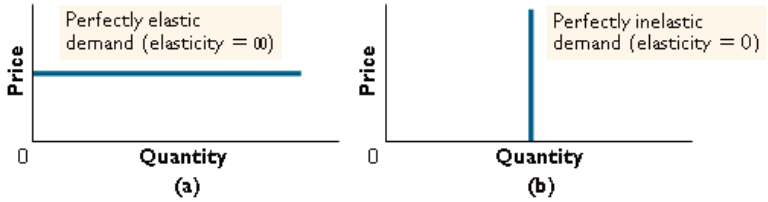
Being brittle is not the same as being inelastic, a piece of spring steel might be high or low in its elasticity like with V-Bi people having a normal level of bread consumption. Brittleness then is a similar concept to being inflexible but includes chaotic tipping points where a market can shatter into many disconnected pieces, bendable economies can shatter or vice versa depending on how much strain they can take. Being inelastic means a material or an economy is resistant to stretching but does not mean it will break or bend.

An Iv-B market might have people swinging from booms to busts over and over because they are have no choice but to try to maximize profits in Biv or minimize losses in Roy, they need to be competitive and increase momentum to keep up with other people and so cannot afford to slow down. They then need to bend according to circumstances or risk shattering their finances.

When they hit a ceiling as the height of a boom or bubble their finances might be bendable or they will shatter, for example investors in the GFC were

sometimes able to survive by bending or adapting to a different situation. As house prices plummeted with reverse momentum towards a floor some were able to bend with this by renegotiating house payments or delaying eviction, others had their finances shattered and lost their homes and sometimes their jobs.

With the example of jam sales going through chaotic booms and busts because of swings in supply and demand the market might shatter as people give up jam for good when it becomes scarce and expensive, they might also bend to these high prices by buying much less jam and perhaps not resuming the same level of jam purchases when the price crashes in the future. Iv-B brittleness is most important between the booms and busts where people move with higher momentum and there are no nearby floors and ceilings, the question of bending versus shattering mainly occurs near floors and ceilings in booms and busts.

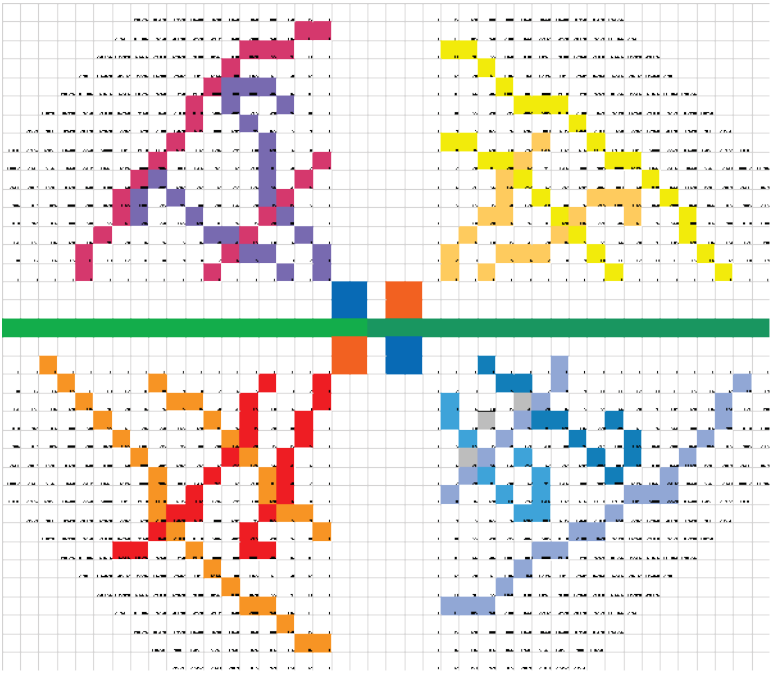


In the diagram above elasticity depends on the slope of a demand curve, on the left the curve is perfectly elastic because people can most easily switch to another supply. On the right the curve is perfectly inelastic because people have to buy the goods, for example a medicine they cannot do without even if the price rises.

In Aperiomics the curves occur in different directions, below in the diamond graph the lines radiating from the center are more brittle because they can chaotically shatter. The lines at right angles to these are elastic because they like elastic tend to snap back to a normal price or quantity. The two lines in the diagram above then would have the same ratio of elasticity to brittleness

because they are each at 45 degrees to both V-Bi and Iv-B in the Biv economy.

A curve can be brittle with some degree of elasticity or elastic with some degree of brittleness, these are not exactly the same. For example an Iv-B economy might have people mainly competing and deceiving each other, they may sometimes be elastic in that they cooperate with some normal behavior. For example Iv stock traders working for a hedge fund might be highly competitive and keen to deceive each other for a higher bonus, they might also help each other with smaller deals or go out drinking as a team.



In a more V-Bi economy stock brokers might work mainly as a team freely referring work to each other, sometimes though they might take a particularly good deal for themselves and deceive the others about it, this is elasticity with some brittleness. The transition from a cooperative team to competitive loners is uncertain, it can be like an elastic material being bent too much and shattering as V-Bi becoming Iv-B. It can also like a piece of iron that is easily shattered becoming more springy as it is heated and cooled slowly.

A perfectly elastic market then might eventually shatter when too much competition and deception causes booms and busts. A perfectly inelastic market might shatter when price rises cause people to die when they cannot afford medicine but become more elastic as some of it is donated at cheaper prices.

Instead elasticity in the diamond graph depends on how a curve will change from a random to a chaotic one or vice versa. For example B lines radiating out from the center in the lower left Bi-B quadrant can represent competitive workers, the closer they are to 45 degrees to the X or Y axis the more brittle they are as they can grow or shrink the most in moving from one cell on the graph to the next.

If these lines curve more to the side then this represents more elasticity just as if they were a tree branch capable of bending more to the side without snapping. Turning to the side represents leaving more cash on the table instead of growing at every opportunity, the more they do this as a

group then the more they are leaving this cash on the table for each other as a cooperative strategy.

The Bi line can represent a union working as a team to demand higher wages, also as Bi consumers working cooperatively to inform each other about goods and services so as not to be deceived. The more these Bi lines bend to the side then this is like an elastic rod being bent, it becomes more inelastic the more it approaches the direction of the B lines. This is because instead of varying normally around a price or quantity of goods the Bi consumers might be changing their behavior. For example with cheap bread they might usually be highly elastic where they can buy some more bread but tend to snap back to a normal bread consumption.

As the curve bends this means that cheaper bread might cause a much larger spike in bread purchases like B people not leaving cash on the table. Taking these bread bargains can be increasingly chaotic, for example if the bread goes stale then they lose money. Also the concept of a normal demand and price for bread becomes less

clear as the curve bends, by eating much more bread when it is cheap then they cannot also be adhering to a desire for a normal bread diet. This Bi line might snap into two pieces, there might then be two Bi teams eating different diets with a normal center or one piece might become B chaotic where the people bend to a different diet or their finances shatter under the strain of the cost increases.

The same occurs in plants, for example Iv branches and B roots are more elastic the more they can curve to the side without snapping. Bamboo is highly brittle as it cannot bend easily while grass not very brittle as it can easily bend to the side. However grass is not particularly elastic in its Iv branches as it might bend into a new shape easily rather than spring back upright.

If the top of a tree can be considered the V line then this might be elastic in the wind, the more the wind in a storm pushes it over towards the vertical then the less elastic the tree is until it might snap or separate into patches of leaves letting more light through to Iv-B plants

underneath. In the same way the Bi upper root system might be able to take a sideways push from animals but the more it pushes the plant to the side the less elastic it becomes until it might break. In Aperiomics then the graphs work the same way with the same directions.

This elasticity versus brittleness can change according to four different ways:

Flexible inputs and outputs

Flexibility or elasticity comes from V-Bi and Y-Ro teamwork and cooperative behavior, Iv-B and Oy-R are inherently brittle because each is competing to drive the others into brittle situations where they need to bend or shatter. For example in a poker game people try to pressure each other into making mistakes, they might have to bend their tactics of bidding if they approach a ceiling of how much money they have to bid with or their tactics shatter when they can no longer bid for a pot.

Approaching this bidding ceiling a poker player on shattering his finances might be ejected from the game, this would then be a tipping point for him. Some might gamble using a Kelly System for example where their edge on a hand is divided by the odds to give an indicated amount to bet, this is more bendable and makes it less likely their finances will shatter. This is also extensively used in hedge fund investing, it has no normal bet and so is looking for chaotic growth.

Competitors in an Iv-B or Oy-R economy then need to make brittle decisions while risking bending or shattering at floors and ceilings, allowing more flexibility to competitors might allow them to get ahead and then turn on whoever was generous. On the other hand cooperative teams are more flexible and elastic because they specialize much less and move towards a normal center rather than floors and ceilings, because of this it is easier for them to change inputs and outputs for more elasticity.

When inputs and outputs then are brittle they can cause a supply or demand chain to bend or

shatter, for example if a jam factory had a holdup in berries then other competitors might gain a critical advantage taking market share. If the outputs are brittle then a lack of marketing outlets for the jam such as from a boycott might shatter the company as its capital is used up with higher costs of waiting for berries to arrive. They might also reach a bending point where their company is permanently damaged and so becomes smaller, perhaps selling off some equipment and shedding staff to survive.

This is like in the plant kingdom where Iv branches and B roots can grow in a brittle way, they then either bend or shatter under external shocks. For example if the wind is usually strong from the North then trees might bend towards the south in a permanent change to their shape, if there is a large storm the wind might shatter these branches. B roots might bend around large rocks or shatter as the ground moves in an earthquake.

In the Oy-R animal kingdom Oy predators also have to chase R prey in a brittle situation, if they let some go then their competitors might eat

them and gain an advantage by being stronger. When they hit a ceiling of depleted R prey then they might bend or shatter under the strain of starvation, they might bend by moving around less or leaving the area or shatter by dying. The R prey might bend under the lack of V grass to eat in a drought by having fewer offspring and moving around less, they might shatter as Oy predators decimate their numbers or they starve.

Mobility of inputs and outputs

With flexibility also comes mobility, people can move more easily as a V-Bi team because they can support each other if there are problems. For example a Bi team of workers can move more easily to another area to work because they would share food and expenses, also they take more time and use less energy. Individual Iv-B workers however can have more problems because they each might deceive the other into getting in trouble so as to get to the worksite first and get higher wages. Iv-B people can also be different on how quickly they are mobile, for example B workers might be able to more quickly move to other work sites by expending more

energy and adjust faster to new jobs than a Bi union could.

V-Bi people can have high or low levels of elasticity with this mobility, for example some might be able travel to more distant jobs but prefer a more normal distribution of distances from home to work. The more elastic the Bi union is the longer its members would be willing to travel, and the more inelastic the closer to home they would work.

Iv-B people might be more brittle as they move to different areas in their pursuit of profits while Oy-R people move to minimize losses. This brittleness can cause them to bend or shatter, for example they might never return to their normal environment or home town if opportunities are better elsewhere. This would be a bending from this situation, they might also shatter if in travelling they were robbed or their car broke down so they lose their job.

When mobility is brittle but restricted people cannot move around because they are tied down in some way, this can cause their businesses and employment to shatter, for example after the GFC many people could not sell their houses and move. This made it harder for many to get new jobs causing them to go bankrupt, also as neighborhoods shattered under the strain of many foreclosures people often could not move to minimize their losses in the Roy negative sum game. After the GFC there was also a shortage of credit for exporters in the global economy to finance their sales to other countries, until the governments stepped in by providing Roy liquidity this caused many companies to shatter from becoming immobile.

Substitute inputs and outputs

When a material is elastic parts of it can substitute for other parts over a period of time, for example treacle can flow so if some parts of it move then other treacle can fill that place. In the same way motor oil is elastic because the atoms are bound together loosely and move as a team or like a herd of Ro animals. Because of this an elastic

material can act as a lubricant while no oil can lead to cracks and an engine seizing up. In the same way an economy can also seize up with too much Iv-B competition leading to localized hot spots or bubbles like overheating parts of an engine.

Instead of Iv-B people cooperating together to close and fix cracks in an economy each has an interest in opening them up wider to profit from them. This is because if someone knows about an individual crack and their competitors may not, if they don't take advantage of this then their competitors when they deceive about other cracks may force them to a tipping point and collapse.

For example prior to the GFC some investors worked out that subprime securitization was likely to collapse because of so much fraud and poor credit scores amongst the borrowers. However instead of cooperating with the I-O regulators to heal these cracks they waited for them to widen to make more profits, some even made the situation worse by creating securities more

specifically designed to fail and causes losses to investors.

This would have caused the Iv-B subprime system to continue to accelerate towards its ceiling and crash for longer than otherwise by providing more capital for more fraudulent loans to short. The presence of increasing numbers of investors shorting subprime bonds encouraged others to go long as they believed they could make profits against these shorts.

An alloy such as bronze can also be elastic where copper molecules might have enough bonds to the tin molecules to prevent cracking, other alloys can vary widely in their elasticity or tendency to bend and shatter such as with steel. V-Bi and Y-Ro workers can also be elastic in substituting for each other, for example men and women on a Bi team might be interchangeable in picking wheat so if men become scarcer because of mining jobs then women can take up the slack. In picking berries women might be better at blueberries while men are better at strawberries but both can substitute for each other.

In an Iv-B economy men and women might compete so that each uses an advantage to hurt the other's chances for profit, for example women might be better at picking blueberries and rather than substitute for a shortage of men picking strawberries they might benefit from higher blueberry prices as strawberries become scarce. Prior to the GFC the global economy was more elastic to shocks because many different kinds of securities could substitute for cash, however many of these reached tipping points as the Iv-B deceptions behind them became apparent.

As the economy hit a ceiling this caused more wreckage and this then became a free fall where those ahead of the competition had to short the market or have a Roy fire sale to minimize losses and get out of any securities that previously had substituted for cash. It also led to some Biv maximization of prices where those with securities that were a better substitute for cash could pick up bargains in less liquid stocks and bonds.

Iv-B specializes and this implies separating different occupations, minerals mined, produce farmed, etc according to which is the most likely to compete successfully. This makes a market more brittle and creates a movement between floors and ceilings, for example when B workers specialize in picking strawberries or blueberries they compete against each other, this prevents their finances being elastic and hence they cannot afford to buy and sell in an elastic way. If the blueberry pickers manage to shatter the strawberry market by denying them substitutes for inputs they lack such as workers or fertilizer then blueberries will become more expensive making more profits for the blueberry pickers, also the strawberry market might become permanently bent or crippled to a lower level as they lose land to blueberry production.

Other alloys can be brittle as they can bend or shatter, for example a biscuit might have an elastic caramel center but the rest easily bends or shatters. In the same way bread prices might be inelastic on the edges of a V-Bi normal curve, as prices boom and bust this can cause those most

deviant to the V-Bi center to change their diet and demand.

Those closer to the V-Bi center cooperatively return the market to normal as they try to make up for each other's shortcomings, for example they loan each other money to get through the times of high bread prices. For example men mining salt while women pick wheat and raise chickens for eggs, they might have disruptions in the supply or prices of some ingredients or it might take longer to do some jobs, V-Bi cooperation would mean the team works together to resolve these problems.

Bread making might be brittle in Iv-B because the wheat pickers, the salt miners, and the egg farmers have the choice of either cooperating to provide all the ingredients for bread or competing with each other to sell separately and perhaps bend or shatter the bread market. For example the salt mine might have a short term advantage in selling salt to preserve meat for more money, if they do this they might shatter the bread market as people won't pay more for bread without salt.

This might cause them to stop eating so much bread that they bankrupt the Iv bread factory leading to the prices for wheat, eggs, and salt crashing. The higher salt prices might also bend the market, the Iv bread maker might survive on lower bread sales by shedding equipment and staff like an Iv-B tree surviving with a poor mix of nutrients from its B roots by shedding branches and leaves.

This higher salt price can then cause a shear or crack in the market with much higher salty bread prices compared to unsalted bread. This then tends to bend or shatter apart the prices of unsalted and salted bread, if salt became too expensive for use in bread over time more salt might be found allowing the bent market to regain its shape but a shattered market might be permanently ruined or take a lot of extra energy to restore. This then is like righting a vase that fell after reaching a tipping point, it might be shattered or bent. It can even be undamaged but requires energy to restore it to its previous level.

Time and energy

Time tends to be more elastic in Aperiomics, this is because more time can allow more substitutions of inputs and outputs. This means that having more time to make buying and selling decisions allows people to make more normal or averaged choices rather than having to pay higher prices in a boom. For example a demand curve in economics can be regarded as elastic when higher prices cause buyers to go elsewhere when they have the time to look around, it is regarded as inelastic when people will continue to buy even if the price goes up such as for critical medicines. When they don't have time for an alternative, such as with some medicines, then they must also act more quickly expending more energy to get in first for these inelastic goods.

This kind of inelasticity is more chaotic than random though it can be a mixture of each, people depend on goods and services like this so they are becoming more like dependent variables. This kind of inelasticity or brittleness can be because people don't have the time to find substitutes, for example people might pay more

for medicine because they cannot wait for the price to come down or to look around for a cheaper price. The kind of medicine can make a difference too, if the medicine is necessary for survival then the price is brittle as going without can cause a person's life to bend if they become crippled or shatter if they die.

However if the medicine is less critical then it might be needed for a normal V-Bi lifestyle, for example cough medicine might help a person function normally, if they work near other people in a Bi union the situation might be more inelastic as their team members want to avoid the chaotic contagion of the disease causing the cough.

This shortness of time can then represent inelasticity, however it also indicates an increase of energy as the situation becomes brittle. For example Iv-B people might be in a hurry because of a heated economy, when driving to work they might have to pay higher prices at a convenient gas station rather than take the time to look around for a cheaper price.

To go faster and keep up with their competitors these people might need to drive faster, accelerate and brake more using up more fuel as energy to save time. Their schedule is inelastic and becomes brittle meaning that failure can no longer be averaged out against successes for a normal performance. In a V-Bi economy being late for work might be averaged out by being earlier at other times, as it becomes more Iv-B being late could result in a catastrophe such as missing a sale or being fired because a competitive employee is more punctual.

This brittleness of some markets such as gas stations near freeways can lead to bending and shattering points, for example expensive fuel might lead to some jobs being uneconomical so the economy becomes bent like roots and branches of trees. People might have to give up some kinds of jobs or abandon living in outer suburbs, instead of rebounding to a normal lifestyle they might become bent into this new situation and never go back to the outer suburbs causing a collapse of the economy there. Higher fuel prices can then shatter the outer suburban economy, instead of being just bent as people

relocate some housing might be abandoned as unsalable for the cost of the mortgage as some was in the US because of the GFC.

When the market is inelastic even a small difference in prices can cause consumers to switch, however there is a strong tendency for both the supply and demand to return to a normal equilibrium. For example in a V-Bi economy high fuel prices might become inelastic so price increases cause people to stop driving. This lack of demand causes prices to return to normal and so the amount of driving also returns to normal. In this case then inelasticity can drive supply and demand back to normal more quickly, however when the market is brittle the change is usually permanent such as people switching to buses or in a state of flux where prices move chaotically while avoiding returning to the same price.

A car going too fast might have far more damage because of this excess energy making its bumper bar more brittle than elastic in a collision, in the GFC the energy of money moving around the globe seeking a safe harbor caused many

businesses to shatter as they could not handle the large amounts of liquidity coming and going so quickly.

In an elastic market the Bi consumers would see these chaotic changes in price and react slowly over time absorbing these small profits and losses, in effect they often end up paying the same amount as if the chaos did not happen. For example someone who does little driving and has a large fuel tank might only fill up when prices are low, this tends to force elastic fuel prices back to normal.

They would also tend to pay less in the long term because as many Iv-B businesses destroy each other with excess competition it can lead to bargain prices for goods and services in a shattered economy. For example if the US government was not acting as a Roy public financer of mortgages then it would be much more difficult to get a loan in the shattered real estate market.

Highly energetic markets are then highly inelastic as for example with the high energy of an earthquake, but also highly brittle. The rocks in an earthquake can bend elastically to some degree without breaking, they might return to the same shape with only a few cracks. Other rocks might shatter because they are more brittle, or as the energy of the earthquake increase the excess energy makes the situation more chaotic than random. When people move with faster momentum in an Iv-B economy they use up more energy and their momentum makes it harder for them to react in an elastic way to price changes.

For example when people have to rush in their work they can tolerate fewer delays and are more likely to go to another store if service is slow, when they find the new store is reliable then they often cannot take the risk of going back to the old store because a delay might be catastrophic for them. For example someone might give up on a gas station because of delays there, they might then never be able to afford to go back there because another delay might get them fired.

They also cannot afford to waste time taking a chance on more expensive stores so that their prices will come down from their elastic demand, if they do and Iv-B competitors do not then they might suffer losses that make them uncompetitive and fail. For example a cafe might be short staffed one day because of a contagion like flu and lose half its customers as they move permanently to another café. People are unlikely to move to a third café with higher prices even though if they did their numbers might bring prices down there with the extra volume.

Supply and demand bottlenecks

A bottleneck of supply or demand in economics can be like how a carburetor works, a gas fuel vaporizes as it moves faster through a constricted area or bottleneck. This increased velocity lowers the pressure and causes the fuel to evaporate more quickly. This increased velocity can also occur by pinching the end of a garden hose such as when watering a garden, paradoxically this can sometimes cause water to go through the hose faster In effect then bottlenecks often increase the velocity and energy of a flow through them as

long as additional friction or chaos doesn't affect the flow too much. For example pinching the end of a house might increase the distance the spray can go but pinching too much can close off the flow completely.

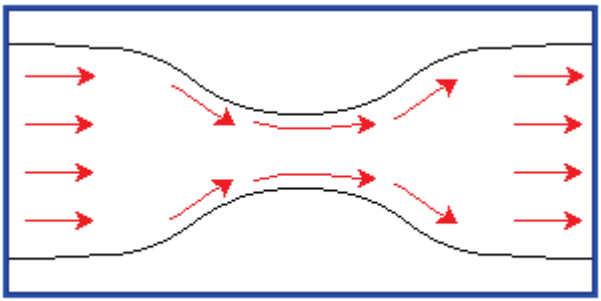


Figure 3-2 Venturi tube

In the diagram above the Bernoulli Principle is illustrated, this can also occur in an economy. For example with some demand or supply bottlenecks people respond by working with more energy and taking less time. This is at first elastic such as with water but on reaching a tipping point the flow might shatter chaotically such as fuel in a carburetor turning into droplets then vapor.

The flow can vary elastically by adjusting a bottleneck but it can also react in a brittle way as a flow is bent or shatters. For example when pinching the end of a hose the water spray might shatter into an irregular pattern as the random bonds between the water molecules break apart into turbulence, it can also bend as the bottleneck forces the flow into a different direction. It can also cause more friction so the lost energy slows the water as V-Bi randomness, for example a carburetor that pinches the fluid too much might cause friction which slows the fuel so much it no longer evaporates.

This might be seen on a freeway with one lane closed, sometimes this can cause cars to flow more quickly through the remaining lanes if they have enough advance notice of the closed lane. When there are bottlenecks in supplies of some goods and services people can respond to providing these more quickly, this can however increase the chance of the market bending or shattering with the increased momentum. For example a limited number of taxi licenses might cause taxis to go much faster to satisfy the demand and hence have more car crashes.

The bottleneck can also be elastic, a shortage of taxi drivers might make getting a taxi more inelastic, the market might then bend into a permanent shortage or shatter with car crashes and missed appointments. If there is an elastic demand then people might start using the bus and train which tends to move the taxi supply back to normal as V-Bi.

When cars are going more slowly there are fewer chances of crashing because of bottlenecks, a V-Bi economy then has fewer problems like this because with random buying and selling there are usually variations of normal goods and services available. With no freeways there might be many different roads and so which one people take can be random, it might be slower but with so many streets a traffic jam is less likely. Competition tends to restrict the paths on which transactions can be made to those which are the quickest such as on freeways, profit margins are much tighter and people like the taxi drivers usually respond with faster momentum and more dangers of chaos.

Freeways usually end up choked with more cars because in an Iv-B economy people compete to be the fastest and so any advantage of a freeway can be used up until a ceiling or floor is reached. The chaotic flow of cars can bend or shatter such as with car crashes and closed lanes for repair, for example many might give up the freeway and switch to using the train if it reaches a bending point with too many delays. It might also shatter if it reaches the shattering point of too many delays causing job losses and a collapse in the local economy. Often though the traffic rebounds in an elastic way with normal traffic flow at off peak times and deviations from this at peak hour, people reduce their demand by travelling when the traffic is lower.

After the Japanese carry trade dried up in the 00s this made the profit margins on many financial deals tighter and so hedge funds and banks responded to this with much higher leverage and faster transactions, this then eventually reached a bending point of a brittle market where companies adapted to this new situation.

By this time there was no normal situation because the carry trade brought in the V-Bi savings from Asia to the advanced economies, this is different from where local V-Bi people save their money and invest it in Iv-B businesses, they have a normal income and if the economy becomes too chaotic they can change this by investing less. However with foreign investors providing much of this V-Bi capital the situation was vulnerable to their investing elsewhere such as their own economies, also with weak I-O policing this capital became spooked when the level of Iv-B fraud became apparent. Also subprime was a new kind of market with no normal benchmark of housing ownership, it was more like a boom likely to bend or shatter when it hit the ceiling of how much poor B people could afford to pay for houses.

For some time this appeared to be a more efficient economy because everything was happening much faster through these bottlenecks with few accidents, however with competition and increasing momentum eventually these constrictions can lead to major crashes as on a

freeway. For example one bottleneck in subprime was refinancing, people needed the market to go up enough to refinance. So as the subprime money poured into the US real estate market the bottlenecks of housing prices, credit worthiness, employment prospects, finding carry trade money, selling securitized loans, etc initially worked well by speeding up.

The real estate market grew quickly in value with few crashes, this increased momentum was like traffic flowing faster through a constriction. Credit worthiness and employment as bottlenecks were sped up by the same money creating employment while fraud often covered up credit problems. The securitized loans sold more quickly as the system of securitizing loans became more efficient, there were few defaults or crashes because people could refinance with the rising real estate market.

Eventually though this market could either return to V-Bi normal elastically or if Iv-B brittle it could bend or shatter. As the carry trade money dried up the market tended to return to its normal investors who had much less money available, this

created a pressure on the real estate market to return to normal prices leaving many home owners with negative equity.

The Iv-B market responded to this more crowded bottlenecks by increasing speed and leverage as it became bent into an unsustainable system like Iv-B trees bending and finally breaking because of their unnatural shape. As the Iv-B and V-Bi economies separated the Iv-B market shattered in the GFC so that many securities could not be sold or valued against each other, also many houses had no normal value as neighborhoods shattered under foreclosures and unemployment.

An Iv-B economy then copes with bottlenecks by going faster and either bending to other transaction or shattering, this is why a horizontal demand curve in Aperiomics is inelastic or brittle. For example in a perfectly competitive economy a company that raises its prices too much might lose all its customers to its cheaper competitors, this can be elastic if the company gets them back if it drops its prices to normal. It can be brittle if

people stay away, they might go to a new supplier and have no reason to change back to the old one.

The new supplier has higher sales but the same equipment and staff which is a bottleneck, he can respond to this by working both faster like cars going faster through a freeway with one lane closed. His business might also shatter under the extra load, the extra demand might cause machinery to break down, workers to get sick, the quality of their goods might suffer and they could even go bankrupt over this sudden extra demand. This can then cause movements to other businesses that also bend and shatter like falling Iv-B dominoes.

More V-Bi time with warnings of bottlenecks on the freeways can allow people to switch to other routes or take public transport elastically until the problems are resolved, they can also change in a brittle way so a toll operator running the freeway might go bankrupt as people permanently avoid it, a money market can also handle shortages of capital by people either elastically using money for a shorter amount of time such as with

overnight transactions or by bending to other financing paths such as subprime securitization and junk bonds which eventually shattered.

It seems elastic when an economy rebounds after small setbacks because of bottlenecks but elasticity needs to have a normal shape or price to rebound to, Iv-B economies have no normal state except to grow between a floor and ceiling just like there is no normal bet in poker. Often then Iv-B innovation and mutation of goods and services can be a way around bottlenecks before they become too brittle, however with the increasing momentum of the Iv-B system any path can eventually become a bottleneck.

For example with more forewarning of traffic bottlenecks people can maintain faster speeds but if this process continues in warning of even a few cars bunching up then eventually any other car on the freeway can represent a bottleneck. Also people start expecting to get through these bottlenecks at this faster speed, the situation can then become brittle because with competition most of them have to get to work at the new faster speed or some will lose their jobs or go

broke. By that time the margins of error are much lower and a chaotic pile up more likely.

The law of Iv-B demand

The law of demand states that people do less of something as the price of its rises, the corollary of this is that people do more of something as the price drops. This then is a constantly increasing curve, the cheaper goods get the more people will buy them, the supply curve also increases in the same way because the higher the price the greater the supply.

Together they represent in an Iv-B economy a kind of balance between two potentially growing curves with no normal center in each, in effect there is no normal supply and no normal demand here. This situation then causes booms and busts where an oscillation or feedback loop is set up between a floor and ceiling. For example consumer electronics might have an increased demand and hence a willingness to pay a higher price, this causes an increased supply which in theory should push prices back down.

This demand curve is competitive, when many people demand the same goods and services the ones who get in first will usually get the cheapest and largest range to choose from like the people at the front of a queue waiting for a sale to begin. When companies are competing to supply these goods the ones who get to market first make more profits because some people are early adopters of new technology and also cannot wait to have a greater choice, these companies also have a head start to grow with these profits before their competitors. These businesses are like the reverse of the people queuing at a sale, instead of buyers trying to get at the front of a line the sellers are themselves trying to get to the front. For example sellers at a swap meet might compete to get there earlier and earlier to get a better position.

Putting the two together then creates a chaotic market where some Iv-B buyers and sellers are trying to build momentum and make deals before the others, this momentum can only increase because the system rewards those who are faster and the slower competitors miss out or go broke.

When the system is highly leveraged with V-Bi loans being slow can be fatal as even small losses can wipe out the equity in a business. There are other ways for companies to get to the front of a queue like this, for example they can innovate with goods and services to create a new supply that people will demand and by definition they are then at the head of that queue.

They can also be secretive and deceptive, for example some companies might be developing more conventional goods and services but be hiding the size of their factories so they can ramp up production before the others can. If the goods and services become popular then these companies might capture a large portion of this increase and send their competitors broke.

This was seen in 2012 where bottlenecks in producing smart phones hurt both Apple and Nokia, many buyers got tired of waiting and switched to Android phones perhaps permanently. A buyer might hide the amount of money or credit he has by looking poor so he can buy more than others in the queue, a seller might

be hiding that he can provide credit to buyers so the others don’t copy him.

The result then is Iv-B booms and busts where higher prices cause surges in production which then create gluts and low prices, this causes some businesses to collapse creating a scarcity of the goods and services. In the same way the buyers surge in booms and busts as well such as at department store sales, this demand for goods and services increases until there is a glut of money available for their purchase and so many buyers miss out completely. Many of them can then give up in frustration and the market can partially collapse leaving unsold goods and services, there is then a boom and bust in both supply and demand.

Many people experience these Iv-B and Oy-R boom and bust scenarios, for example people might go to a bar which becomes popular until there are too many people queued there. Then so many give up because of the crowding that the bar becomes unpopular, it then loses the critical

number of people to create a social scene and might even go broke.

Sometimes people queue at a store for service and then give up in frustration, over time the store has a bad reputation even though its goods and services are good. Because an Iv-B economy has high energy as momentum but low time people become quickly frustrated by using up time, companies often then have to waste energy to give smaller returns of saved time. For example escalators might be necessary at shopping centers to save time for shoppers so they can buy more, a bar might have to use the fastest bartenders or people decide to go elsewhere. Cars might waste more fuel for small increases in acceleration, then larger brakes allow people to shave more time from a trip.

It is difficult to have an equilibrium between two processes going in opposite directions and growing exponentially, the result is usually that one side wins in many areas like in a game of poker. The exception to this is if there are enough different businesses then so many are booming

and busting that they average out as an equilibrium like the surface of boiling water.

More usually an economy on the boil like this tends to quickly overheat as with prior to the GFC, it can also go off the boil suddenly as the momentum moves away from a slightly uncompetitive business as with people leaving the overcrowded bar. This happened with the carry trade of borrowing money from Japan to fuel the US housing boom prior to the GFC, once this money was attracted back to Japan with higher rates then shortages in capital and a suddenly cooling market caused the US real estate boom to stall and crash.

Often then central banks try to balance this knife edge of opposing exponential curves but the result is usually excess demand creating a bubble or excess supply creating a crash. This then is the problem with an Iv-B economy because two chaotic process oppose each other, instead as mentioned earlier the system is more stable when supply is chaotic and demand is random or vice versa. When governments or reserve banks try to

solve problems with multiple exponential curves then the result is inevitably a crash of some kind, this is especially true because Iv-B economies are highly misleading and secretive so the curves are usually inaccurate.

These Iv-B businesses trying to balance these exponential supply and demand curves might be traded on a stock exchange, their shares then can also experience booms and busts between floors and ceilings. For example an Iv strawberry jam maker might have a popular product so demand is increasing, this enables him to supply more with these higher prices. Investors in the jam company then increasingly demand more shares, this causes the price of the shares to rise and the company might respond to this by issuing more shares to raise capital and supply more jam.

Other companies also enter the jam business and make good profits with the high prices, they also issue shares which are thought to go up in price in the near future. This then creates a glut in the jam market, the weaker jam companies then lose money or go broke while some share collapse in

price on the share market. In this situation the Iv-B way to profit is to increase momentum even more, they spend more on energy to shave time off production lines and deceive each other as to their ability to increase production.

The consumers can also get caught in this boom and bust scenario, they buy shares in the jam companies because they think the product is good, the price going up is deceptive because it appears that it is a good investment. Eventually though their very enthusiasm for the jam or the shares causes its downfall because it creates a glut of unsold jam as well as shares on the market so the shares go down, the original jam company might even go broke even though its innovation caused the original demand. The resulting scarcity of jam from so many companies going broke might frustrate many buyers, they then move on to buy other things instead and are also disillusioned with buying jam stocks because they got burned in the downturn. The result then is a boom and then recession caused by chaotic supply and demand.

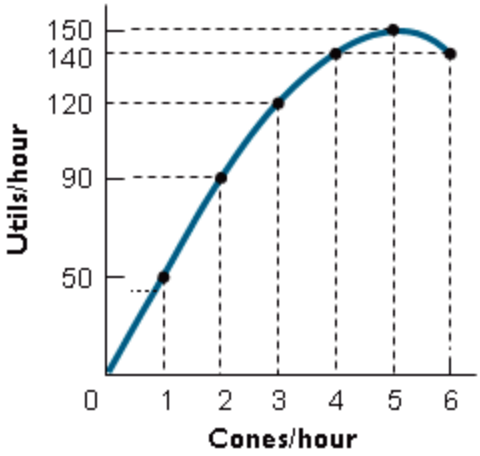
This is like supply and demand inside Iv-B plants, they find some nutrients and water which stimulates demand inside the plant and causes more growth. As the plant gets bigger it finds it easier to get these nutrients by growing bigger B roots and more Iv branches that hold the V leaves for energy, this causes it to grow even faster. It can then experience a sudden shock as it hits the ceiling or limits to growth, it might find there are no more nutrients, they cannot be absorbed any faster because they must leach from neighboring soil at a slow rate, or that it cannot collect enough energy from the sun because of clouds or being overshadowed by competing plants.

The plant then experiences a recession where it creates seeds to regrow with after the crash, this is like where the jam companies realize they may go bankrupt and try save parts of their business. For example they might radically restructure by shedding workers and infrastructure like plants shed leaves and branches, if the shock is too severe then they might realize the company cannot be saved so the management takes its seed capital out of the business to restart it later

by using the wreckage or humus of other failed businesses when the recession is over.

Iv-B Utility and V-Bi Outlook

The concept of demand tends to be subjective, people demand goods and services because of their benefits in a Biv economy which is called their utility, however in an Iv-B economy utility itself can be distorted by deception. For example deceptive advertising might convince people they need certain goods and services to be happy, this increases demand for them. Utility can also be addictive where people feel disillusioned or unsatisfied by the attainment of this Iv-B utility and see the answer as more exponential growth in getting more innovative goods and services such as consumer electronics.



In economics utility is regarded on the margin, for example how much more happiness people get from having another ice cream cone. Eventually this happiness can fade and people start to feel sick as they continue to eat, this is called the law of diminishing marginal utility. The concept of utility is a dynamic one, the word implies that what you can do with something is a measure of happiness. This makes it Iv-B or Oy-R, someone expends energy to increase their happiness on the margin in Iv-B or to decrease unhappiness in Oy-R. An antonym for utility is hindrance or handicap, Oy-R people then increase their utility by minimizing hindrances, it is then related to reducing bottlenecks in demand.

However there can also be a positional happiness in V-Bi and Y-Ro, for example someone might own a house that makes them happy, some days they are more happy than others but on the average they are happy. There is then no need here to measure happiness on the margin when the average is more accurate here. This positional or time based definition of maximizing happiness or minimizing sadness could be called outlooks, viewpoints, attitudes, etc.

V-Bi then might have a strategy of maximizing their outlooks as happiness, this is like looking out the window of a house that makes someone happy as opposed to looking from an office that makes them less happy. The average happiness as good outlooks then is stationary for a longer time, utility is a movement depending on a shorter time. In Aperiomics positive and negative have other meanings, generally it is better to avoid these terms such as by saying positive or negative outlooks.

For example Y and Oy also mean negative and not positive in color logic, R means positive and Ro

means not negative. O means not positive and not negative so arguments can be defined according to colors. However when a term like opportunity cost is referred to as positive or negative it can get confusing if it seems positive opportunity cost is referring to R people for example. Generally then in economics when positive or negative is used as an adjective it would be better here to use good and bad or similar terms, the intended meaning is the same. Positive and negative as yes and no are much more difficult to redefine.

A bad Outlook then is where people are trying to reduce their sadness in Y-Ro, for example Y lions might have a negative outlook because of a lack of food. Oy hyenas might need to minimize their low utility, this means that they cannot do as much as they want to reduce their unhappiness, namely catch more prey.

Utility and Outlooks are then related to other concepts such as opportunity cost and reservation price, for example an Iv agent in Abundia might have an opportunity benefit by opening up a shop. The focus is on opportunity benefit rather than

opportunity cost here because V is trying to maximize profit not minimize costs.

His reservation price is his minimum profit he expects to make on various deals before he refuses to make a sale. His Utils are the happiness he gets from each profit, this is different from the actual dollar amount or surplus he makes. His sunk costs are in setting up the shop, if it is not successful then he loses this money.

A V cartel in Abundia might also open their hundredth shop, they also have an opportunity benefit which is an average over all their stores compared to being in another business. Their sunk costs are also averaged out over all their stores, if they lose more on one store then with random business they are likely to make it up elsewhere.

V's Outlooks for each shop are averaged out overall, some shops have a good Outlook and others have a bad Outlook. This can also be unrelated to the average surplus V makes compared to his reservation price of a minimum

profit, for example he might have a markup of 20% on the goods he sells on the average. However if the store is in a high crime or polluted area then troubles from this can make the Outlook much worse than just the profit figures. These random Outlooks can be measured on a normal curve over a longer time for the V cartel.

In Roy an Oy agent in Scarcia might be trying to minimize his negative utility by getting more predatory business. He needs to minimize his opportunity costs by making this store successful, also he needs to minimize his producer deficits compared to his reservation prices on his good. For example he might have to minimize all his costs as a way to make this store better than others lowering his opportunity costs. If the area is poor in Roy his profit margins are very low, he then needs to cut costs to minimize deficits compared to his reservation price, for example selling the last of his wheat at a loss before it goes rotten. His sunk costs are the cost of setting up the shop, if he fails to minimize costs enough then he might lose this in bankruptcy.

A Y team in Scarcia might be trying to minimize their poor Outlooks by minimizing their average costs, they might have a chain of stores like V but these are on the average close to bankruptcy like many chains in the US during the GFC. Their sunk costs are averaged out over all their stores as in bankruptcy an administrator would take on the whole chain. However if the situation is G-Gb then some stores will be in Roy Scarcia minimizing their costs and others will be in Biv Abundia maximizing their profits. If the chain goes bankrupt the Gb stores might be sold off maximizing profits and the G stores dismantled minimizing their costs.

The Y chain has its reservation prices, it tries to minimize the producer deficits by cutting costs on the average throughout the chain. Its Outlooks are bad on the average, some stores have good Outlooks while others are very bad and close to closing.

There are then booms and busts in in Iv-B Utility as well as in monetary values, people might see having the latest smartphone as an increase in Utility and camp out overnight to be at the head

of the queue, when a better phone is released they do the same for more Utility. If they miss out on the phone because of too much demand they might have to wait a long time, this can decrease the Utility of the phone like the bar that become too crowded. People can then move on to seek Utility in other goods and services causing a bust with the sales of smartphones.

Companies also seek Utility for all their employees and shareholders, this can drive them in an Iv-B economy to seek exponential growth and more counter innovations. This increasing momentum eventually hits a ceiling where there are not enough resources to supply everyone with the utility they want, the resulting disillusionment can devalue goods and services as people seek Utility often with the false promises of other Iv-B deceptive companies.

Just as Iv-B plant's perception of reality change in booms and busts so too can people's perceptions, this is like in a poker game where people have a perception of a happy outcome of a particular hand according to their experiences with previous

hands. For example someone might have a full house and be happy with winning a pot of a certain size, if they are beaten or win a smaller pot then they lose Utility. In an Iv-B poker game there is no normal outcome and so people are usually more happy than they expected or much sadder, the Utility they get then moves between booms and busts rather than going towards an equilibrium of an acceptable level of Utility. Measuring Outlooks in poker is then harder because there is no stable position or average.

This Utility in poker is also related to a reservation price when someone makes a bid, they expect a certain chance of a return for it as their reservation price and get more or less than this in Utils or money. It then illustrates the problem with the concepts of reservation price and Utility in Iv-B and Oy-R systems, because there is so much bluffing and deception people usually have an inaccurate idea of what will happen and often have to rush to keep up with others.

The result is a swing from overestimates of Utility and then disappointments as they hit the ceiling

and crash. This is a common factor in modern societies where Iv-B hype in business makes people expect much more Utility from a product than it delivers. For example a new movie might appear to be exciting from selected parts of it being advertised, then it is a disappointment because these previews were misleading about the story.

V-Bi demand and utility

The previous sections describe what often happens with Iv-B demand and Utility, however there are many other situations where this does not occur. Instead of people demanding more of goods and services as the price falls sometimes they only want a normal amount of them and so demand fails to grow or even lessens as it gets cheaper. This is similar to the marginal theory of demand and Utility in an Iv-B economy because people have only so much use for some goods and services, for example as jam gets cheaper many people will not be able to eat much more jam.

This can be described at the margin where each succeeding jar of jam eaten produces less utility, it can then describe the floors and ceilings of booms and bust. For example eating too much jam might make people feel sick and so the Utility from it crashes chaotically. Their Outlooks from eating jam however might average out on a normal curve to an a good experience, it ranges randomly from very good when the jam is fresh to very bad with occasional overeating or a bad batch of jam.

In a V-Bi economy there is a tendency to move to the normal center of demand for goods and services, this is not the same as a slowing of demand as a ceiling approaches nor of a turning of the momentum of demand away from the goods and services. For example in an Iv-B economy as demand for jam increases prices rise and supply increases until it hits a ceiling, prices reverse and crash because people don’t want all the jam available. This can cause a selloff of the jam company’s shares as the momentum heads down towards the floor.

People in this case are not slowing their growth of jam consumption because of a sense of what is a normal diet but because of a glut of jam on the market and a sudden realization that their perception of the Utility of jam or jam shares was flawed. Instead of thinking how a normal amount of jam makes them feel in Outlooks they are instead thinking that too much jam makes them sick and too little makes them crave it, they might think the same about the shares of jam companies they own. As jam companies fail the consumers can also lose Utility with frustration at not being able to get the jam they want, this accelerates the downward momentum as they seek their Utility in other products such as berry wine instead of berry jam.

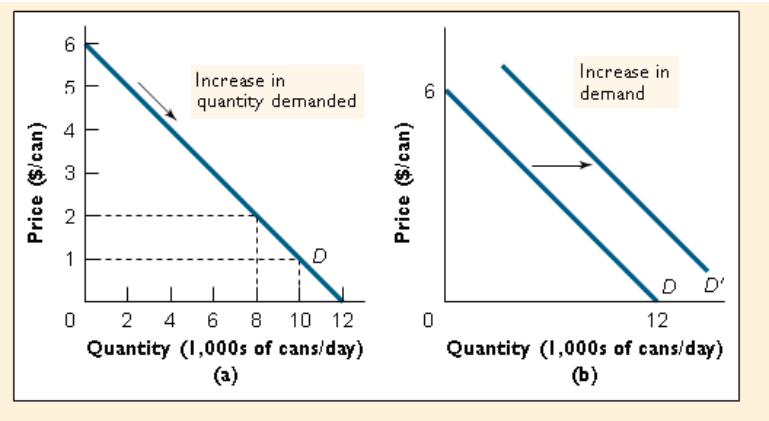
A V-Bi economy has a normal sense in Outlooks of how much jam to eat, people then slow their purchases of jam after a certain amount not because each succeeding jar eaten makes them less satisfied but because it is abnormal to eat that much jam by comparison to the sweet spot in the center of optimum jam eating. An average or normal jam diet might be a jar a week with

standard deviations on either side eating progressively more or less jam.

When companies understand what is the normal jam consumption for their buyers they can then gear up for normal jam production because they know the demand will not necessarily rise if prices go down. This is a highly elastic jam market because people will tend to snap back to this normal jam consumption despite other forces trying to change this such as advertisements about jam, innovative new kinds of jam, or cheaper prices.

This elasticity can be of two kinds like a thick or thin rubber band, a market for jam might be more elastic if it can stretch to create more demand with price drops or new kinds of jam but still tending to snap back to the average of a jar a week or less for a while to balance it out. A thicker rubber band might also be elastic but resist change more, price drops might make little difference in jam consumption. This would be like a wider normal curve as more elastic and a tall but narrow normal curve as less elastic.

For example people the bread market might be less elastic because like a thick rubber band it does not stretch as much, people will then pay more for a similar amount of bread when it is scarce but not buy much more even when prices crash. This can also be because bread is not easy to store, if they buy extra then it can go stale and be wasted. Also if they eat more bread people get fat and this might affect their health, the normal diet of bread then is less elastic than jam.



In the diagram there are two kind of increases in demand, on the left demand increases as the price drops while on the right demand increases

even if the price stays the same. In a V-Bi economy demand might tend to stay around the center of the demand curve on the left, if prices drop then like stretching an elastic band demand might increase but will snap back to the center if prices rise again. If prices go up the elastic demand will cause some people to stop buying the product, it will again tend to snap back to the center if prices go down again.

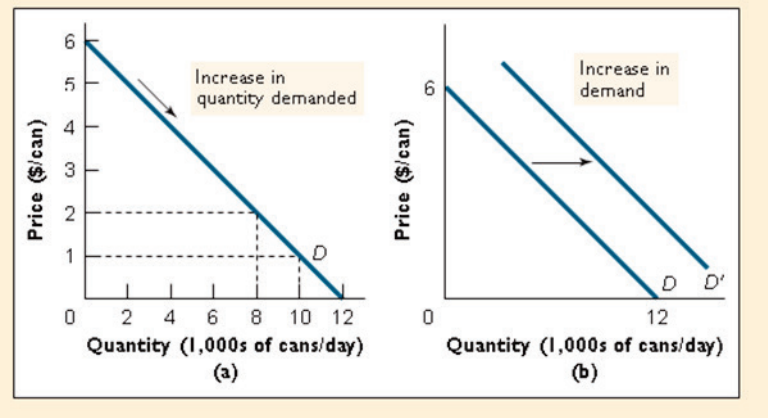
In the diagram to the right however this represents a more Iv-B economy where the demand curve moves closer to and further away from the intersection of the X and Y axis, here demand might go up in a boom because prices rise and then crash when prices drop. This could be an investment like stocks or real estate, it can also be where people look for bargains and assume price rises mean they have to buy now before they go even higher.

As prices of goods such as cans of food drop they might buy much less assuming they can buy it even cheaper later, this behavior causes the prices to fluctuate more chaotically between floors and

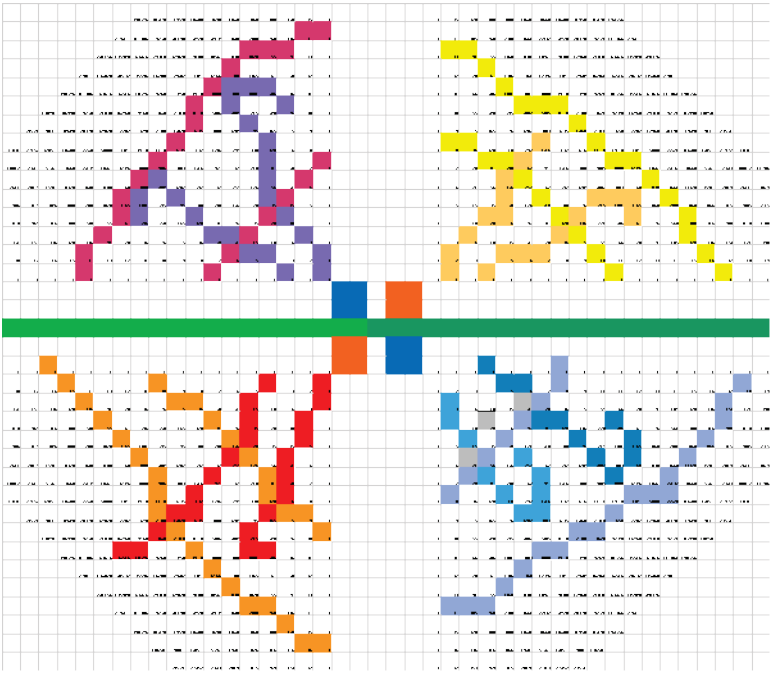
ceilings as people compete to be among the first to buy or sell.

The floor happens when the price of these cans becomes so low that further savings are outweighed by the anticipation of a price bounce, it can also be a dead cat bounce as on the stock market where the momentum of hitting the floor causes enough damage to depress prices. For example people might lose money from hoarding these cans as the prices crash and so cannot afford to buy at the lowest price.

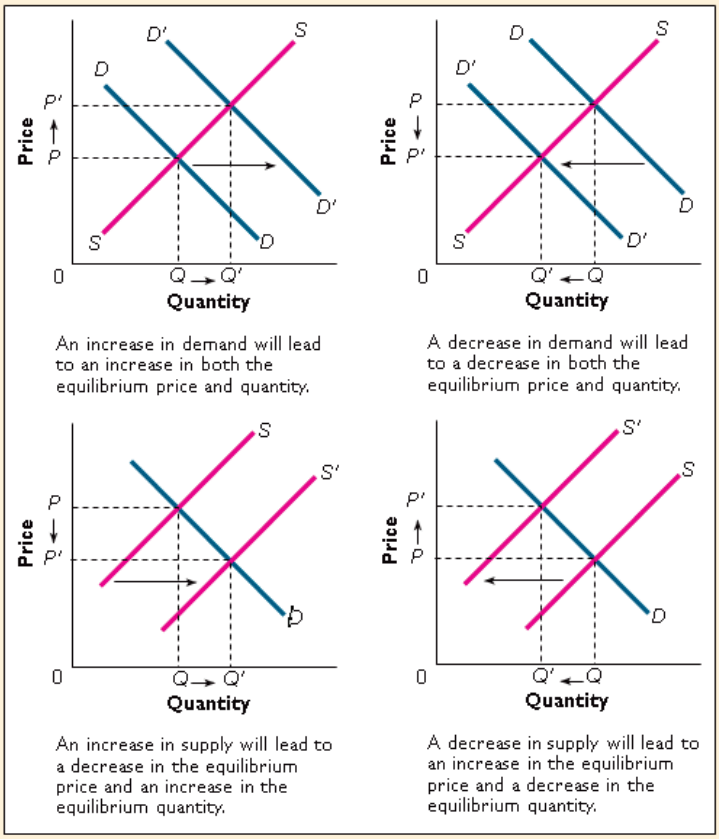
Shops might have gone broke from the price crash and cannot afford to stock up, the supply chain then is damaged from the crash to the floor like a falling vase breaking as it hits the floor. Some customers have also been scared away from the price crash, for example even though capital for business in the US after the GFC has been scarce after hitting the floor many businesses have been afraid to expand in the shattered economy.



The right hand diagram above then has no real equilibrium because it does not move as a normal curve, it is more like Iv-B lines radiating out from zero pushing the V-Bi lines to the right and left, the lines are shown in the diamond graph below.



In the upper right V-Iv quadrant the Iv lines radiating out from the center might be demand curves in an Iv-B economy, one might also be a demand curve and the other a supply curve. Instead of finding a normal supply or demand each tries to bluff and deceive the others leading to booms and busts both in money and Utils.



In the diagram above four variations of supply and demand are shown. In the upper left section the increase in Iv-B demand might lead to a decrease in supply as sellers restrict the availability of goods and services to increases profits. This can happen with monopolies but also with competitors deceiving each other, they try to allow the others to sell at lower prices and then wait to sell when prices later rise from the increased demand.

There is then momentum towards slowing supply until profits hit a ceiling where the lack of supply might make the demand lessen as people buy substitute goods, then there can be a collapse in price as the supplies held back are dumped. Trying to gauge the price in this kind of market is like in the expression to catch a falling knife, those who sell out early usually minimize their losses.

In the upper right section a decrease in demand has the opposite effect, sellers might increase supply to capture more sales at the high prices before they crash, this might cause demand to increase again after hitting a floor. For example as supply increases chaotically then demand lessens even more as people wait for even lower prices, eventually they buy when prices cannot go down any more. However after hitting this floor many suppliers will be crushed or bankrupt from the low price and so the goods might become extinct like some Oy-R animals can. Otherwise sales can rebound like Oy-R animals after a time of near starvation.

The demand lines can also occur in a V-Bi economy, in this case the demand curves tend to move elastically to a point where price and quantities are normal as mentioned earlier. Demand might also rise abnormally, for example the demand for umbrellas might rise in summer monsoon weather but there is still an elastic point where a normal amount of umbrellas is desired by consumers. If they have too many umbrellas then they might wait until some of those stored wear out, the effect of chaotic events like more rain are then averaged out by V-Bi random behavior like an insurance company would.

In the lower left section an increase in supply might cause prices to rise in an Iv-B economy because people assume this supply will create more demand as in Say's Law. For example increasing the size of a mall might give a larger supply to a suburb but increase real estate prices around it because buyers assume this will attract more business to the area. In the lower right section a decrease in supply might drop prices as a converse of Say's law, as some shops close down buyers might think the area is becoming less

prosperous and sell out causing real estate prices to crash.

Demand can also rise with increasing supply if the goods are fashionable or growing in a viral way, for example investors might see signs of a factory expanding as a reason to buy its shares rather than seeing a slump in prices coming. Supply side economics can then encounter chaotic paradoxes because of so much deception, the idea is that increasing supply will reduce bottlenecks and eventually increase demand. However after the GFC there is plenty of excess supply but little demand, much of this is because of the economy becoming dislocated by hitting the floor and losing energy becoming stagnant.

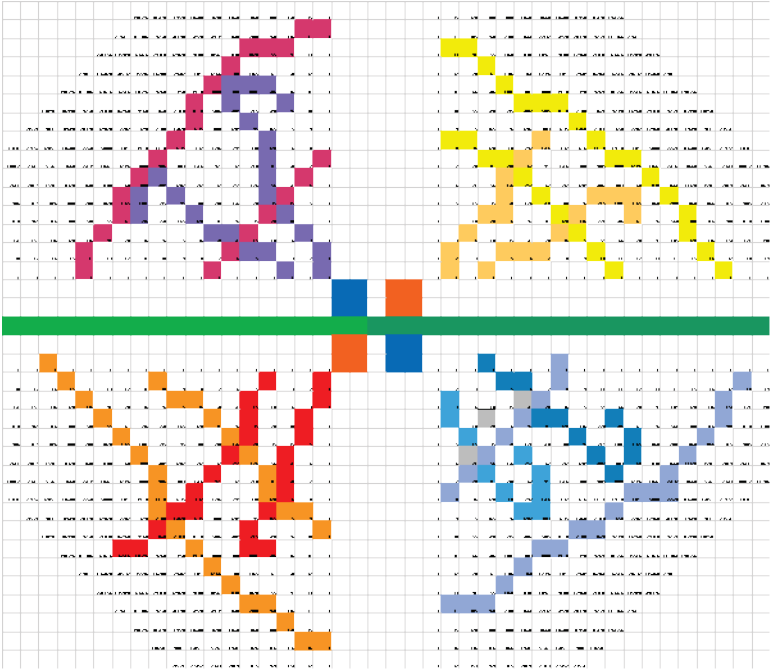
The supply lines can also occur where the demand curves are shown in a V-Bi economy, in this case more supply might make prices drop a small amount but with elastic supply and demand people might still pay a high price rather than trying to bargain the prices down. For example a real estate market might have more homes on the market as some sell out, they fear the area is

declining because shops are closing down. However this might not affect prices much, if people don't buy the homes then the sellers might wait so buyers pay the same but have more choice. When supply is short people might also have an inelastic normal price they will pay, they will wait longer to buy a house rather than pay more to get one earlier.

In the diamond graph below the yellow lines in the upper right V-Iv quadrant might represent a real estate market, one is the supply of homes for sale and the other home buyers. In the center of each line is the normal price and both might be highly elastic in coming back to this price. A glut of homes might depress prices slightly or a scarcity only raise them a small amount. If the market is more elastic then the prices might fluctuate more with gluts and scarcities of homes but still tend to come back to normal prices and quantities of homes available.

If the glut lasts too long then the V team of homeowners can be split by some cutting and running at a lower prices, this can lead to the

market becoming Oy competitive and reaching a tipping point. This was seen after the GFC where many areas held their real estate prices until the tipping points of some individual's finances cause a general collapse.



People sometimes do less of what they want as the cost rises, but this depends on the chaos and randomness involved as well as whether they are competing or cooperating with other people. For example as house prices go up they might still buy

because they expect their V-Bi cooperative neighborhood will not try to exploit them when they have to sell. Also the normal behavior of their friends and families is to buy homes at an average age, also there are random needs based on having children. This kind of buying and selling then moderates Iv-B real estate booms and busts.

Instead of prices crashing when there is a later glut of homes then V-Bi people might pay more than if they waited because they expect when they are in the same situation others in their community will not try to bargain them down too much. The result then is with this cooperation people make average profits and losses as the market fluctuates, this might happen for example in a religious suburb where their common beliefs prevent them from hurting each other financially.

Of course in the real economy there is an Iv-B dynamic where people try to bluff and cheat each other on house prices because they expect the same to happen to them, there is also this V-Bi dynamic where people trust each other averaging out the profits and losses. When the two

economies deal with each other there are chaotic versus random markets, in a stable economy this is worked out in the I-O market where the chaotic tendencies of supply and demand to boom and bust or balanced against their tendency to normalize around particular prices and quantities.

Sometimes the real estate market can separate into V-Bi and Iv-B, for example prior to the GFC many areas outside the larger cities in the US did not have a strong real estate boom and bust. Instead V-Bi people pursued their normal house buying and selling, the availability of subprime financing and the idea using their home like an ATM was abnormal to them. Instead they normally paid off their houses to leave to their children. Other areas became dominated by Iv-B speculation including creating subdivisions deceptive for living in, when the bust happened they were too far from normal work and often collapsed with few inhabitants.

Cash on the table

The supply and demand curves tend to shift to create a more efficient market, in Iv-B this is often in response to grabbing cash on the table before someone else does creating momentum between floors and ceilings. The faster someone is at grabbing this cash the more profit they make, this creates a momentum towards learning to be faster at this. For example in a chaotic earthquake people might rush to their local stores to panic buy, those who get food cheaper this way before the others in effect take the cash on the table.

They might then resell this to slower buyers at higher prices, known as price gouging. This gouging is predatory like Oy predators trying to gouge food out of R prey that manages to get away. Suppliers can also do this, insider traders might sell shares in a company when they secretly know its profits will be much lower and so they get a higher price for their shares. They might also short these shares to get this cash on the table, the weaker the I-O police are the more markets can be dominated by this.

One extreme example is looting after a chaotic earthquake where people's possessions are lying around like cash on the table, without I-O police those fastest and most deceptive at looting might make the most profits. Often then grabbing cash on the table can be as destructive to an economy as looting, only the most profitable parts are taken according to the low hanging fruit principle leaving the rest unstable.

In a V-Bi economy this cash on the table tends to be averaged out because people leave it unless they need it because others will do the same for them, since there is less panic buying and selling there is less need to grab this cash on the table so the community has more savings. The reduction in US savings rates prior to the GFC happened as the economy became more Iv-B competitive with weaker I-O policing, much of this saving rate decline then happened because of systematic looting by V companies acting more like Y organized crime.

In the I-O market these two tendencies can balance out, Iv agents might try to grab cash on

the table by looking for bargain goods to sell to Bi consumers who usually pay a normal price. If they see bread 10% cheaper at a bakery they might buy it up before another Iv agent grabs this cash on the table, they then risk selling it out to Bi consumers or getting stuck with stale bread if they buy too much. This grabbing of cash on the table is then prone to booms and busts.

The Bi consumers tend to leave more of this cash on the table and so they are generally more average in wealth, an Iv agent might try to take advantage of a chaotic earthquake to price gouge with bread prices only to find Bi consumers refusing to be gouged rather than panic buying against each other. Also the Bi people might boycott Iv agents like this so this moderates their grabbing of this cash on the table, also the I-O police tend to regulate these kinds of markets to prevent this cash on the table being grabbed in natural disasters. Bi consumers might also refuse to buy cheap goods after a natural disaster because they think they might be stolen from their own community.

In Aperiomics the socially optimal prices and quantities of goods and services are achieved by two kinds of economic surplus being balanced against each other, people can have reservation prices against which their individual surpluses or deficits can be calculated. However V-Bi people tend to average out these reservation prices, they have an average price they will pay for goods like bread and sometimes will pay more or less than this perhaps with an overall surplus if the bread is usually cheaper than what they would pay.

In a V-Bi society this is cash on the table because companies could in theory raise their prices and still sell the same amount of bread, however this can be set against workers not demanding all the wage rises they could get because of the cheap bread. In effect then a V-Bi economy has more savings because this cash on the table is left until people need it or can use it productively rather than grabbing and hoarding it before someone else does the same.

In the Iv-B economy the reservation price is calculated on the margin, a company might then

make an extra loaf of bread if they can make any money on it or even if they break even. An Iv-B buyer might get a loaf of bread if it is cheaper than his reservation price even if he is sick of eating too much bread.

When these two economies balance in the I-O market the different definitions of reservation price and surplus or deficit reach a compromise, companies might not sell as much bread as they can even with extra customers available because in a cooperative environment it gives a friendlier and more relaxed society. The bread maker might be easier on his competitors by not selling every loaf he can, they then make good profits which they pass on in higher wages so workers can pay more for bread.

In balancing these two the economy is most efficient in the sense that it reduces the shortcoming of the Iv-B economy at its crashes wasting resources or the V-Bi economy becoming stagnant. In Aperiomics then efficiency has a different meaning, as a balance between being most efficient on the margin and on the average.

Consumer and producer surplus

1	14	105	560	2380	8568	27132	77520	203490	497420	1144066	2496144						
1	13	91	455	1820	6188	18564	50388	125970	293930	646646	1352078	2704156					
1	12	78	364	1365	4368	12376	31824	75582	167960	352716	705432	1352078	2496144				
1	11	66	286	1001	3003	8008	19448	43758	92378	184756	352716	646646	1144066	1961256			
1	10	55	220	715	2002	5005	11440	24310	48620	92378	167960	293930	497420	817190	1307504		
1	9	45	165	495	1287	3003	6435	12870	24310	43758	75582	125970	203490	319770	490314	735471	
1	8	36	120	330	792	1716	3432	6435	11440	19448	31824	50388	77520	116280	170544	245157	
1	7	28	84	210	462	924	1716	3003	5005	8008	12376	18564	27132	38760	54264	74613	
1	6	21	56	126	252	462	792	1287	2002	3003	4368	6188	8568	11628	15504	20349	
1	5	15	35	70	126	210	330	495	715	1001	1365	1820	2380	3060	3876	4845	
1	4	10	20	35	56	84	120	165	220	286	364	455	560	680	816	969	
1	3	6	10	15	21	28	36	45	55	66	78	91	105	120	136	153	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	

In the diagram above two horizontal price lines representing a price control ceiling and floor have been drawn, one where the upper Iv and left hand Y lines intersect in the Y-Oy quadrant, the other where the Iv line is just below another intersection of Iv and Y. With the right hand Y line the lower Iv branch just gets to it and then chaotically collapses, represented by the Iv line reversing direction pointing downwards.

The Y lines might be cartels of jam makers while the Iv lines might be smaller competitive businesses selling different kinds of jam and ingredients to the cartel. The Y line then represents a demand curve and the Iv line a supply curve, where they intersect is the price and quantity of a sale and the values of those cells represents the likelihood of those sales.

This was mentioned earlier, the Y line is approximately a normal curve so where it intersects the value represents the probability of the Y team doing business at that price. The value of the Iv line there is the possibility of Iv doing business at that price.

Because the price ceiling misses the center of the left hand Y line its prices are restricted in how they can average them out. Usually they would sometimes pay higher prices to balance against paying lower, perhaps seasonally. The Iv-Y transaction is right on the line indicating that there is some pressure to go above this ceiling, Iv wants to increase their price and quantity of jam

sold while Y is resisting this because it is above their average price.

Now Y cannot pay the higher price because of the price ceiling so this affects their average purchases, it causes stress in the Y cartel and possible fractures where it might split it up. Floors and ceilings of price or quantity controls tend to affect the chaotic colors of Iv-B and Oy-R more than V-Bi and Y-Ro, this is because the chaotic colors naturally move between floors and ceilings already.

This affects the Y reservation price as an average because the edges of the normal curve around this average are no longer symmetrical. It tends then to force the average price Y pays down, then Y buying cheaper might represent an increased consumer surplus and Iv loses some of its producer surplus. In Roy Scarcia then a price ceiling can cause more chaos in the economy and potential collapses of Y cartels.

The bottom horizontal line is a price floor just below the Y line to the left where it is intersected by the lower Iv line, here they pay much less than the first cartel and buy much more jam. This is also an abnormally good sale for Y, they would again average this out against the purchases from the upper Iv line to give their normal consumer surplus. This surplus then is an average value from both Iv agents.

The Y line to the right just misses an intersection with the lower Iv line, this means the Iv agent grew but partially collapsed for lack of a deal with Y. The price ceiling and floor are highly asymmetric for Y, they are used to paying more for jam at lower quantities, while this deal would have been at a good price there was too much jam to buy so the lack of a deal damaged the Iv agent's growth. This is like an Iv branch of a tree that grew too quickly for the nutrients it could get and then broke off at the end.

The Y line to the right does not make a deal with the upper Iv line, they do not grow enough to make a deal because of the price ceiling and so this Y line does not have a second Iv agent to balance a sale against. This is like a ceiling affecting the way Iv branches of a plant grow, it might stunt or break them.

If one Y line was a seller of jam ingredients and the other a buyer then both would be normal curves, because they do not intersect then the price line is where the two cartels differ over the amount to be purchased at that price. For

example the lower Y line might be selling excess jam ingredients at a low price but want to sell a lot of it, the higher line represents the jam cartel that wants to buy at that price but not as much as they want to sell.

The price control floor and ceiling then affect each Y cartel differently by changing how they can average out their purchases and sales, for example they might usually have higher and lower sales than this floor and ceiling but now these sales are forbidden. This then introduces chaos into their usual random deals where for example one Y might make more losses sometimes, then at other times it might find it harder to recoup them with an average higher price because it would go over the price ceiling.

Without a price floor and ceiling both are normal curves, the actual sale might then be more random based on how each averages out their costs and profits. For example they might meet somewhere in the middle between the bid and ask price between them, the quantity sold could then be calculated by comparing the two normal

curves on a three dimensional Gaussian Copula. For example in the diagram below the cell with a border has a color between Y and Oy, it might represent by its cell value a more probable compromise price and quantity for a sale between the two Y companies.

66	286	1001	3003	8008	19448	43758	92378	184756	352716	646646	1144066	
55	220	715	2002	5005	11440	24310	48620	92378	167960	293930	497420	
45	165	495	1287	3003	6435	12870	24310	43758	75582	125970	203490	
36	120	330	792	1716	3432	6435	11440	19448	31824	50388	77520	
28	84	210	462	924	1716	3003	5005	8008	12376	18564	27132	
21	56	126	252	462	792	1287	2002	3003	4368	6188	8568	
15	35	70	126	210	330	495	715	1001	1365	1820	2380	
10	20	35	56	84	120	165	220	286	364	455	560	
6	10	15	21	28	36	45	55	66	78	91	105	
3	4	5	6	7	8	9	10	11	12	13	14	

If these two Y cartels regularly did business then random changes in the price and quantity between them might come to a normal deal, this can appear to be price collusion but they naturally

tend to act like one large team because their two normal behaviors act like one. This can happen in an economy where for example a Y oil company and a Y exploration company might sometimes offer each other better or worse deals than the normal price, overall however they work cooperatively to help each other out so they make their average profits. The outlined cell in the diagram above might then move randomly around this area as deals between them changed according to their respective normal curves.

The two Oy lines are chaotic and so they grow and decline instead of coming to normal sales and prices, in the diagram above ignoring the Y lines the lower Iv line can be the buyer of jam ingredients and the upper one the seller. Because both are deceptive their strategies are more like game theory as in poker, they try to bluff each other to get a better deal or to bankrupt each other. For example if one sends the other broke they might buy them out cheaply or gain market share.

The upper Oy manufacturer might be willing to sell to the lower one but not at the price and quantity they demand, there is then a gap between them like with the Y cartels but in this example it is more to do chaotic prices and quantities. The lower Iv manufacturer might be a bargain hunter hoping to make profits by getting the goods cheaply or to take advantage of the upper manufacturer's difficulties to hurt their business.

The price floor and ceiling affects their more usual floors and ceiling, it is like having a minimum ante

for a pot and a maximum bet in poker. This can be an advantage to some players but prevents some from using a bluff effectively with large raises.

The compromise between the two will be more chaotic than random, with regular sales like this they will follow a boom and bust pattern. For example sometimes the seller will get a higher price like a poker player bluffs and wins a hand with inferior cards, he hides his desperation at needing to sell while the buy hides his need for the jam ingredients.

At other times the bluff will fail, the buyer might wait to see what the seller does and this might cause the price to crash through desperation like a poker player losing a hand when the other player doesn't fold. The price point and quantity of sales between the two will then move chaotically up and down but it will also have a random component as the two Iv manufacturers are also cooperating to some degree. Over time then the prices might be a combination of a normal average with some booms and busts above and below this.

Without the price floor and ceiling the chaos will be more unrestrained as in poker, with these limits deals might be against these limits more often. For example in poker a limit of an ante size might mean some always bit that limit, the limit of how much they can raise might be always used by some to appear more confident when bluffing.

This could be like two Oy second hand dealers selling at a swap meet in Scarcia, sometimes one of them needs to cash out of his stock by selling at a discount to another dealer. There can be a race between them to get to the swap meet earlier than each other to get a better stall near where the people first come in. This race also varies chaotically until they hit the ceiling of when the swap meet opens perhaps at 4AM. There is then often a chaotic crash at this time as the Oy dealers vie to get in first.

When one Oy dealer needs to sell some stock he might need to raise some cash for food or be trying to get rid of faulty stock. There is then a game of bluff and deception between them like

poker, the business will change between them on the margin in booms and busts.

66	286	1001	3003	8008	19448	43758	92378	184756	352716	646646	1144066
55	220	715	2002	5005	11440	24310	48620	92378	167960	293930	497420
45	165	495	1287	3003	6435	12870	24310	43758	75582	125970	203490
36	120	330	792	1716	3432	6435	11440	19448	31824	50388	77520
28	84	210	462	924	1716	3003	5005	8008	12376	18564	27132
21	56	126	252	462	792	1287	2002	3003	4368	6188	8568
15	35	70	126	210	330	495	715	1001	1365	1820	2380
10	20	35	56	84	120	165	220	286	364	455	560
6	10	15	21	28	36	45	55	66	78	91	105
3	4	5	6	7	8	9	10	11	12	13	14

One deal between them might be represented by the outlined cell on the left, here the top line Oy dealer did better. The outlined cell on the right might also represent a second deal between them when both their businesses are booming more, this is because the Oy lines are longer meaning

they are selling more at a higher price. This time the lower line Oy dealer did better.

For the Oy jam manufacturers their consumer and producer surpluses or deficits would be represented by the position on the Iv lines, further along these lines would represent higher prices and quantities as a booming market while falling back towards zero would represent a market crash. The surplus or deficit would be at the margin instead of probabilities under a normal curve, for example their surplus might be the difference between their current position on the Iv line compared to the lower prices and quantities towards zero.

In the real estate market for example the surpluses or deficits of house buyers and sellers might be dominated by booms and busts in the market rather than a normal price. If a house has a normal price of $100,000 and in a city 1000 houses sell a week at this price then the buyers might have a consumer surplus compared to abnormally higher priced houses that might sell more slowly. For example they might have a

reservation price of $110,000 so they normally get a cheaper house than for what they are prepared to pay.

This would then be consumer surplus on the normal curve, in the same way the producer surplus would be those selling homes above or below this normal price. For example those selling a house for $120,000 might sometimes make a sale when the cheaper houses are randomly all been sold. They might then only expect to get the normal price of $100,000 but sometimes get a surplus of $20,000 because of a random shortage.

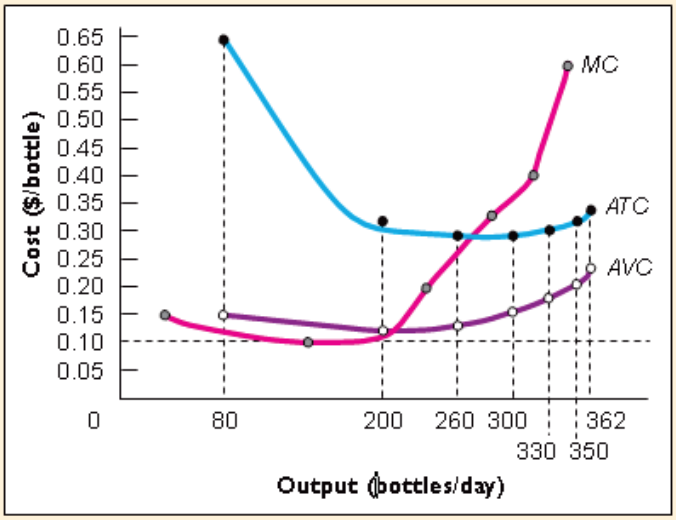
In a more chaotic Iv-B market the Iv buyers and sellers of homes might be experiencing a boom in prices and are speculating between themselves. Sometimes they overreach and have to sell some real estate cheaper to a rival speculator like the Oy second hand dealers, this price then moves chaotically according to how much leverage and capital they have and whether they are being squeezed for a lower price.

The consumer surplus of the buyers then might change chaotically, they might buy far fewer homes if the price rises close to a market tipping point and far more if there are occasional bargains because they would use leverage to buy these and then resell as in arbitrage. The more normal prices are then where these arbitrage surpluses might be calculated on a normal curve, the traders can work out the probability of making profits from how abnormal the low price is of a house being sold.

This often happened in the share market boom prior to the GFC, Iv traders would look for bargain to buy long or overpriced stocks to short. They would compare these prices to their normal or average price and buy or sell on the assumption that the current price was a deviation that would return to normal.

With a more chaotic market however they might calculate these profits by comparing exponential curves, for example a bargain might be snapped up because it is expected to appreciate over time or be resold as a smaller bargain to other

competitors for a quick sale. Here then there is no normal price but each calculates the expected growth of housing prices and the point on these exponential curves where the house might be resold over different time periods. The faster the resale the more chaotic the price might be, they might even make a loss if the competitors try to wait the seller out until he goes broke or sells cheaper. Calculating this would then be like with the Oy second hand dealers mentioned earlier.



In the diagram above a business might sell bottles of blueberry wine. AVC refers to average variable

cost and ATC average total cost, these are more random and would tend to move to a normal value. This is shown by the U shaped curves, a V-Bi company might minimize these costs around a normal level of production in a cooperative business environment because others would not take advantage of this by increasing their own production.

MC refers to marginal cost which is more chaotic, the higher values mean that to make an additional bottle of wine is more expensive than the last. The two are then incompatible with each other because randomness is based on independent variables while chaos or exponential growth is based on dependent variables, for example average costs change less with variations in some inputs such as changing prices for blueberries on a weekly basis.

The MC or marginal curve however depends on the cost of the bottle of wine before it, otherwise its cost would have been the same as the previous bottle. The graph then attempts to reconcile prices for companies by balancing chaos and

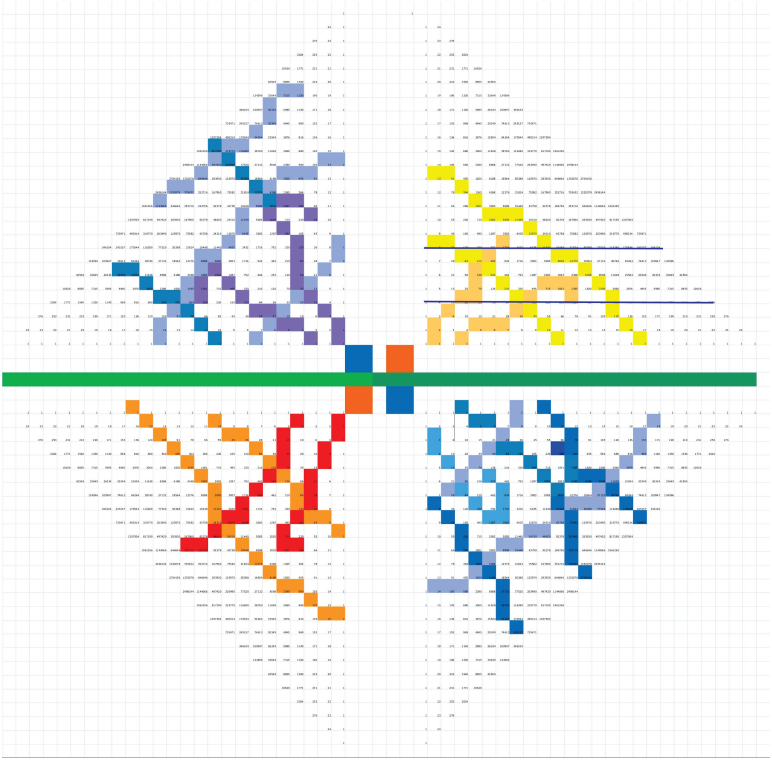
randomness, often however this a competitive Iv-B market where no cash is left on the table and so each business usually needs to sell any bottle of wine it makes even a small profit on. In Aperiomics this is not assumed to be true, instead the market varies between a balanced Biv tree where the I-O police are strong and where weaker I-O police break it up into separate V-Bi and Iv-B markets.

The graph then represents a market with serious problems, the I-O regulators are weak and so companies must either compete in an Iv-B market where each marginal sale that makes a profit must be taken. If they Iv-B competitors don't take this profit then another company might and this might make the difference between surviving the next boom and bust.

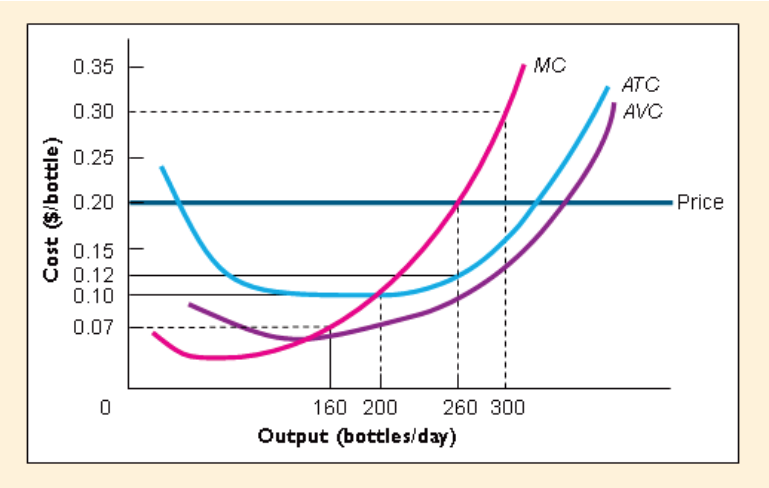
If these companies don't take this marginal profit they tend become V-Bi. In this stagnant V-Bi market the power of teams prevents this excessive competition and forces cash to be left on the table, if rival businesses try to sell too much cheap blueberry wine at the margin then

the Y cartels and Bi unions might boycott them until they stop or go broke. In this way the absence of the I-O regulators is compensated for by more inefficient wars of attrition of boycotts and strikes, because this is a war it creates some damage to the economy and so is less efficient than a strong and neutral I-O police.

The diamond graph below can represent the same values as in the diagram above, for example the V lines in the upper left quadrant are where V cartels average out their costs rather than look more at marginal costs of the last good produced. They might act as monopolies or be monopolistic, this will vary to some degree how close to the minimum average cost their quantities of goods sold will be. The Iv lines can be individual manufacturers of jam that sell every jar they can up to the point that the last can makes no profit. This then increases their average variable cost more than the cartel but they might make up for this by selling more jam by following the MC marginal cost curve in the previous diagram.



In a perfectly competitive Iv-B market marginal costs and revenues dominate over average or normalized costs and revenues, it is then more like the roots and branches of the Biv economy where trees have to grow quickly and grab all the nutrients and sunshine before their competitors do.



In the diagram above the rule for competitive Iv-B markets is shown, they should sell blueberry wine until their marginal cost of the last bottle equals the price leaving no profit on this last bottle sale. As shown this marginal cost price point does not follow the lowest AVC or average variable costs, instead the average cost for the company is higher by making this last bottle sale making the business potentially less efficient in Aperiomics.

The rush by each company to leave no cash on the table causes a momentum between floors and ceilings in prices leading to booms and busts, for example by grabbing every additional sale of wine it can propel the wine manufacturers into a

market glut where their smaller profit margins can cause some of them to go bankrupt. Iv-B customers might grab bargains in wine until they suddenly stop because they run out of storage, they might even have to sell some of it depressing prices.

If the wine sellers collapse then the ripple effect of this as chaotic waves might cause other businesses to collapse, then the wine buyers slow their purchases even more or sell more win. This increases the downward momentum of the wine sellers towards a floor where they crash again before rebounding.

If instead the price point and quantity was directly above the lowest average variable cost then this would maximize profits in a V-Bi economy because no business would have to worry about others taking this lost business. For example many economies have a restricted number of banks that don’t try to steal business from each other, instead they maximize their profits by restricting supply.

This is different from monopolistic behavior where they might work out their prices and quantity supplies at where marginal revenues and costs intersect, a monopoly like this is maximizing its own team profits at the potential expense of Iv-B individuals in society and so is not socially efficient. With a V-Bi economy this cash left on the table might cause cooperative businesses to enter the market and work in partnership with the others, for example they might have somewhat different goods and services to take some of this cash on the table without reducing the buffer the V-Bi society has against chaos.

This is like in the Biv plant kingdom where many V-Bi plants like grass do not try and grow to cover all soil, often poor soil is left bare or taken over by Iv-B weeds. This is similar to V-Bi companies taking the richest resources and allowing Iv-B businesses to exist on their margins. The more competitive Iv-B plants are then more aggressive, however the team action of the grass usually chokes off any attempt by the Iv-B weeds to penetrate far into it. More often the Iv-B weeds evolve into other grass varieties and so the cash

on the table as rich soil is preserved while they share each other's humus.

By contrast the Iv-B weeds would act more like the Iv-B companies and grab any soil nutrients that contain enough to give some marginal growth, like these businesses this can lead to sudden crashes as they use up too much water and minerals hitting the ceiling of what is available. They in effect will take any nutrients that allow them to grow one more Iv branch or B root, this is like the wine companies selling every bottle they could.

In the Roy animal kingdom this also occurs, Y-Ro animals might leave cash on the table by not breeding as quickly as they could to take advantage of all the food available, Ro buffalo might leave plenty of grass uneaten while Y lions breed slowly even when there are plenty of Ro buffalo to eat.

This protects them from starvation with chaotic weather conditions, if Oy predators such as hyena

try to overbreed to use up the prey then the Y lions might attack and chase them away like the V companies protecting their cartels from competition. If R prey such as gazelles overbred then they might experience booms and busts of famine as they used up the available V grass, over time this can diminish their numbers because the Ro animals don't starve as much while the weaker R prey are decimated by predators.

A Ro herd can take over an area and eat the fodder slowly, this pushes the R animals away from them or they can be trampled preserving the Ro food for Ro. This is like a Bi union working cooperatively with other unions to keep wages high, when B workers try to compete by offering lower wages they might attack them and drive them away. The B workers might then only have work on the poorer margins where the Bi unions cannot make maximum profits, for example dirtier and more dangerous work that pays much less.

In between these two extremes would be a balance of chaos and randomness in the I-O market, V companies might be unable to leave all

the cash on the table because some Iv competition is permitted by the I-O police as price collusion is discouraged. In the same way Bi unions can be moderated in their attacks on B workers by not being able to compel people to join a union or to attack businesses without just reasons.

The result would be a price and quantity between the two extremes of lowest average variable cost and highest marginal cost, often this is broken up between buyer and seller with opposing strategies. The cash on the table in V-Bi can induce stagnation, so many reserves are left unused instead of creating more business and innovations.

For example Iv agents might buy up goods cheaply and sell on the margin, as long as they make any profit they take it before another Iv agent does. This brings the prices of goods down for the Bi consumers, these Bi people try to minimize their average variable cost by buying bargains when they can though they also avoid buying

abnormally large amounts of cheap goods they don’t need.

The Bi consumers might avoid trying to get more Utility or increasing their Outlooks on the margins, instead they try to make normal savings and purchases, for example Iv agents selling ice creams might not do well because the Bi consumers are rarely tempted by abnormal cravings. They might however do well selling cheap bread close to being stale because the Bi consumers average this out against sometimes having to pay more for bread.

The roles can also be reversed, Bi might be cooperatives selling the produce of B farmers such as wheat, eggs, fruit, milk, and lumber. They try to average out the prices of these goods because the B farmers go through booms and busts from the weather, overproduction, damaging their farms by going after the low hanging fruit and leaving the rest to rot, etc. This in terms of happiness gives an average value of Outlooks for the Bi cooperatives while the B farmers try to maximize their Utils.

The Iv agents might buy these Bi goods to try to resell to other Bi cooperatives or the V cartels, for example they might try to buy cheaper blueberries to sell to the V blueberry wine makers, while these prices are more random around normal prices they sometimes get chaotic bargains to making a living with. For example some blueberries might be closed to spoiled and the Iv agents calculates he has just enough time to get them to the Y cartel to make a tiny profit over the marginal cost, he might buy up all he can from the Bi cooperative on the marginal cost curve to the point where there is no profit on the last kilo of blueberries.

Grabbing this cash on the table might disrupt some business between the Bi cooperatives and the V cartels, for example Bi finds they got a lower price from the Iv agents than by dealing direct to V so they boycott the agents until they raise their prices or go away. This is like Bi consumers boycotting Iv agents with marginally desirable goods like ice cream that are wasteful in the long run.

It is also like Ro herds of buffalo chasing away Oy hyena from picking off weaker prey, sometimes though the exertion of chasing them away is not worth it and so the Oy predators get some food. In the same way the Iv agents make some small profits because it is not worth the Bi cooperatives uncovering all their deceptive deals unless they grow too large undermining the cooperative.

Consumer and producer surpluses and deficits

In a Biv economy both the buyer and seller usually make a surplus, they get more than they expected for their goods and services. This is because Biv economies have high amounts of Gb resources and so people can more easily end up with goods and services they need. For example in a fertile area B farmers might easily and cheaply grow blueberries, they then have produce that is worth more than their small costs in picking them.

If they exchange some of these with an Iv agent for blueberry wine then they usually get more wine than the cost of the small effort of picking berries, the Iv agents might easily make wine by

fermenting these cheap berries so they end up with surplus wine out of the deal by selling wine back to the B farmers. Their costs would be low, just some yeast to ferment the wine and perhaps some water which is also plentiful. A Bi farm might also have low costs and sell their berries to V cartels who also have low costs of making wine, each then ends up with a surplus because of the wealth of Gb resources.

When the I market is strong the Biv economy is most efficient as Iv agents gain less from trying to rip off the B farmers, instead of both doing business that makes a surplus the distrust from this when the I civil police are weak causes both to avoid some deals that were profitable. With a strong I market Bi unions and cooperatives might do business with V cartels, each is restricted to some degree from price and wage collusion which prevents wars of attrition such as wildcat strikes and strike breaking. When the I market is weak each might become greedy by trying to use their market power to get better prices, as a result long strikes and boycotts can leave both idle instead of doing business.

In a Roy economy however resources are scarce and so are usually G public property, businesses then have to concentrate on reducing consumer and producer deficits rather than maximizing surpluses. For example R farmers might have to fend off raids by starving people after their berries, predatory Oy wine makers trying to cheat them with adulterated wine, droughts causing crop failures, etc. In this situation yields from berries would be very low, those who scrimped and saved to reduce costs might have more chances of survival rather than those who tried to do more business with Oy crooks or planted more berries in a drought.

Oy wine makers would have to contend with poor prices for their wine, they might be lucky to have any left over when exchanging it for more berries with the R farmers. Those who minimize losses might survive better, for example they might use all parts of the berry over and over to get all the juice they can from it while in Biv it would be more profitable to get more berries instead.

Ro gangs might also grow berries, they protect their crops by acting as a team and chasing away Oy predatory wine makers trying to steal berries or trick them with adulterated wine. The Y mafia might make wine like the V cartels do, here they need to minimize their producer deficits by avoiding Oy agents tricking them by stealing the proceeds from sales by claiming the wine was stolen or they got cheaper prices for it.

They might buy berries from the Ro gangs and in a drought it might turn into a war of attrition where each tries to rob the other to avoid starvation. In this situation a weak O police to punish crime can cause the Oy-R and Y-Ro interactions to waste more berries and wine with war, when the O police are strong the economy is more efficient but when weak theft destroys berries and wine. For example R farmers might be in the fields and be attacked by Ro gangs to take over their crops, also Oy wine makers might steal their berries at night. Without police this is less efficient than making sales to minimize costs.

Price and quantity ceilings and floors

Sometimes the government or businesses can create floors and ceilings on prices and quantities of goods and services as shown earlier. For example there might be a tariff on cheap overseas cars which raises the overall cost for consumers, a similar approach is to have a quota of overseas cars to prevent the cheaper cars from taking too much market share. This can then act as a floor on car prices and a ceiling on how many cheap foreign cars there are. The government might also decide to subsidize wheat for bread by creating a ceiling, for example they might give manufacturers or consumers a rebate on each loaf, this would tend to increase the demand for bread as the effective price dropped. The minimum wage can act as a price floor where people are forbidden to employ someone below a certain wage, the government could also do this by offering a rebate to employers or giving workers a subsidy such as a negative income tax.

In a V-Bi economy these floors and ceilings can be resisted by the normal actions of people and businesses, for example restricting foreign car

imports or making them more expensive might not make people buy more locally made cars than they normally could drive. If they have a normal desire of how new a car they need then the incentive to trade an old car early might be resisted even with lower prices. A limited quota of cheaper foreign cars might not create much interest even though they represent cash on the table, people could buy them and then the resale value might be higher than new when compared with domestically produced cars.

In the same way subsidizing bread in a V-Bi economy can be inefficient if Bi consumers don't want to eat more than a loaf of bread a day, they might buy more vegetables even if more expensive to normalize their diets. Abolishing or lowering a minimum wage might have little effect if cooperative businesses don't want to exploit this extra cash on the table, for example lower wages might just give workers less money to buy the V goods. For example in the US few workers are paid as low as the minimum wage.

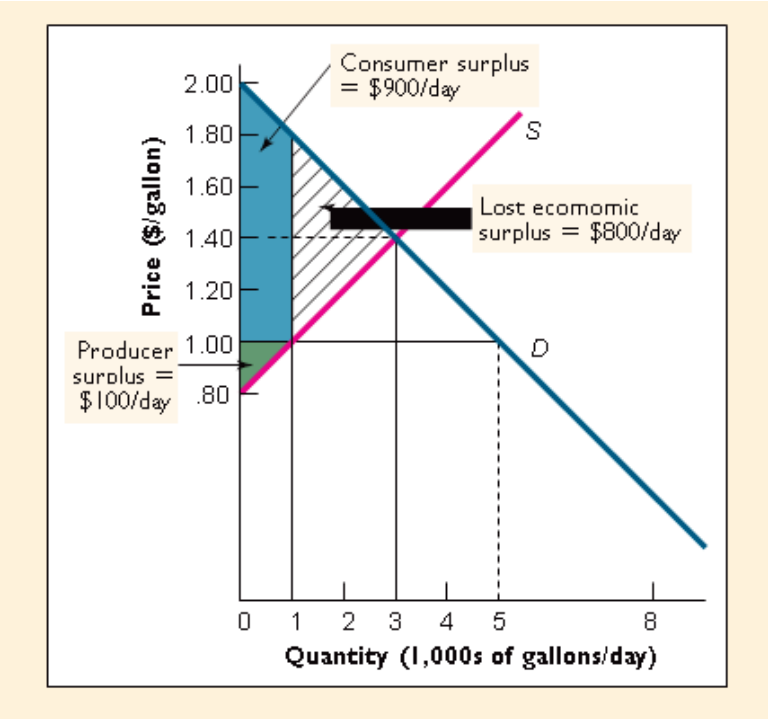
Instead of imposing floors and ceilings in a V-Bi economy it works better to try to move normal behavior, for example if people eat an average of a loaf of bread a day then increasing this average might work better than be trying to affect people's behavior on the edge of the normal curve. For example subsidizing bread might only make abnormal people buy more bread, those in the middle of the normal curve might not be tempted if their traditional meals did not include much bread. Floors and ceilings of prices and quantities then introduce chaos into a V-Bi economy because they tend to break up team behavior by encouraging abnormal purchases. Cash on the table subsidies are also less effective in a society where exploiting this is considered deceptive Iv-B and often punished.

Instead there is often a war of attrition to change team behavior to a new normal, for example a Bi union trying to boost its wages often gets resistance from V businesses until they realize the change is inevitable because the Bi union has more reserves to outlast a strike. Subsidized bread might slowly change the normal diet over time

just as restricting foreign cars might slowly change people into desiring domestic cars more.

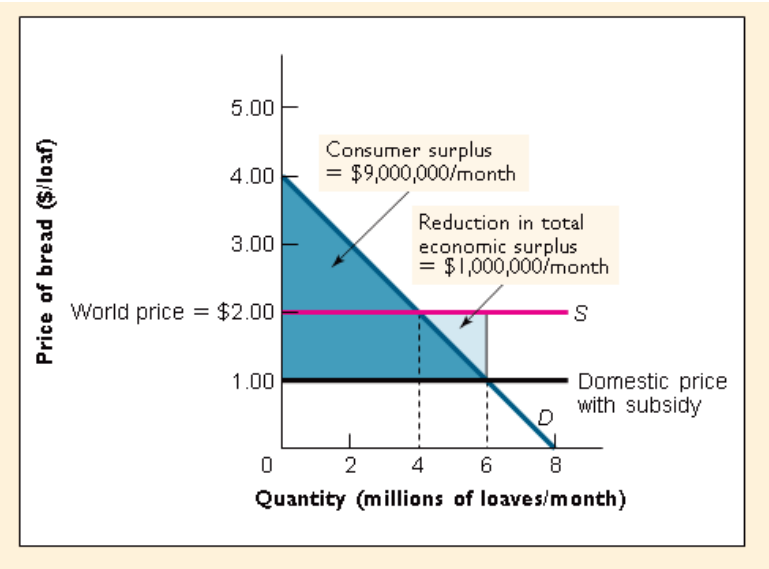
Subsidies might be paid for by taxing deviant behavior to move people to a new normal, for example raising the prices on vegetables along with subsidies on bread might be more revenue neutral but it targets the normal center's preference for vegetables more. If normal car buyers trade their cars in every three years then incentives might only make deviant drivers change cars leaving the average unchanged.

Instead there might be a clunkers tax on keeping a car for longer than the normal period but which does not increase over time, for example after three years there might be a 10% tax on trade ins. This targets normal behavior while leaving those who trade in early and later alone, it then exerts more pressure on the center and may change the habits of normal behavior more quickly. Once the normal center gets used to eating more bread and trading their car in more often the subsidies might be removed and the new normal remains.



In the diagram there is a limit to the supply of fuel, this raises the price but stops some deals that might otherwise occur, this would affect people on the edge of the normal curve that are slow at buying fuel while those faster would get all the fuel they need. This then has a chaotic effect in tearing apart the edges of the V-Bi economy by establishing a ceiling on the fuel available.

Instead the government might work out the average use of this fuel and tax this a higher amount while allowing smaller and higher amounts of fuel to be untaxed. For example an average family might use 20 liters of petrol a week, this might have a tax of 10% which makes them drive 10% less or buy more fuel. Those people who drive much more might get this extra fuel at the untaxed price, also those driving much less don't pay the tax. The result then is the normal center is pushed towards a new normal of buying more fuel efficient cars or taking the bus more often.



In the diagram above a price subsidy on bread increases demand, however in the V-Bi economy this would tend to skew the normal curve towards an uneven oblique slice of Pascal's Triangle as it introduced exponential changes in demand. For example those who eat more bread anyway would tend to profit more than those with an inelastic normal bread diet, they then separate more into another group than those who would not change their diet.

In the Iv-B economy floors and ceilings can be more effective as the market reacts to them more often, for example a bread subsidy in an Iv-B competitive market might make people change their diet and suddenly eat much more bread because it gives a competitive advantage. There would still be booms and busts between floors and ceilings but now these are adjusted by the subsidy.

For example if there is a boom in berry sales they might become more expensive and people can switch more quickly to subsidized bread, this can make the berry market crash earlier than it might

have otherwise. A ceiling on fuel supplies might make some real estate booms in growing cities crash earlier because building further out becomes too hard to get fuel for travelling.

Sometimes these subsidies and taxes might be useful by pricking a chaotic bubble before it hits a more dangerous ceiling, for example government often create a higher floor for interest rates in a real estate bubble. This can make the market crash earlier as the momentum towards higher prices runs into more expensive costs of leverage earlier, also people might build less momentum in a boom or bust if they expect changes in the floors and ceilings like this.

For example in a real estate slump there might be a race to the bottom where people sell out in the expectation of buying a cheaper home later, thinking the government might randomly step in to establish a lower ceiling on interest rates might slow this selling momentum so it hits the floor earlier and more slowly with less damage.

Subsidies and taxes then depend on their effect according to whether they act on the margins of their target or the normal center, interest rate changes on homes might hit the normal buyer more and change their behavior, if instead it affects mainly Iv-B speculators it can cause an earlier price crash or create one that might have been avoided by speculators slowing their own momentum when the price ceiling is neared.

Before the GFC subprime loans affected the margins of society more than normal buyers and so they had a chaotic effect, for example poor people were able to buy more homes but normal home buyers were not as affected. This however acted like a ceiling on the costs for these marginal buyers and the resulting increasing obliqueness of the normal curve caused a slippery slope effect where real estate prices went up exponentially but then slipped down the slope even for the normal center.

This situation was illustrated earlier in how the normal curve is formed by balls dropping down, when they fall on an inclined surface they create

an oblique normal curve with a tendency to collapse in an avalanche. Changing the surface of the economic playing field can in effect cause avalanches in normal distributions.

Taxes and subsidies can introduce a deadweight loss onto the market, however the effect depends on whether this works at the margin or on average people, for example with a restricted supply of fuel the slower buyers have more of a deadweight loss than those quickly finding when fuel goes on sale. This might happen for example with fuel rationing after a chaotic earthquake, those who see fuel available quickly line up and those fastest experience no deadweight loss.

This can also allow some deception, for example fuel might be sold to some customers for a bribe by phoning them and telling them when it will be available. A V-Bi randomizing rationing system might give each driver 10 liters a week and this restriction suits the normal driver, those who don’t drive much might sell their fuel or save it while those who drive much more such as Iv

travelling salesmen would not be helped by even 50 liters a week.

There is also a deadlift force in Aperiomics, this is where a force tends to lift things upward instead of a downward pressure with a deadweight loss. This deadlift like a deadweight can be a gain or a loss, for example in a hurricane a tree might fall on a house and the weight creates a tipping point where it causes the roof to collapse. A deadlift is like where the wind gets under the roof edge lifting it up and ripping it off.

This happens in an Iv-B boom and bust, for example in the share market a deadweight of short sellers might cause a stock to collapse with the weight of sell orders breaking waves of rallies. A deadlight might be where an influx of money like a wave or wind has high energy, also a short time because people are rushing to grab a perceived bargain.

This lifts a stock off the foundations of its innate value based on earnings and its assets, when this

wave passes it can lead to a deadweight or undertow after the wave that collapses the stock price. It then reaches a ceiling at the height of the wave where there is no more energy and it becomes turbulence wrecking the stock prices as people panic sell. When the stock crashes to the floor hitting its fundamentals of earnings and asset values causes more cracking, for example the company might now have debt if it was bought by a larger Y-Oy predatory company as prey in the boom.

Generally a deadweight or deadlift gain is Biv and a loss is Roy, the objective is to maximize these gains in Biv and minimize costs in Roy. For example price controls on apartments in New York might give a deadweight loss because they become more scarce, people who can afford them cannot buy them so this is Roy scarcity. The objective of this is to minimize the costs of renters.

However a deadweight gain is where in Biv prices might be artificially low and so people profit from this, for example the government might keep

mortgage prices low by making them tax deductible, this gives a multiplier effect of more Iv-B home ownership at the risk of disconnecting the housing market from its foundations of value.

A weight or lifting force can be either chaotic or random, for example the weight of a fuel tax might cause normal consumers to use less fuel or buy more fuel efficient cars but not cause any cracks in the economy. In this case the weight falls on an elastic part of the economy, like a safety net its resilience quenches its chaos.

The deadweight or deadlift is then long on time and low on energy as V-Bi or Y-Ro, it moves slowly or exerts a low energy pressure like price controls on apartments. It creates little chaos but makes people move randomly around the deadweight loss of apartment prices by resisting its effect or adjusting to the new normal price of apartments.

A deadlift of tax deductible mortgages is like a random uplifting force on house prices and affordability, people can adjust randomly by

resisting buying a house just because it is easier with this deduction. They can also adjust to this new normal where the average person is more likely to own a house, however if this deadlift is removed by repealing this deduction the resulting deadweight can then potentially cause chaos as some can no longer make payments. Others however might randomly adapt as real estate prices sink back to the old normal.

1	14	105	560	2380	8568	27132	77520	203490	497420	1144066	2496144						
1	13	91	455	1820	6188	18564	50388	125970	293930	646646	1352078	2704156					
1	12	78	364	1365	4368	12376	31824	75582	167960	352716	705432	1352078	2496144				
1	11	66	286	1001	3003	8008	19448	43758	92378	184756	352716	646646	1144066	1961256			
1	10	55	220	715	2002	5005	11440	24310	48620	92378	167960	293930	497420	817190	1307504		
1	9	45	165	495	1287	3003	6435	12870	24310	43758	75582	125970	203490	319770	490314	735471	
1	8	36	120	330	792	1716	3432	6435	11440	19448	31824	50388	77520	116280	170544	245157	
1	7	28	84	210	462	924	1716	3003	5005	8008	12376	18564	27132	38760	54264	74613	
1	6	21	56	126	252	462	792	1287	2002	3003	4368	6188	8568	11628	15504	20349	
1	5	15	35	70	126	210	330	495	715	1001	1365	1820	2380	3060	3876	4845	
1	4	10	20	35	56	84	120	165	220	286	364	455	560	680	816	969	
1	3	6	10	15	21	28	36	45	55	66	78	91	105	120	136	153	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	

In the Y-Oy quadrant of the diamond graph above the horizontal lines can represent artificially

imposed floors and ceilings on the price of bread, this will then affect the Y and Oy lines differently. The Y cartels might find the government has imposed price controls so they must sell bread at prices between these two lines, this affects the normal price so the average price they charge must come down from what they normally charge.

This will encounter some Y resistance because it affects the edges of the normal curve differently, the times they sell bread more cheaply are affected but now the times they raise prices to average out the lows are cut out much more. The idea of the price controls in this case would be to establish a floor so bread manufacturers do not go broke and a ceiling so that they do not make too much money.

By working with floors and ceilings here this tends to break up the Y cartels in favor of Oy competitive manufacturers, the parts of the cartel that cannot sell bread cheaply enough can no longer rely on cooperative behavior from the others to get by and might break away to try to

survive as Oy. This might be with deception, for example they might sell bread at the official price but people must pay a secret surcharge because the price controls have made bread scarce.

The Oy manufacturers are affected more chaotically by these price controls particularly if they were introduced quickly and with deception or little warning. Some might have invested in an expected market demand and now they cannot charge enough to pay for their equipment, they go broke and their equipment is bought up in bankruptcy by the others. Those who had not invested might then survive better, also the price floor prevents some with lower costs from dropping the prices to bankrupt their competitors though if they grow then their own costs might also go up so there is still much bluffing about prices between them.

The increase in chaos might cause the Y cartel to react angrily to losing market share, they might try to bribe the government or use strong arm tactics to chase away the Oy manufacturers like Y lions chasing away Oy hyena when prey are

scarce. It might also cause the Y cartel to collapse causing more chaos and booms and busts forcing prices to hit the floor and ceiling over and over creating more bankruptcies.

Instead the government might target the center of these two lines rather than floors and ceilings, for example they might offer a rebate to manufacturers who sell bread for a dollar a loaf plus or minus ten cents. Those who do receive a ten cent subsidy while outside this receive nothing, in this case the government aims at the target they want with a subsidy rather than penalizing the margins.

Now this strengthens the normal center of the Y cartel and those on the fringes have an incentive to narrow their price swings, this might still average out the same profit except now they drop their prices less in bad times and raise them less in good times. The result then might not be a difference in profit but the price stabilization is less chaotic, for example people starve less when prices go up.

The Oy manufacturers also have less of a chaotic effect, they might have more incentive to cooperate and join a Y cartel to maintain this price band. When they do go out of the band they can still hit their floors and ceilings however there will be less momentum away from the center as profits in a boom or a race to the bottom in a bust might be less attractive than before.

Subsidies like this can also be tailored to specific curves, for example there might be a normal curve with a center at a dollar a loaf, as prices deviate to either side the subsidy diminishes according to the values of the normal curve perhaps end at plus or minus twenty cents a loaf. An oblique normal curve could also be used, here the bread companies might receive more of a subsidy by keeping bread under a dollar a loaf than if it is the same amount above a dollar. Subsidies and taxes when they are ceilings and floors can be acting as tipping and righting points, for example a tax on luxury cars over $30,000 in value might dramatically affect a kind of technology used making it uneconomical for all cars. A minimum wage might act as a righting point by enabling people to live on this wage and pay rent without

sharing with others, this could make for dramatically less crime in a suburb. It might also act as a tipping point by making some alcoholics and disabled people completely unemployable whereas without this tipping point of a wage floor they could have found work for less money.

A lower bound on interest rates was reached after the GFC, loan money was in such low demand that rates fell nearly to zero and so could not be lowered more to stimulate the Iv-B economy. This is then like a floor Iv-B hits causing damage, loss of energy for a rebound, and V-Bi stagnation. It then becomes the new V-Bi normal to stay at this lower bound like the examples of the Y cartels moving to the edge of a price control.

The solution to this is to get these economies off the floor, not to rebuild with more Iv-B businesses that will suck up available Gb resources in a boom and crash again. This requires stronger and more neutral I-O regulations, because Y-V is still strong from plundering prior to the GFC they still have the funds to lobby against these rules. It is then

like Y lions dominating R prey such as gazelles and undercutting the whole food chain.

One way to lower this zero bound is to offer a tax deduction for money saved and a corresponding tax on money in banks and similar institutions. For example people and businesses might receive a 5% tax deduction on the monies deposited in a bank or other institution that loans money, this in effect gives them an artificial interest rates. Those banks holding this money pay a tax on it of 5% per year so it is revenue neutral for the government but allows an economy to deflate less chaotically by moving this zero bound. This is then like moving on of the price floors mentioned earlier downwards, this allows V-Bi and Y-Ro businesses more leeway to average out their loans.

For example a bank might receive more savings from consumers this way, then they can lend out at a negative 1% interest rate to other consumers without losing money from the loan. The consumers borrowing this money gain an advantage in the loan becoming cheaper over time, however this often happens in times of high

inflation anyway so does not affect the economy much. These consumers might then pay the 5% tax to the government for borrowing this money, it in effect increases the interest rate they pay.

The system could work like a GST or VAT tax, each person or company can get a tax credit by lending out money and a tax liability for borrowing it. Some consumers might be subsidized as with a GST by paying less tax as an end user, for example with a GST some foods might not be taxed. To promote for example student loans this tax might be less, to promote more savings from some groups the tax deduction might be increased. It then allows prices to deflate and move randomly, then with a lower floor and stronger I-O policing the economy has more breathing space for interest rate variations.

Game theory

Aperiomics is in a sense built on game theory, it is like a collection of game strategies between color codes that evolution and revolution in nature has devised. Each color code interacts with any other

sometimes and so it needs to pursue a strategy to maximize its profit or minimize its losses, if it does not then others that do this will replace it. For example R prey adapt with a competitive chaotic strategy of deception, camouflage, and a high birth rate. They feed on V leaves of plants so to counter this chaos, these leaves adapt to using a random cooperative strategy to smooth out the booms and busts in foliage this kind of feeding would cause.

It can then be said that V foliage adopts a cooperative strategy and so R prey have a chaotic strategy to match it, this reduces the chance of booms and busts or stagnation occurring between neighboring colors.

The main kinds of games in Aperiomics are chaos versus chaos, randomness versus randomness, and chaos versus randomness. A chaotic strategy is competitive because it comprises individuals or loners, they can only compete with each other to remain loners. If they cooperate with each other by definition they become a team and are no longer loners.

These are the three main classification of games, examined more separately here though a real life situation can comprise all three kinds of games mixed together. There is also the Roy negative sum game where losses are minimized, a zero sum game in G-Gb where one side profits and another side loses, and a positive sum game in Biv where both sides profit. The diamond graph covers all color interactions and so all Aperiomics games can be illustrated in the cells of the graph.

In the negative sum game losses are minimized, this means that generally those that lose less survive which represents winning in these games. For example an Oy fox might be trying to survive in a drought by finding R rodents, it is not trying to profit but to try to minimize the chance of starving while the rodents are trying to find enough food to survive as well as to avoid being eaten. This can happen sometimes in game tournaments such as where each player in a knockout chess tournament is trying to survive to the next round. Tactics and strategies can be more to avoid mistakes rather than to take unnecessary chances,

if there is a draw then both might survive to play again.

This kind of tournament is highly deterministic and chaotic, its shape is like the roots or branches of a tree with the eventual winner like where the trunk of the tree is attached. A tree then is like two knockout tournaments where the B roots and Iv branches compete with each other to grow and find nutrients, then those most successful share the different nutrients with each other. It is a positive sum game because each root and branch tries to maximize profit rather than minimize losses, those roots that find the most nutrients grow more and get more nutrients from the branches in return.

In a drought the plant might become more Roy and minimize losses, this can cause the plant to fall apart as some sections survive better than others. For example V leaves and some branches might be more expendable so the plant sheds these to try to survive the drought by minimizing its losses.

In a Roy environment sometimes the negative sum game can turn positive, for example Oy hyena in a drought might minimize the energy they use up because they might not have the strength left when they find R prey. In the rains there might be plenty of prey and so the object might be might maximize profits, the Oy hyena then try to eat more R prey and have more offspring to balance the negative sum game later.

In between these is the zero sum game of G-Gb where the hyena might have to decide whether to minimize energy losses by resting or maximize profits by chasing more prey, those that choose wrong are more likely to die. Each game then rewards the victors with a greater chance of survival, this can be higher random odds on a normal curve or higher chaotic chances on an exponential curve.

For example a Ro herd of buffalo has a high chance of survival because Y predators take some on the edges leaving most of the herd untouched. They don’t increase their offspring much in good times so their food is less likely to become scarce

from being overeaten. R mice or locusts might breed exponentially in good times and then their numbers crash when the food hits a ceiling.

When chaotic strategies are pitted against each other the result is like the knockout tournament where each player must find a deterministic strategy to win so tactics are more important. Using a probabilistic strategy would only win a fraction of the time on average and so the player would usually get knocked out. The one that finds a tactic such as a chess combination might instead be assured of winning or avoiding losses if his opponent is taking random chances.

In the same way the Oy hyenas that have a deterministic strategy survive more often and the R prey that have better tactics such as dodging and running quickly are also more likely to minimize losses and survive. Those that try to team up in a chaotic situation are less likely to survive, for example two Oy predators with only enough prey for one will both die unless they fight each other for the food.

This tends to create a boom and bust in Oy-R predator prey numbers, the Oy predators must overeat to survive because otherwise other Oy predators will get the food first. Then the R prey becomes hard to find and Oy predators starve, those who minimized losses now survive while those trying to cooperate will be rebuffed and die. Sometimes Y and Oy predators can cooperate and then resume competing later, for example off the Eastern cost of Africa large schools of sardines are attacked by sharks and dolphins cooperating to trap more prey. At other times sharks can attack dolphins.

It's likely there is some cooperation between Y lions and Oy hyena, it is common for Y lions to steal the carcass from hyenas but this could also be a tacit agreement where the hyena get a commission I exchanging for giving Y the lion's share.

After Oy predation causes the numbers of R prey to collapse they will rebound chaotically because the pressure on them from Oy predators has lessened, those Oy capable of breeding more

quickly will take over from those slower breeding so the cycles favor chaotic fast breeding, higher momentum towards the floors and ceilings of food available, and minimizing losses.

When random strategies are pitted against each other the result is usually a war of attrition between cooperative teams, information is rarely hidden or deceptive because the teams need to inform each other accurately or deception will break them up into chaotic loners instead. This can be seen with Y prides of lions attacking Ro herds of buffalo, each cooperates with their team and tries to pick off those on the edge of this normal distribution.

For example the young and old buffaloes are deviant to the average and so evolution has placed them more at risk. With the Y lions also younger and older lions might be less agile and more likely to be gored by the buffalo. The result is these deviant predator and prey are less likely to minimize losses and so the normal curves of both are reinforced by losing the more chaotic edges.

Often though both plants and animals employ all three strategies, chaotic versus chaotic and random versus random as described and then chaotic versus random. For example Oy chaotic hyenas and wild dogs in Africa might try to use deception and secrecy to grab weaker buffalo from random Ro herds. Sometimes chaos will succeed, for example Oy hyenas might sneak in a grab a young calf or old and sick buffalo before the others notice.

At other times randomness will succeed where the Ro team alerts each other to the intruders and manages to gore or trample them. This is like Oy thieves sneaking into a Ro neighborhood to rob R people, the Ro gangs might have a neighborhood watch and random patrols to counter this and use vigilante justice to deter them.

A Roy game is fought in G public property, this means that the animals involved do not own any area though they might claim some of it as their territory. If they cannot defend this territory against others then they might lose it or have to

share it, for example Y lions might not be able to keep Oy hyenas or even a rival pride of lions from sometimes coming onto their territory to feed.

A Biv game is fought in Gb private property, for example plants own a piece of land they grow in and they do not try to move nomadically from one area to another like animals. Two tree side by side might compete to grow faster and the winner might overshadow the other cutting off its sun, however they don't move from their ground nor does a plant usually try to take this ground from another. Some exceptions to this are where one plant might overshadow and kill another plant or take so much nutrients from the soil that a neighboring plant dies from a lack of water, however this is not like one animal chasing another on G public property.

There is one other aspect to a game in Aperiomics and that is the referee represented by I-O, they act to enforce the rules of the game. When they are strong V-Bi and Y-Ro evolution as well as Iv-B and Oy-R revolution are more stable and cohesive as a complete system, when they are weak the

ecosystem can break up and collapse. This can happen with any games, for example a knockout chess tournament might have widespread cheating where the winner pays off other players from the prize fund without policing.

A tournament where everyone plays the same number of games might use a war of attrition such as Bobby Fisher complained about with the Russians, they might give their best players easy victories while trying hardest to bring down their opponents. If this is not policed then the tournament can break down into games not representative of the best game possible, in economics this would be socially inefficient games or transactions.

In the Roy animal kingdom the O animals are the middle of the food chain, they tend to warn the prey when predators are around to keep more food for themselves, they also sometimes side with the predators to weaken the prey to get food. This is like the O human shepherd which acts like a referee between the predators such as

Y wolves and Oy wild dogs against his flocks of Ro cattle and R goats.

Without the O shepherd the flocks would quickly be destroyed and the predators starve, he domesticates some Oy dogs and makes them guard dogs to keep the worst Y predators out more often. This is like O referees using snitches to reduce the worst crime or rule breakers in a game tournament.

He in turn feeds these Oy guard dogs with some meat from his flocks so they have more food than they otherwise could get. This is like the O referee of a tournament letting his snitches get away with minor rule infractions in exchange for exposing the more serious cheating so the overall tournament follows neutral and fair rules more often.

This evolves into O police using Oy petty thieves as snitches against Y organized crime, in exchange they plea bargain some of their crimes so they do better than they would without the police. Like

the sheep the people are safer with this lower level of crime than a higher crime wave with no police, this would wipe out the assets of the people but soon the criminals would be starving after having exhausted the resources of their prey.

The referees, regulators, police, judges, etc are represented by I in Biv and O in Roy, according to Aperiomics in the animal kingdom there are O animals that act like referees between predator and prey. They evolve like the other animals, eventually they became O shepherds as people and the criminal justice system we see today.

In the plant kingdom I evolved as the trunks of trees to balance the nutrients created by photosynthesis coming from the Iv branches and V leaves with the minerals and water coming from the B roots and Bi upper roots system. Those plants that better balanced these two grew more efficiently otherwise one half of the plant might keep more nutrients and take more from the other to be more stunted overall.

So those more efficient at balancing these nutrients created a kind of fair marketplace in the I trunk where these are exchanged rather than one part of the plant taking more than its share. The more efficient this I refereeing role was the bigger and faster these plants grew on limited Gb resources, they then overshadowed and made more seeds than those plants with weak I trunks. In the same way a more balanced Roy food chain is more efficient because its various populations of animals are less likely to go extinct unnecessarily.

This is just an overview of the color interactions, more can is explained in my other Aperiomics books. Here this book focuses more on game theory in economics and how it fits in with the principles of Aperiomics.

The elements of a game

In economics a game has three elements, the players, the rules or tactics and strategies each player can use, and the payoffs. In Aperiomics a fourth element would be added as the I-O

referees or police because a game can be very different in outcomes if cheating is not enforced. A fifth element can also be included though it might be implied under the rules, that is whether it is played on G public property or Gb private property, even a combination of the two.

For example a game of football is played on G public property because any player can usually go anywhere to get the ball, in practice their movements are restricted by rules such as being off side but generally there is no area of the field a team is said to own. Such a game is Y-Ro because there are two opposing teams battling on G public ground, often such a game is a war of attrition where mistakes in minimizing losses can decide the game. The teams might then train to not make mistakes and to carefully defend.

Another G game is judo where two players fight as individuals to deceive each other, there is again no place where one player owns as Gb private property but instead a player holds an area by his strength, endurance, ability, etc. It is more deceptive as an Oy-R game, using feints and bluffs

a player might use the other's momentum against him. This is like an Oy predator trying to use the momentum of R prey to make them trip or not be able to turn as easily.

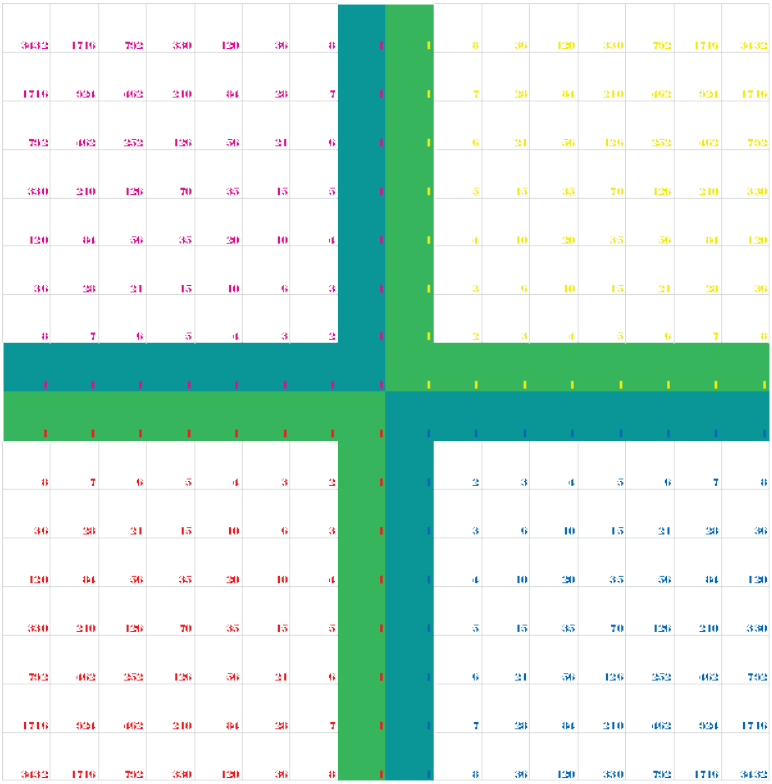
In a Gb game there is private property, for example in chess each player owns his pieces and the squares they are on. His opponent can only capture those pieces and squares according to the rules, if it was football he could with superior strength win by pushing the opponent's pieces off the board and onto the floor.

This is more of a V-Bi game where opposing teams of pieces cooperate with each other, the player acting like the general of these forces. An Iv-B game with Gb private property would be tennis where each player has his own side of the net where the other player cannot come, also the ball must stay inside the boundaries of the playing area. Each also has their own racquet, one player could not grab the other's racquet and play with it. It is often decided by high energy serves where the first to move has an advantage, also they can feint by pretending to hit the ball to a different

area of the court. Because of this the rankings tend to be unstable, a new player with an innovation such as a faster serve might quickly rise to a higher rank.

Game matrices

In the diagram below there are 4 quadrants like the diamond graph except these can also be a game matrix. The two central colors in a cross shape are G or green representing public property and Gb representing private property.



Y-Oy and Ro-R are G public property based economies and games, they should then be completely colored with green. However to keep the diagram clear I have just colored the edges of each quadrant. In the same way the Bi-B and V-Iv quadrants are Gb private property based economies and games, I have colored their borders with this Gb or green-blue color.

To move to an adjacent quadrant then this fence must be crossed to change from G public to Gb private property or vice versa, for example for a game like football to change into chess it would need to add areas of the field players can own. This happens to some degree in soccer where the goalie controls an area in front of the goal where the other players are restricted in entering.

The numbers in each cell are colored to remember them more easily, for example the Y-Oy quadrant has Y yellow numbers and the Bi-B quadrant has B blue numbers. The G area can be called Scarcia as a separate economy to the Gb area of Abundia, these terms were used earlier because Scarcia has scarce resources and Abundia has abundant resources.

The upper right quadrant is Y-Oy which is on public property so next to it on its left is the G fence, the upper left quadrant is V-Iv which is on private property so the Gb fence is next to it. A game between the two quadrants would have to move across this fence or change from G public to Gb private or vice versa.

This is called a fence because in G-Gb economies it usually is one, for example there might be a G open range where shepherds feed their sheep, next to this Gb private property might erect a fence to keep the sheep out. Also sometimes in a Biv economy Roy land is fenced off, for example land contaminated by toxic chemicals and not usable might be fenced off to prevent people hurting themselves there. A G public park in a Gb city might have fences all around it to define what is the G park and what are the Gb houses and their land around it.

The bottom left quadrant is Ro-R which is on G public property so it has G to its right. Bi-B are overtones of Ro-R which is on Gb private property because resources are more abundant, someone in a Ro-R economy would then have to transition from a G public based economy going over this fence into a Gb private property based economy in Bi-B.

For example an Ro-R sheep herder in Scarcia might be used to having his flock on G public lands

but to go into the Bi-B in Abundia he must have Gb private property to feed his sheep. An R homeless person might have to get a job with enough money to own or rent a piece of Gb private property to be part of a Biv economy.

The Y-Oy quadrant on the upper right is a Y predatory authoritarian government with Oy cronies, Scarcia is poor so it mainly G public property. If these cronies want to move to V-Iv in Abundia, which are overtones of Y-Oy, they have to own Gb private property. In the real world economy this often happens, Oy cronies of Y dictators buy up Gb property in the Biv advanced economies with money gained by controlling G public property in their home country.

3432	1716	792	330	120	36	8	1	1	8	36	120	330	792	1716	3432
1716	924	462	210	84	28	7	1	1	7	28	84	210	462	924	1716
792	462	252	126	56	21	6	1	1	6	21	56	126	252	462	792
330	210	126	70	35	15	5	1	1	5	15	35	70	126	210	330
120	84	56	35	20	10	4	1	1	4	10	20	35	56	84	120
36	28	21	15	10	6	3	1	1	3	6	10	15	21	28	36
8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8
36	28	21	15	10	6	3	1	1	3	6	10	15	21	28	36
120	84	56	35	20	10	4	1	1	4	10	20	35	56	84	120
330	210	126	70	35	15	5	1	1	5	15	35	70	126	210	330
792	462	252	126	56	21	6	1	1	6	21	56	126	252	462	792
1716	924	462	210	84	28	7	1	1	7	28	84	210	462	924	1716
3432	1716	792	330	120	36	8	1	1	8	36	120	330	792	1716	3432

In terms of game theory crossing the G-Gb fence means a different set of rules, for example a Y-Ro war game might be represented in this matrix by Y lines in the upper right quadrant and Ro lines in the lower left quadrant. In this Roy war the object is for one team to beat the other, they might score points by hurting or killing someone on the opposing team. To cross this game over into V-Iv on the upper left and Bi-B on the lower right means that instead of roaming over G public

property like armies do they need to own the land they are on. In real life this is like a conventional war becoming a trade war.

This war game would have to change from being territorial such as in Warcraft to become more like a game of chess where each position of the soldiers must be purchased or sold. It then becomes more like business, for example this conventional war might have been Y-Oy Nazis against the Ro-R communists in World War Two. Crossing this over into Gb would make it a trade war, the Ro-R communists would become a Bi-B left wing economy with Bi trade unions replacing the Ro communist army while the Y-Oy armies would become V-Iv cartels and management.

Trade wars are often military wars by other means and vice versa, to paraphrase Clausewitz. In this military war Oy soldiers might have been like the Gestapo as a secret police using disinformation against the Russian equivalent as the R Cheka and later the KGB. To cross this into Gb the Oy Gestapo would become more like industrial

espionage companies and Iv agents trying to secretly get knowledge about their customers.

The R Cheka would become more like B workers who are secretive and deceptive against these agents in their trade war. This G-Gb fence has been crossed many times, for example China was formerly an Ro-R communist economy and now is more Bi-B worker based. It now has a trade war against the West instead of the previous cold war, the US appeared to it like a right wing Y-Oy imperialist power and now is seen more as a V-Iv capitalist economy. Russia now has a trade war against Europe including with oil and gas supplies, before this there was the Roy cold war.

The same occurred with Japan which was a Y-Oy economy in World War Two occupying Ro-R China and other parts of Asia with a G game. Afterwards it became more V-Iv refining and improving raw materials from newly Bi-B parts of Asia. The military conflicts were based on the concept that countries were G public property and so whoever could control or capture them was expected to do so in war. As the world became more prosperous

in the twentieth century it became more Gb and so this military doctrine became a trade doctrine where private property was accepted and could only be taken through a business transaction though some deception could still be used.

In effect the Great Game between nations of the nineteenth century straddled this fence where governments might invade each other but also mount trade wars. More is explained about this in my previous Aperiomics books, here it is mentioned to help define the rules of the Aperiomics game matrix.

In this matrix then different games can be represented, first there are G or Gb games. Then there are games of opposing teams, this can be on either G or Gb or both. Then there are games of opposing individuals on G or Gb. In the center there are I and O representing the referees or police of the games, when they are weak or absent then colors might change the game by breaking some rules.

For example the Y-Ro war such as the Y Nazis versus the Ro communists had some rules such as the Geneva Convention, modern trade wars also have some rules such as those defined by the World Trade Organization. A Roy war might be highly controlled by O referees, a Roy society might have a low level of crime because of these O police. A Biv society with weak I civil police such as the SEC in the US might have too much deregulation and become corrupt such as prior to the GFC.

A stronger I civil police after the Great Depression kept the US economy much more efficient and less corrupt for many decades. When this I regulations were weakened after the 1980s in the US more companies broke the rules changing the game, for example Glass Steagall was a rule that was broken by the formation of Citibank. After this other banks were able to break this rule with impunity, this led for many other regulations to be ignored or only enforced with small I fines lower than the profits made from breaking these rules.

Weak I-O police can also allow a spillover from G to Gb or vice versa, for example at the end of World War Two the armies of Ro-R Russia took over many Bi-B Eastern European countries because the other Allies were too weakened to stop them. Today many modern Biv economies have companies that plunder natural resources in Africa taking advantage of the weak O police both there and at home.

		American's Choices	
		Raise ad spending	Leave ad spending the same
United's Choices	Raise ad spending	$5,500 for United $5,500 for American	$8,000 for United $2,000 for American
	Leave ad spending the same	$2,000 for United $8,000 for American	$6,000 for United $6,000 for American

In the diagram above two airlines have to decide whether to raise their ad spending or keep it the same, if both leave the spending unchanged then both do better overall. The lower right and upper

left boxes then can represent the airlines cooperating as a V team. If instead they compete as Iv then the results can be either the upper right or lower right left where each tries to get in first raising ad spending.

This is like the Iv-B economy where companies win by getting in first and deceiving the others, the result however is often movement from one box to another in a boom and bust scenario rather than an equilibrium. For example United raises its advertising first and makes a windfall profit and then American does the same so the profits taper off. They then hit the ceiling of profitability from this strategy.

The market might then change so advertising has little effect, for example in a recession people might not be flying regardless of ads so the first to lower their ad spending might make an initial profit. Then the other follows suit until they are both at the floor of ad spending. As the economy moves from booms to bust then the two airlines will tend to try to beat the other in turning around as the economy hits this floor or ceiling.

Some airlines might then decide to use a V strategy of overt price collusion or just signal to the other their willingness to team up on price. The game then has components of both chaos and randomness depending on whether the airlines cooperate or compete.

The dominant strategy in this case might be to move first and take the windfall profits and then move first later if the economy reaches a floor or ceiling. A slower Iv-B company might have a dominated strategy where in moving second they always have to do what the other airline just did, this is like in football where one player might shadow or watch another player in case he takes the initiative.

		Mountain Spring	
		Charge $1/bottle	Charge $0.90/bottle
Aquapure	Charge $1/bottle	$500/day for each	$0 for Aquapure $990/day for Mt. Spring
	Charge $0.90/bottle	$990/day Aquapure 0 for Mt. Spring	$495/day for each

In the diagram above the situation shows a V cooperative strategy, if they both charge $1 or .90 c a bottle then there have a more stable business. They might then have an average price of .95c a bottle with some variations on the normal curve.

The temptation is for both to undercut the other as Iv competitors in which case the price might move between a floor of .90 and a ceiling of $1 a bottle chaotically. For example the price might be $1 a bottle each and Aquapure moves first gaining extra profits at .90 c until Mountain Spring matches it. Aquapure might then jump back to $1 to take advantage of its extra customers who will continue to buy until they realize the price is

cheaper for Aquapure, when Mountain Spring realizes Aquapure is profiting from this they might raise their prices as well.

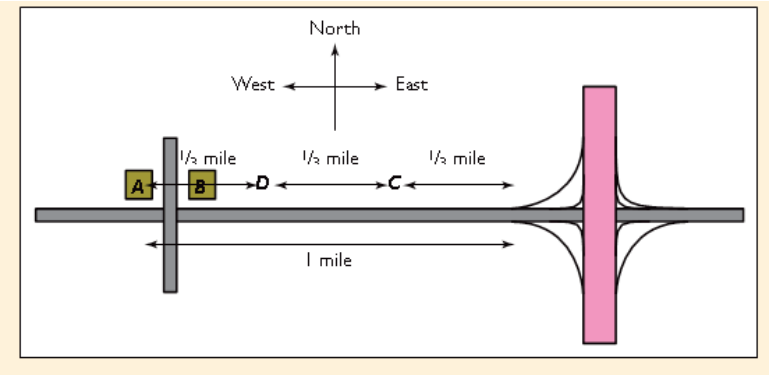
The result is a chaotic movement where profits boom and bust for both. This often happens in real life where competing chocolate companies One and Two might try to drop their price to steal market share, one might offer a sale price which moves more inventory and so they get new customers who like One's chocolate. Then the sale ends and One gains extra profits as some of the customers stay with One's Chocolate.

What usually happens though is that when One drops its prices Two follows suit soon after, this reduces the profits and customers that One gets from this strategy and so they jump back to the higher price more quickly followed by Two. This gives a chaotic boom and bust profit curve, when One is successful in catching Two off guard it get a chaotic profit spike where profits zoom up when they drop the price with the extra sales and then continue as the raise their prices and then they fall. When Two is faster to follow suit this affects

the boom and bust for One, if they start changing prices in a more complex battle then consumers will move more chaotically between the two kinds of chocolate.

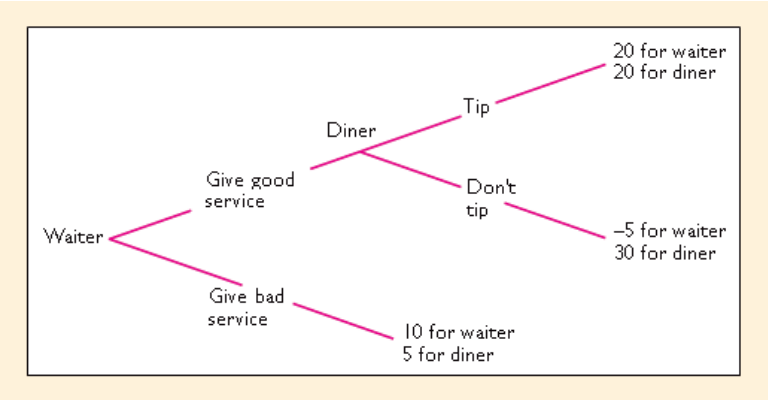
Tit for tat can have a disadvantage here if tat takes too long to follow tit, for example in a real estate boom those who get in early make more money than those who come in later. If Two is a slow and ponderous company then Tit for Tat will not make One cooperate on price more often. This is why in Iv-B the system is high on energy and short on time, those who can move more quickly and energetically make more profits.

When the system is more V-Bi it is low on energy and high on time so each chocolate company would have plenty of signs the other is getting ready to drop its prices. For example the supermarkets might each tell the other transparently when a sale is planned so they can follow suit. In this case tit for tat will likely cause both to follow a cooperative strategy.



In the diagram above this shows how tit for tat can fail when there is plenty of time for a response, shop A sets up first and then shop B sets up to take most of the business from shop A. A tit for tat strategy would be for shop A to move even closer to the shoppers near the intersection at D but shop B would have time on seeing this to move closer again to C. When they each have plenty of time to decide then there is a tendency to make V-Bi teams. However once a shop starts construction or signs a lease they have no time to change their plans and so the second shop does better than tit for tat by using speed and deception instead.

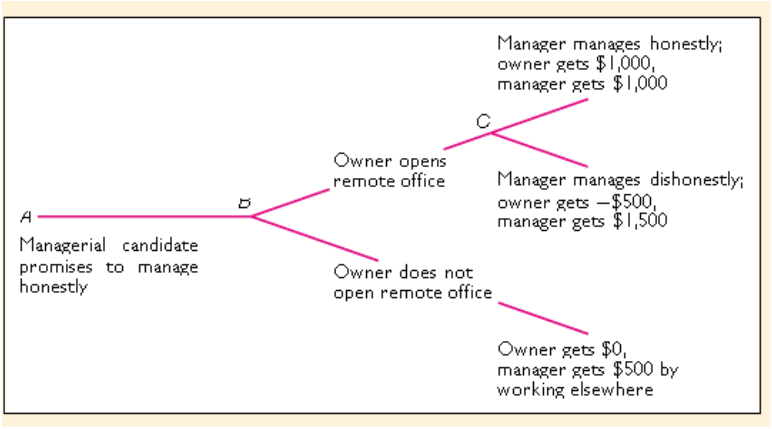
Commitment problems



In the diagram above tit for tat might not be the best strategy if there is no time for retaliation, a waiter has to decide whether to give good service in exchange for a better tip. However the waiter has no time to change his service if the diner later does not tip. If the diner comes there regularly then the responses can be highly chaotic, the diner realizes he often gets bad service with no tip and tries to sometimes leave a tip to maximize service with the minimum of tip money.

If instead there was a tip jar on the table where the diner placed some money through the course of the meal each could have plenty of time to modify their behavior if speed and deception were used, the most likely outcome would be a V-

Bi team where both cooperate for average service and an average tip. Another way is the diner can see how the service through the meal is progressing and they might discuss cooperation to move towards V-Bi teamwork for the tip.

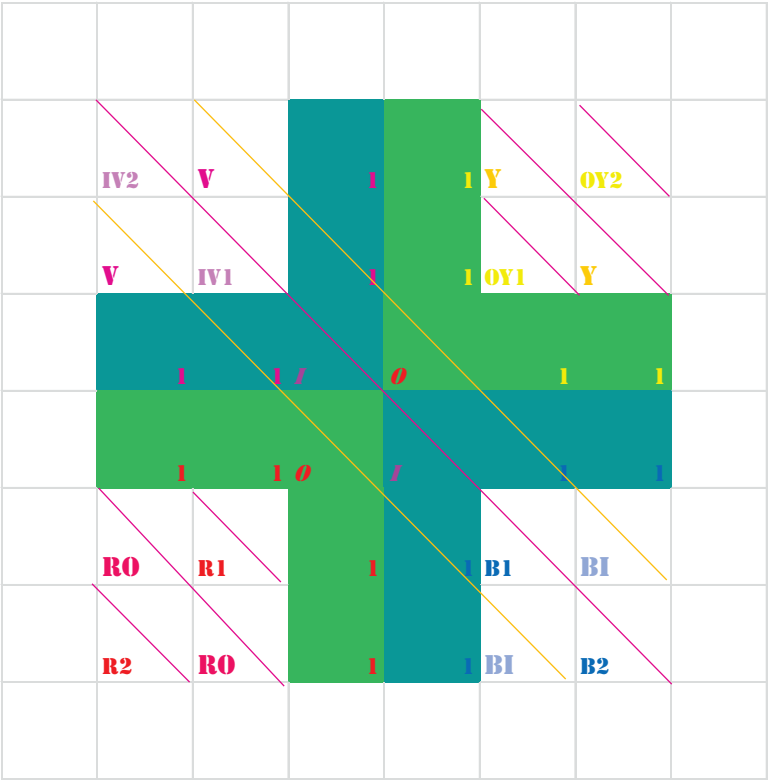


In the diagram above this is an Oy-R decision tree trying to minimize losses. The owner as Y tries to minimize the chance of their Oy manager robbing them, if instead the potential profits were much higher this would be an Iv-B decision tree where profits are maximized. The difference is usually how scarce resources are, people rarely turn to crime when there are abundant Gb resources to be had honestly. The shape of these trees are like Iv-B and Oy-R, for example the diagram above can

represent Iv agents in Abundia and has the same shape as a Biv tree in the plant kingdom.

Aperiomics matrix

A four cell matrix from the Aperiomics diamond graph can illustrate some principles such as a Nash Equilibrium and the Prisoner's Dilemma.

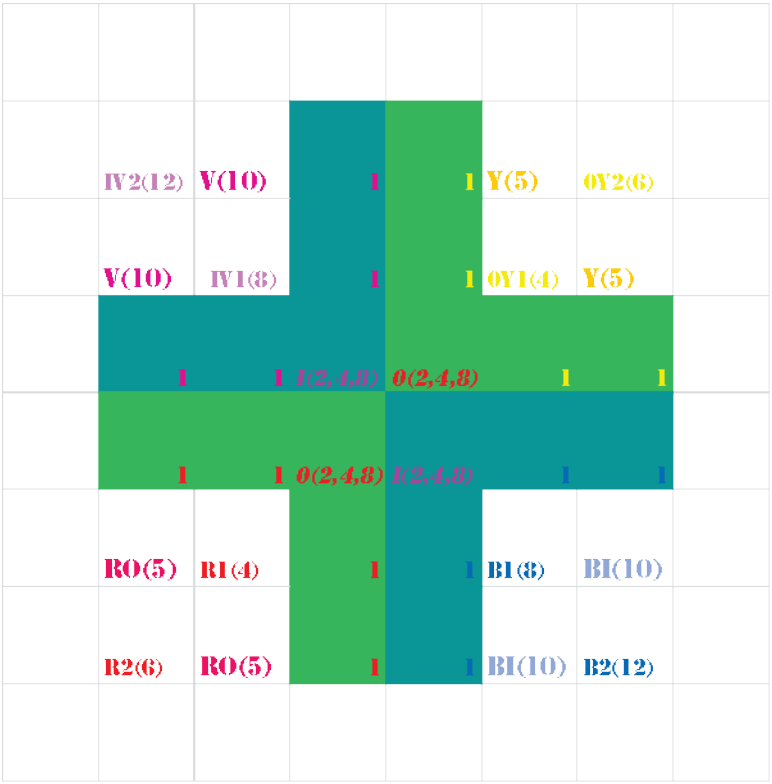


The diagram above shows twenty cells at the center of the Aperiomics diamond graph, four quadrants each with four cells and four in the center representing the I-O police. There are two chaotic people in each quadrant, B1 and B2 in the Bi-B lower right quadrant are competitive workers while the two people in Bi are Bi1 and Bi2 representing workers in a union.

Each has a diagonal line through its cell as used in game theory graphs though this will not be used in these examples. With other games different values can be added above or below this diagonal line. Each cell can then have a high or low value on either side of this diagonal line, however in this example the four workers in each quadrant are sufficient without needing this diagonal. The team colors such as Ro are represented by larger fonts to make them stand out, they also have their own correct color such as Y being yellow and Oy being orange-yellow.

In the center there are four cells representing the I-O police or referees of the game. These letters

are shown in Italics to represent police and justice systems. In the game matrix each I and O can have the value of 2,4, or 8 in this case representing dollars per hour.



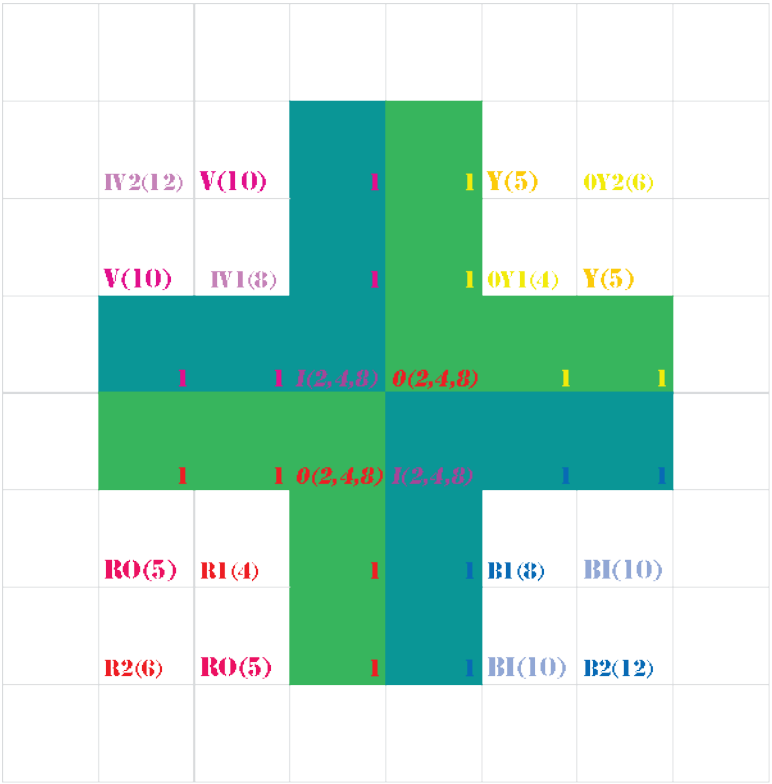
They can also represent high or low values, for example the two I cells are in the lower right and upper left as they are Gb colored. When the I police are strong and neutral these are both high

values of $8, when the I police are neutral and weak these are both low as $2. When the I police are biased towards Iv then the upper left value will be high and the lower right value will be low. When the I police are biased towards Bi the lower right value will be high and the upper left will be low. O is orange and I is indigo in color, similar values are used in the Roy part of the game as well as with the O police in the center cells.

Each chaotic worker such as Iv1 and Iv2 can make either $8 or $12 an hour in Biv. Each chaotic worker in Roy can earn either $4 or $6 an hour, for example R1 can make $4 and R2 $6. Generally this is the case in the game examples though sometimes the pay is reversed so R2 does better or both might miss out with no work that week

The random cooperative teams such as V or Bi are represented with the same price of $10 meaning each person in the team like a Bi union or V management makes the same money, this can vary randomly above or below this but both V and Bi try to maintain this average.

The same system works with the Roy cells, Y-Oy in the upper right quadrant and Ro-R in the lower left quadrant. When the O police are strong and neutral the values will be high in the upper right and lower left O cells in the center.



In the diagram above there are four cells from the Bi-B quadrant on the lower right in Abundia, B1 and B2 represent individual workers that compete

with each other while Bi is two members of a union.

In the diagram above there are also 4 cells from the V-Iv quadrant on the upper left, these are running an employment agency in Abundia, Iv1 and Iv2 are competitive agents working for the agency while V represents two team members of this business.

The Roy quadrants also comprise a game, they can be an employment agency in Scarcia where the objective is to minimize losses to survive. This can also be Abundia in recession where the Biv cells have to minimize losses instead of maximizing profits. For example in the GFC some parts of the more wealthy global economy collapsed into third world levels of debt, they then went from being like Biv Abundia to Roy Scarcia and so their game changed.

Each person in Abundia wants to maximize their profits from the Gb resources available, they have to decide whether to compete with each other or

try to cooperate like in a Prisoner's Dilemma. The Roy cells of Scarcia can represent a Prisoner's Dilemma with some extra options such as how strong and neutral the O police are, for example if the O police are weak then the prisoners might not feel as much pressure to confess. The Biv cells of Abundia are more like a Negotiator's Dilemma as each is person trying to get the best deal by maximizing profit, this can also depend on how strong the I civil justice system is.

In the Bi-B cells in the lower left quadrant they can play a dominating or dominated strategy as defined in economics, a dominating strategy is where a player decides on his best strategy regardless of what the other player does. The B workers B1 and B2 have to decide whether to undercut each other to try to get a job available from the V-Iv employment agency.

For example B1 might decide to always accept $8 immediately as this might give him more of a chance of working, this is like a game analyzing the minimum wage. The Bi unionists would prefer this minimum be $10 so they are not undercut by

other workers, they might strike to try to influence the I-O police to impose a minimum wage on the game.

There is one job available to an outside business, each week for one week's duration they will hire one V-Iv person as supervisor with one Bi-B worker while the others miss out for that week. Each week the job is finished and the client bids for a new pair to work the next week.

There are many cells like this competing and cooperating with each other, for example there might be thousands of employment agencies like these in both Abundia and Scarcia, also thousands of workers and unions. Generally the Abundian clients pay between $16 and $24 an hour depending on the work available and the offers they receive from the employment agencies.

The V-Iv employment agencies can then make good profits, they need to maximize these by working out which Bi and B workers to employ. The V managers can work as supervisors

themselves, otherwise they can use their Iv agents and receive a commission of a dollar an hour from their wage. Price is not the only factor, Bi union workers are often more competent and honest but sometimes cost more. B workers can sometimes be a bargain but if they do a bad job they give the Biv employment agency a bad name, they can also be bluffing as to their competence.

The Scarcian clients generally pay between $8 and $12 an hour. So when they offer $8 an hour this might be divided between Oy and R so each does not get a living wage of $5, they would have to minimize their costs to survive. Like with the V managers the Y managers can work as supervisors themselves or get a commission of 50c an hour from their agents. The Roy employment agencies then can just manage to survive, those that minimize losses might prosper over time while those that do not go out of business. This is like in third world economies where businesses often have trouble surviving.

It is just possible for a person in Scarcia to live on $4 an hour temporarily if they are very careful,

however they cannot buy enough food on this wage to cover the energy used in working. In Scarcia then sometimes workers and employers try to play the game to get higher wages to offset the times when they barely survive, in this situation those Ro-R workers that minimize losses can slowly get ahead. This is also like the real world in third world economies where those workers that save every penny might survive bad times later while others starve.

The work available depends on the amount of resources, in Abundia the Gb resources are more abundant so there is generally work to do, for example the workers might have to dig in a mine or harvest crops on a farm. They might also work in a factory refining goods such as in making jam from blueberries or strawberries. There are usually plenty of minerals to be mined, the weather is also very good for farming the fertile soil. In this situation it makes more sense to privatize resources into Gb, crime is low because it is easier and safer to find resources elsewhere rather than to steal them.

In Scarcia resources are scarce and so work is hard to find, when the clients find some minerals they might only then hire workers or when they find a patch of blueberries growing wild they might hire workers to harvest them then lay them off. Crime is high as many are starving for lack of work and food, berries and other foods are very rare and the rainfall is very sparse. Generally wages in Scarcia are between $4 and $6 an hour depending on conditions, however $5 an hour is the break-even point for survival.

In Abundia resources are cheap and plentiful so people only need $5 an hour to pay for rent and food. In Scarcia it costs about the same. This means that in Abundia everyone is making profits compared to their costs, the objective is to maximize them. In Scarcia everyone is trying to eke out a living, sometimes they make losses and so to survive they need to minimize them. For example if it costs $5 an hour to live in Scarcia and wages can be $4 an hour for extended periods then some workers will starve or move away.

Also in a recession Abundian wages in some areas might drop to $4 an hour so workers there might have to minimize losses like in Roy Scarcia to survive the recession, this happened in many parts of the global Biv economy after the GFC. In Scarcia sometimes there is a boom when it rains or sometimes more minerals are found, then wages might go up in some areas to around $8-12 an hour while clients offer $18 to $24 an hour like in Abundia. In Scarcia while the good times last they might try to maximize profits with these new Gb resources until the boom ends. So usually with increases in G resources the most fertile parts of Roy Scarcia might become Biv, with decreases in Gb resources parts of Biv Abundia might become Roy.

This model represents the real world in many ways. Booms and busts can cause wages to rise to where people maximize their profits with a Biv strategy, when there is a bust such as after the GFC many have to scrimp and save to minimize their losses such as in trying to avoid defaulting on their home loan. People can choose to cooperate in team or compete as individuals to maximize these profits or minimize these losses.

Scarcia and Abundia might try deregulate or regulate their economy to some degree by selecting different values for I and O, this can also represent bias in the police and courts by for example making one side of I or O a higher value than the other. This bias is also common in the real world. With extra resources the game can move from Roy to Biv, Scarcia can become more like Abundia maximizing profits. This can happen in the real world such as where a country finds oil or gas deposits. Abundia can also run out of resources and become Roy like Scarcia, this happens in the real world when economies use up their natural resources or have an extended drought.

The model can represent other businesses rather than just employment agencies, for example the Bi-B and V-Iv quadrants might represent complete companies where the Bi-B workers work on a wheat farm while the V-Iv section refines the wheat and makes bread. This is called vertical integration where some companies try to handle all parts of a product's development, for example

oil companies might drill for oil and also refine and sell fuel in their own gas stations.

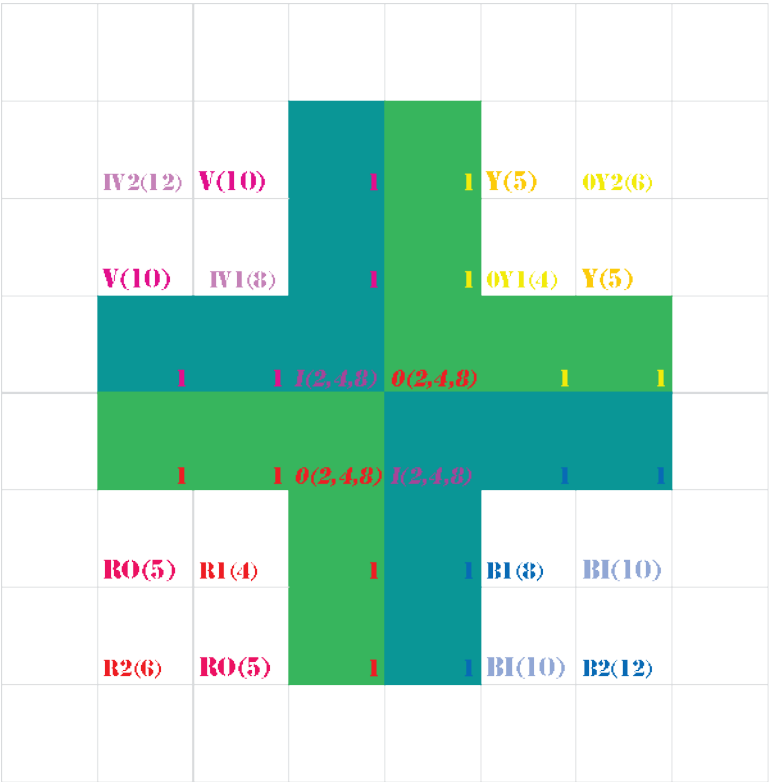
Sometimes the quadrants remain separated, for example the Bi-B quadrant might have B workers in farms and mines selling their goods to Bi cooperatives. It is common in the real world economy for B dairies to sell their milk to Bi cooperatives, that stabilizes the milk prices in the market. The V-Iv quadrant might buy berries harvested from the Bi-B quadrant, they refine and improve them by making jams and wines for sale.

The same businesses can also be found in the Ro-R and Y-Oy quadrants except that they have to minimize losses to survive, they also usually work on G public property. For example a state owned oil company in Scarcia might use Ro-R workers to drill for oil and Y-Oy management to refine and distribute it. In the Soviet Union in the 1930s many people worked on Ro-R collective farms while in Y-Oy Germany people worked in state owned industries such as making steel.

A similar privately owned oil company in Abundia might be similar to the one in Scarcia, it would drill on Gb privately owned land and own refineries and gas stations. This is also common in the global economy where many countries have state owned G oil companies, such as ARAMCO, that compete and cooperate with privately owned oil companies such as Shell and BP.

Generally the complete diamond graph is used to illustrate real world economies to allow more complex values to be graphed. Here a limited number of cells are used to show how Aperiomics also works with many games in game theory.

V-Bi

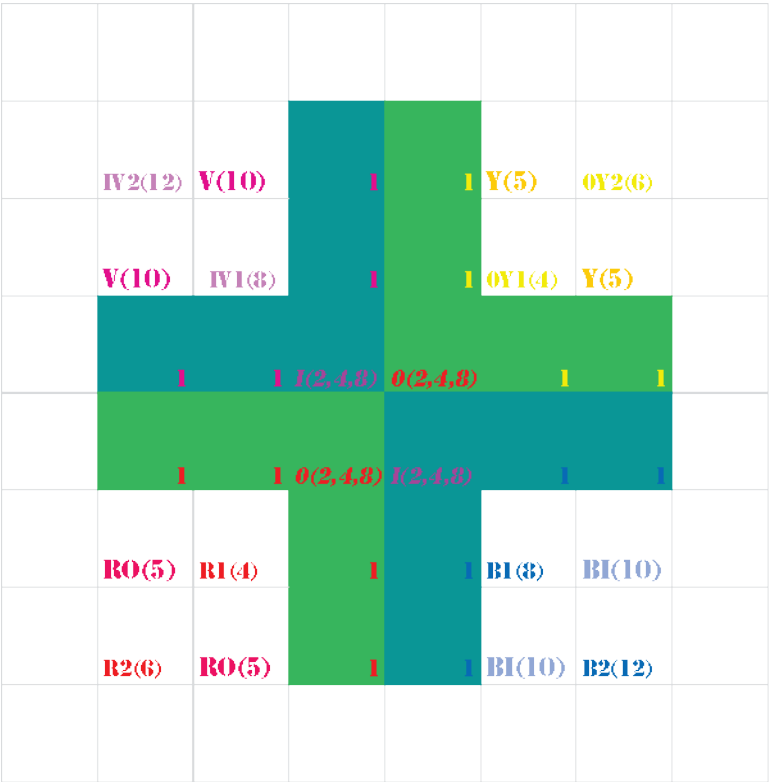


The Biv employment agency opens its doors and advertises for one worker, it will pair him with one person from the V team or an Iv agent for the week's work for a client at $16-24 an hour. At first they might offer $8 an hour for a worker, the Bi union workers usually hold out for $10 and rejects the offer or they might sometimes accept it on the understanding that their average wage will be $10. The V team usually want $10 themselves to work out in the field for the client but they are

more competent and reliable than some of their Iv agents, for example if one of the V team needs help or is sick the other will help or stand in for him.

Iv agents don’t help each other because if one does a bad job then the other is likely to make more money later as it makes their own labor more valuable by comparison. The Bi team is also usually more experienced and honest, if a Bi worker has problems the union will send another worker to help. A B worker will never help another B worker because when one B worker does a bad job the other will usually get more work and profits later.

The diagram below shows V getting $10 and Bi getting $10, $10 appears in brackets after each V manager and each Bi unionist.



The client pays between $18 and $24 an hour, there is a tendency here to normalize wages and profits with some random variations. Sometimes cooperation gets $10 each for the V management and Bi union, at other times the Biv employment agency might get an extra $4 an hour from the client which it saves for when it makes a loss of $2 when the client only pays $18.

If the client pays $24 more often the V team agency makes an extra profit but the union will sometimes demand part of this or go on strike. A more elastic union might also sometimes accept $8-9 an hour as long as the average remains at $10 so sometimes they need to receive $11-12, they might then have an insurance like strike fund where when workers get $11 they pay a dollar in and take a dollar out when they get $9.

Both V and Bi will also leave some extra money in the insurance fund for abnormal situations, for example the V team might leave in 50c an hour out of each deal in a strike fund so they can survive when the union strikes for more money. They could then survive a week-long strike over 40 weeks by tapping this fund without dipping into other savings The union might do the same, put 50c an hour out of each week worked into an insurance fund that pays the two workers a wage when on strike.

This normal V-Bi economy can create wage price inflation as in the real world, for example in the 1970s V businesses and Bi unions fought wars of

attrition with strikes and lockouts to maximize their profits. Because the situation is random profits tend to diffuse through the economy like heat in a liquid or gas, this then creates a generalized inflation where Bi workers everywhere and some B free riders all tend to get wage rises proportional to all price rises. V management fights for higher profits sometimes by locking out the Bi unions in wars of attrition, Iv businesses can free ride on this by raising their prices and only using nonunion labor.

If the Bi union demands higher wages the agency might even have to raise its price for a worker and supervisor to an average of $24 an hour so clients have to pay $20-28 an hour or go to another agency, this can be socially inefficient and create higher unemployment while this war of attrition tries to find an equilibrium between V profits and Bi wages. Often V and Bi begin to factor this into their war of attrition, for example they demand a larger percentage of the profits not only for living expenses but to fill a strike fund for more strikes later.

Wages and profits can also be sticky to the old normal prices, for example if Abundia becomes poorer then the Bi unions might prefer to strike rather than move to a new normal of $9 from $10 an hour. Also the V management might prefer to hire workers with free overtime to try to lower their pay rather than move to a profit of $9 an hour for themselves. This price stickiness can be elasticity rather than brittleness which occurs in Iv-B prices, changes in profits and wages are seen as deviations from the old normal to be resisted until their savings and insurance are nearly exhausted. For example the Bi union and V management might each use up 90% of their strike funds so the other goes to $9 an hour when the client will only pay $19 an hour.

Because this can happen a lot in a changing economy it can cause stagnation and rigidity because each change is met with resistance and a war of attrition using up savings. Some Bi unions in the 1970s used to grind an economy to a halt with nationwide strikes, companies like Ford and more recently Wal Mart would close their factories and shops in some cities rather than accept union labor.

The situation depends on what the employment agencies do, whether they use their V managers or Iv agents on the field and whether they use Bi unionists or B contract workers. So far the game just includes V management and Bi unionists. It also depends on whether these Bi unionists cooperate with each other in other businesses, for example there might be a thousand employment agencies with half of the Bi workers in various unions striking to support each other while the rest of the Bi workers form unaffiliated two man teams in their employment agency.

For example an agency might use two Bi workers that act as a team but don't affiliate with outside unions, their two workers might also be part of a nationwide Bi union that will go out on strike in other businesses if that agency fires their workers. If the Bi workers in the agency are not part of an external union and demand too much money the agency might boycott them find another pair of Bi workers who will work for less. If they use a larger Bi union's workers then they may be unable to sack their two Bi workers or the company will face retaliatory action. For example the clients might

face a boycott or black ban if they fire the Biv employment agency until their reinstate their Bi union employees.

This complicates the game but it often happens in the real world, there is little incentive for V and Bi to deviate from the center of the normal curve at $10 each so this can create a stagnant but stable economy where threats of a war of attrition can move prices and wages to a new normal as conditions change. For example if extra profitable resources are found then the clients might bid more for more workers, this increases the profits to the V managers and Bi unionists who threaten each other with a war of attrition with strikes and boycotts until a new normal apportionment of profits reaches an equilibrium.

The game can be far more complex even in V-Bi but this is just an overview, more will be explained in an upcoming book on Aperiomics Game Theory.

Y-Ro

The game is basically the same for the Roy employment agency except their objective is to minimize losses. Because the clients of Scarcia pays $8-12 an hour then the Y-Oy agency has to decide whether to use Ro gang labor at $5 an hour along with a Y mob manager also at $5 an hour, or they might use their Oy agents at $4-6 an hour with R workers also at $4-6 an hour.

Instead of Bi unions in Scarcia there are Ro gangs of workers, they are also generally more experienced and honest than R workers. The employment agencies are usually run by mafia like mobs who work as teams, they are also usually more competent and honest than Oy agents.

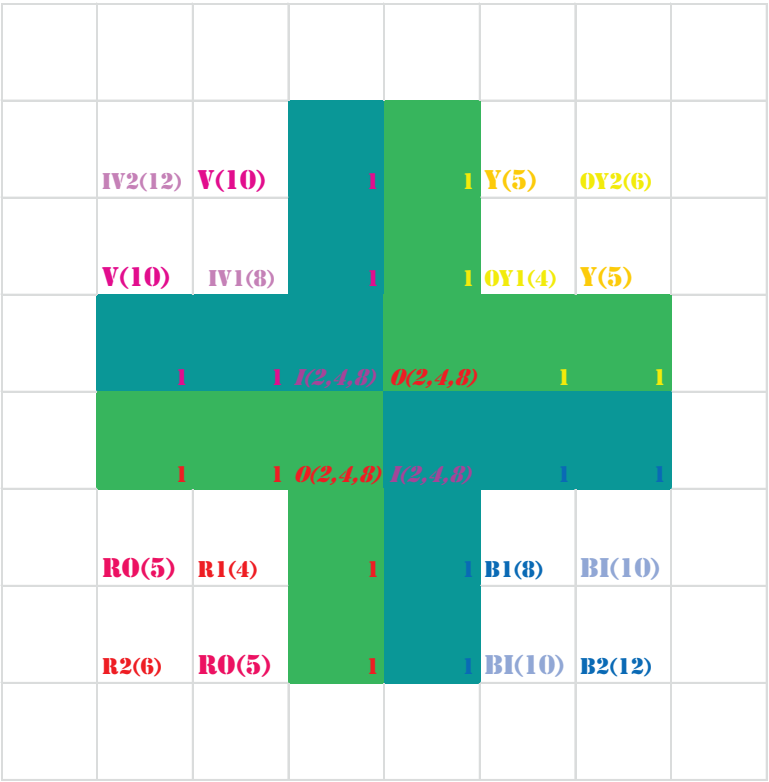
This is also common in the real world where Roy businesses might be associated with organized crime or affiliated with war lords. For example businesses might have to pay protection to a Y mafia and sometimes they are taken over if they cannot pay. This was also seen in the breakup of the Soviet Union where Y Thieves By Law used the power vacuum to corruptly buy state owned businesses cheaply as well as to kill the managers

of successful V-Iv private businesses and take them over.

R workers might sometimes band together as Ro gangs, for example in US ghettoes many workers might have Ro gang affiliations. A gang then might dominate the R workers available for temporary hire like a Bi union does with B contractors, the Ro gangs can also have chapters and control different territories much like Bi union control industries and different cities. For example there are nationwide gangs in the US that control the drug trade in their Ro neighborhoods, they also get a cut of any business done there such as car washing, prostitution, house break ins, etc.

In the diagram below the Roy employment agency gets a job for $10 an hour, they provide one Y manager and one Ro worker. As can be seen the cells in the game have values in them, it can then be seen how the complete game works as each color interaction is explained. V-Bi is an overtone of Y-Ro which means they are very similar, however the game also shows the difficulties in changing from a Roy economy to Biv or vice versa.

For example in Y-Ro it is more important to minimize costs and losses than to maximize profits as in V-Bi, this is because profits are much more rare than losses. However as profits improve with the discovery of more resources it makes sense to convert to Gb private property from G public property, also to try to maximize profits instead. This is a difficult task as was seen in trying to convert Roy communist economies to Biv capitalism with the breakup of the Soviet union.



To illustrate the similarities between V-Bi and Y-Ro I will use approximately the same words from the V-Bi section with only a few changes of prices and minimizing losses instead of maximizing profits.

The client pays between $4 and $6 an hour, there is a tendency here to normalize wages and profits with some random variations. Sometimes

cooperation gets $5 each for the Y mob management and Ro gang, at other times the Roy employment agency might get an extra $1 an hour which it saves for when it makes a loss of $1 when the client only pays $4.

If the client pays $6 more often the V team agency minimizes more of its costs and losses but the Ro gang will sometimes demand part of this or go on strike. Both sides need to minimize their losses as a priority because they can starve if wages stay at $4 an hour for long enough. A more elastic gang strategy might sometimes accept $4 an hour as long as the average remains at $5, they might then have an insurance like strike fund where when workers get $6 they pay a dollar in and take a dollar out when they get $4.

Both Y and Ro will also leave some extra money in the insurance fund for abnormal situations, for example the Y mob might leave in 50c an hour out of each deal in a strike fund so they can survive when the Ro gang strikes for more money. This is a priority rather than profit maximization because in a war of attrition some might starve or have to

move elsewhere. The Ro gang might do the same, put 50c an hour out of each week worked into an insurance fund that pays the two members of the Ro gang a wage when on strike.

This normal Y-Ro economy can create wage price inflation as in the real world, for example in the 1970s many European economies had state owned Y businesses and Ro communist affiliated unions fought wars of attrition with strikes and lockouts to minimize their costs and losses. Often when V-Bi businesses lost this war they were nationalized as G, for example British Leyland in Britain and the British coal mines.

Because the situation is random losses tend to diffuse through the economy like cold in a liquid or gas, this then creates a generalized deflation where Ro workers everywhere and some R free riders all tend to minimize wage reductions proportional to the general deflation. For example a Biv economy becomes poorer as V management profits fall, companies might then become more like Y minimizing their costs by shedding workers

and excess equipment like trees shedding leaves and branches.

Bi unions also have to shed some members and can often become more Ro gang like with communist inspired demonstrations and violent rioting, usually those less senior in the union go first to reduce free riding by new B members, or they might accept lower wages though this can be highly sticky or elastic. Y management sometimes fights to minimize costs and losses sometimes by locking out the Ro gangs in wars of attrition, Oy businesses can often free ride on this by lowering their prices and only using non gang labor.

If the Ro gang demands that wages don't decrease from an average of $5 an hour the agency might have to keep its price for a worker and supervisor to an average of $10 an hour in a deflation so clients have to continue to pay this or go to another agency, this can be socially inefficient and create higher unemployment and bankruptcies while this war of attrition tries to find an equilibrium between Y cost cutting and Ro resistance to lower wages.

Wages and profits can then be sticky or elastic to the old normal, for example if Scarcia becomes richer then the Ro gangs might prefer to strike rather than miss out on a new normal of $6 rather than $5 an hour. Also the Y management might prefer to hire workers with free overtime to try to hold down their pay rather than stay at a profit of $5 an hour for themselves. This price stickiness can then be elasticity like a rubber band fixed at $5 an hour, changes in profits and wages are seen as deviations from the old normal to be resisted until their savings and insurance are nearly exhausted. For example the Ro gang and Y mob management might each use up 90% of their strike funds to make only the other goes to $4 an hour when the client will only pay $9 an hour.

Because this elasticity can happen a lot in a changing economy it can cause stagnation and a tendency to snap back to the old normal price because each change is met with resistance and a war of attrition using up savings. Some Bi unions in the 1980s used to grind an economy to a halt with nationwide strikes so as to not miss out on extra profits made by some companies, for

example in the US union labor did well out of GM and Ford but then had to give much of this up after the GFC.

The situation then depends on what employment agencies do, whether they use their Y managers or Oy agents on the field and whether they use Ro gang members or R contract workers. So far the game just includes Y mob management and Ro gang members. It also depends on whether these Ro gang members cooperate with each other in other businesses, for example there might be a thousand employment agencies with half of the Ro gang members in various chapters striking to support each other while the rest form their own two man teams in their agency.

For example an agency might use two Ro workers that act as a team but don't affiliate with outside unions, their two workers might also be part of a nationwide Ro gang that will go out on strike in other businesses if that agency fires their workers. If the Ro gang members in the agency are not part of an external gang and demand too much money the agency might find another pair of Ro gang

members who will forgo pay increases. If they use a larger Ro gang's workers then they may be unable to sack their two Ro workers or the company will face retaliatory action. For example the clients might face a boycott or black ban if they hire the Roy employment agency until their reinstate their Ro gang employees.

The situation is usually more complex than this because in moving from a Roy to a Biv economy or vice versa chaos becomes involved in Iv-B and Oy-R interactions. This was covered more in my book Crisis Aperiomics where it is shown how the transitions from Roy to Biv or vice versa can be extremely difficult to do efficiently, it is like a Biv forest trying to grow into a Roy desert or grasslands.

Often the forest wastes resources such as humus and water on land which is not fertile enough to support a forest, this is seen on the edge of most forests where fallen trees rot without returning nutrients to the other trees and lost humus from leaves blows away. External aid from other countries can be like adding fertilizer or water but

this often only works while the help is given, then the new Biv forest areas can collapse with those Gb resources wasted. The reclaimed land can then dissipate like this humus blowing away, in the same way where Roy people dismantle or loot the Biv infrastructure the aid is wasted.

This is like Biv industries ending up as rusted out and abandoned factories while their worker's experience and savings are lost through disuse. In this case there is a random loss of resources as some factories average out a loss and close down, others might survive by averaging losses against profits in some years. Workers might also average out a living wage by part time or seasonal work to balance welfare checks.

However there is also chaos in the situation, a factory might collapse because of not enough capital to fix it properly such as the roof falling in. The cost of fixing the factory after this tipping point was reached may not be economical, this is like a tree falling over rather than slowly withering. Workers might have to move away

because they cannot survive off season, then they don’t return for the seasonal jobs.

As Abundia becomes poorer V companies not only have wars of attrition with Bi unions but they can reach a tipping point and collapse to a floor because of excessive leverage. This happened with GM because of the GFC in the US, instead of the Bi car unions being able to slowly adapt to lower wages with some resistance the company quickly collapsed because of high debts and a tipping point of lower car sales because of the chaotic oil shock. There were many calls for GM to be broken up or sold off to foreign car manufacturers rather than loaning them money for this V-Bi process of cooperation to have time to work, this can be highly inefficient like letting a damaged tree fall rather than propping it up until it can heal itself.

As Scarcia becomes more wealthy some Oy-R companies will grow exponentially becoming Iv-B and take market share from Y-Ro businesses sending them broke, this was seen in Russia after Ro-R communism collapsed after an extended

period of stagnation. State owned businesses were often more inefficient than new Iv-B businesses with modern equipment and Western innovations, instead of an elastic transition to a new V-Bi normal business often collapsed wastefully. This is like where a Biv forest is growing into a Roy grasslands, the grass and other plants adapted to low rainfall and poor soil might collapse inefficiently with their humus blown away rather than be used by the growing Biv forest.

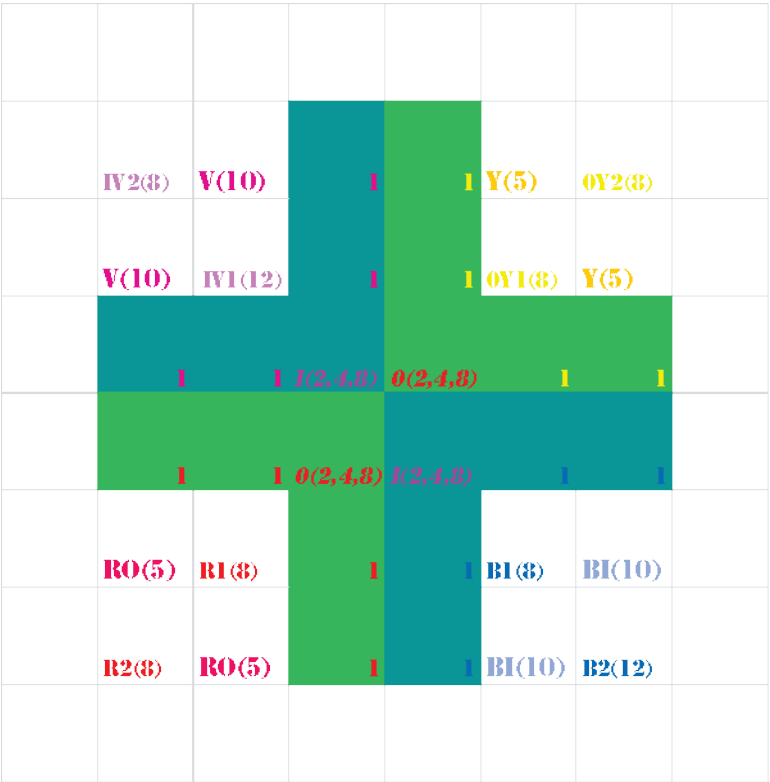
Iv-B

An Iv-B economy is highly chaotic, instead of people forming cooperative teams like in V-Bi and Y-Ro they compete deceptively with each other. As explained earlier in the book the Iv-B and V-Bi economies interact with each other, binding together in a cohesive whole when the I civil justice system is strong and neutral but separating inefficiently as it weakens or becomes biased.

In the diagram below any cell can interact in a game with any other though not all are described

in this overview, for example an Oy employment agent might move to Abundia and become an Iv agent or even a Bi unionist, however he must change his behavior according to the rules of the color. A person might even change to different color rules hundreds of time in his life with different color rules in his job, friendships, politics, etc.

For example with the Oy agent moving to become a Bi unionist he should aim to maximize profits randomly rather than minimize costs and losses chaotically, he should use an open and honest strategy rather than hidden and deceptive tactics. The rules of the game then need not change when people and organizations change color as long as they follow the new rules, if they don’t change then they are still playing the old game and it is the same as if they did not move. Often people experience problems with these changes, for example the old habits of being an Oy agent or con man might die hard in becoming a more honest Bi unionist. He then experiences chaos versus randomness inside himself for a time.



In this Iv-B economy the V team mainly uses its Iv agents collecting a dollar an hour commission, it might later grow the company this way by having a hundred Iv agents working for it though this increases the risk of the principal agent problem occurring with so many deceptive agents. In a later section V will also hire some B workers to work directly with, this gives a random versus chaotic interaction. Bi unionists will later be shown to work for Iv agents and all of these will

be overtones for the same interactions in Roy Scarcia.

The client pays $16-24 an hour and so if the Iv agents can only get B workers for their $12 an hour then they cannot maximize their profits, for example at an average total of $20 an hour the B worker gets $12, and the Iv agent gets $7.50 with 50c for V. Conversely if the B workers can only find Iv agents that work for $12 then they must accept $8 if the client offers $20 or not work. Consequently there is a competition on both sides to get the cheapest B worker or Iv agent to work with.

The situation can resemble a game of poker where the Iv agents and B workers both bluff and deceive to maximize their profits. For example the Iv1 agent might know the Iv2 agent has secured the B1 worker for $8 so Iv2 makes $12. The Iv1 agent then is better off bluffing the B2 worker that the B1 worker is going to accept $8 so he must also accept $8 before him, if the B2 worker finds out the B1 worker is only likely to get $8 then he can himself bluff and demand $12 and

that he does not need to work that week for money. He could even bluff and say that B1 is actually holding out for $12 and with B1 being dishonest he could not be trusted to say what he really got.

The situation can be like a game of poker where everyone has enough money and so they are not afraid to bid too much and be ejected from the game early before they have a chance at making more money. Iv-B players can then afford to take chances in bluffing to maximize profits, if they had little capital then they would as Oy-R have to minimize losses in their bluffing.

Once one pair has made a deal then usually the client only wants one worker and supervisor for the week so there is some time pressure to make a deal or decide to take a week off with a bluff. Each pair of negotiators in their negotiator's dilemma must try to make a deal while sometimes knowing the other pending deal's values assuming that knowledge is not itself a deception to trick them into a wrong decision. This is like poker where players sometimes not only bluff with their

bids but act as if they have a hand, the others must decide if this is a tell or a deception.

If B2 knows B1 might only get $8 from Iv2 then he is in a stronger situation because Iv1 has to worry about falling too far behind Iv2 by taking a week off. For example if one Iv agent takes too many weeks off compared to the other and otherwise gets about the same average profit maximization then this might not be a worthwhile economic profit in the long run compared to other jobs.

Each bluffer then has to carefully weigh not just the potential gains or losses but whether there is a momentum where one is pulling ahead of the other. If the B1 worker falls behind more and more then over time B2 will have more money to bluff with and might even drop his wages to drive B1 away to a better paying job and then B1 can raise his wages to a minimum of $10 as the only worker left.

The game then has secret information on both sides, because everyone is so deceptive neither

knows whether the others are better off taking a week off as a show of strength rather than taking a lower profit that week. For example if a worker gets three weeks of work at $12 he makes $36 compared to $24 at $8 an hour. He can then gain $12 over 3 weeks by maximizing profits only if he can make an Iv agent minimize his profits by $12.

Occasionally missing a week's work at $8 or $12 can then be a good bluff every few weeks, in 4 weeks the difference in wages is $48 as a maximum and $32 as a minimum, getting $36 for 3 weeks by bluffing to get $12 then missing a week from a failed bluff is then better than never missing a week without bluffing and always getting $8 for a total of $32 for the month.

The Iv agent has the same problem, he should also sometimes bluff to the point of not hiring anyone that week. Because the B workers don't cooperate with each other they would not tell each other when they really worked, it is in their best interests to hide this or even deceive the other. So B1 might not be working but dressing up and pretending to go to work so as not to alert B2 who

then might accept $8 next week because he thinks B1 will work again for $8, also B1 might trick B2 into thinking B1 got a job so B1 stops negotiating and in the meantime B1 keeps trying for $12.

The more a worker or agent can be anticipated the less profit they make because in chaos a pattern anticipated can often be refuted. For example the game rock paper scissors works because the selections are random, if one player can see what the other will do or detects a pattern he can win more often. Tit for tat does not work in Iv-B because both are deceiving each other, tit for tat depends on both sides believing the response is real.

If the B1 worker threatens to take $8 more often to ruin the B2's tactic of bluffing to take a week off then this is only credible if B2 knows B1 is doing this and not just dressing up to pretend to go to work. This could be described as tit for tit where repercussions can be the opposite of what the players intend because of the economic problem of credible threats and promises. When they are playing this the Iv agents might also be

trying to work out if both workers are really idle or one is already working. For example if B1 bluffs he will take $8 more often then B2 can't tell this to Iv1 or he will go to B1 more often. If B1 is bluffing though then Iv1 will visit B1 more but not be more successful at getting a worker for $8.

Generally the result is a move from boom to bust because those that move first have an advantage. For example B1 gets up early and goes to Iv1 offering himself for $12, often Iv1 will take this deal rather than miss out if B2 often wants $12 already or he might be bluffing and taking a week off. So he is better off taking this offer of $12 sometimes, at other times he might bluff himself by offering only $8 and taking a chance of having to take a week off himself.

So B1 has a second chance at $12, he goes to Iv2 and says Iv1 will already give him $8 so Iv2 should take him for $12 rather than potentially lose a week from bluffing or at least give him $8. If Iv2 only ever offers B1 $8 in this situation then B1 retaliates by sometimes going back to work for Iv1

instead. By being first then B1 should get more than $8 an hour overall.

Whoever then is first has two chances to get $12, if both of B always arrive for work at the same time then they might average out at $10 a week each and decide after some tit for tat to avoid the game playing by joining a Bi union. The market will then increase in momentum as B1 and B2 speed up trying to be first until they reach the ceiling, for example they might crash their cars in getting to work so at some point this increasing speed for an advantage will hurt one or both. However the one that profited most from being faster will have more money to fix his car so it still makes sense to speed up until there is a crash, this is why an economy has booms followed by a crash.

The Iv agents have the same incentive, the one who gets to work first might be able to see both B workers before deciding, he then has two chances to get one of them to work for $8 so he gets $12 more often. So both the Iv agents also have to move with increasing speed to get to work first

towards the ceiling, this crash might cause them both to get nervous breakdowns from the stress of increasingly fast decisions.

However again the Iv agent with the most profits can spend the most on medicine to recover after the crash, it makes sense then to keep accelerating towards the crash. This is often seen in nature, for example R locusts survive better by overbreeding to grab all the food they can though it guarantees starvation for some later. Also seeds will grow quickly even though most will die from running out of nutrients because of this, the winner however gets to overshadow the losers with a permanent victory.

After this crash then some of the Iv agents and B workers lose profits recovering, some will still profit more overall from the crash while others will lose some profit from it. This can trigger a race to the floor where while recovering all try to do some work, however they must balance recovering to full health while making more money and delaying recovery while getting some work.

Each will then watch the other looking for signs the other is slowing their recovery by working, for example B1 sees B2 is working too much to recover quickly so B1 takes a holiday and ends up making more for the year by recovering first because he gets more of the work available. B2 might know this and only pretends to work but really goes out and relaxes at the beach instead, he might then see B1 is trying to work just less than B2 to recover slightly quicker and so B1 works even less to recover faster in this race to the floor. The client would then experience a boom and bust in workers it can find, first there are plenty competing with each other and then in the crash they are scarce as the workers are recovering from injuries.

This happened after the GFC where companies tried to recover by saving money by shedding workers and replacing inefficient equipment, the equivalent of the workers and agents recuperating. However the companies also had to watch each other, if one of them tried to expand in the recession to grab market share then others might have to try to do the same even when

severely weakened causing some more crashes near the floor. This also happened with the housing crash in the US where speculators had to balance waiting for the floor in prices with missing out if a boom suddenly began and other speculators grabbed all the bargains.

This is like B1 deciding to try to grab more work while B2 is sick by being able to get $12 an hour all the time, B2 might see this and need to do some work to keep B1's wages down or otherwise B1 will have a financial advantage for medicine or car repairs in the next boom and crash so both can be working while sick and have a permanent malaise like the European economy after the GFC. Once the floor is definitely reached both B1 and B2 realize they need to keep increasing their work as recovery has reached a limit on how much profit it can provide, the economy then has bottomed out and starts the next boom cycle.

If the B workers instead decide to be honest with each other in tit for tat then they might be better off joining a union because their Iv-B system is inefficiently losing a week's worth of work a

month to bluff with, however there may also be plenty of bluffs and deception in this tit for tat game. Without any I police to enforce agreements each B worker is free to renege on a tit for tat deal at any time.

However the Bi union can also be inefficient, they might for example strike one week out of a month to try to get $12 an hour all the time instead of $10 because this is like a week's holiday each month for only $36-40=4 if it works. This is not a bluff but a war of attrition, for example while the V-Bi deals are normally at $10 an hour sometimes they elastically deviate up and down according to what the client pays.

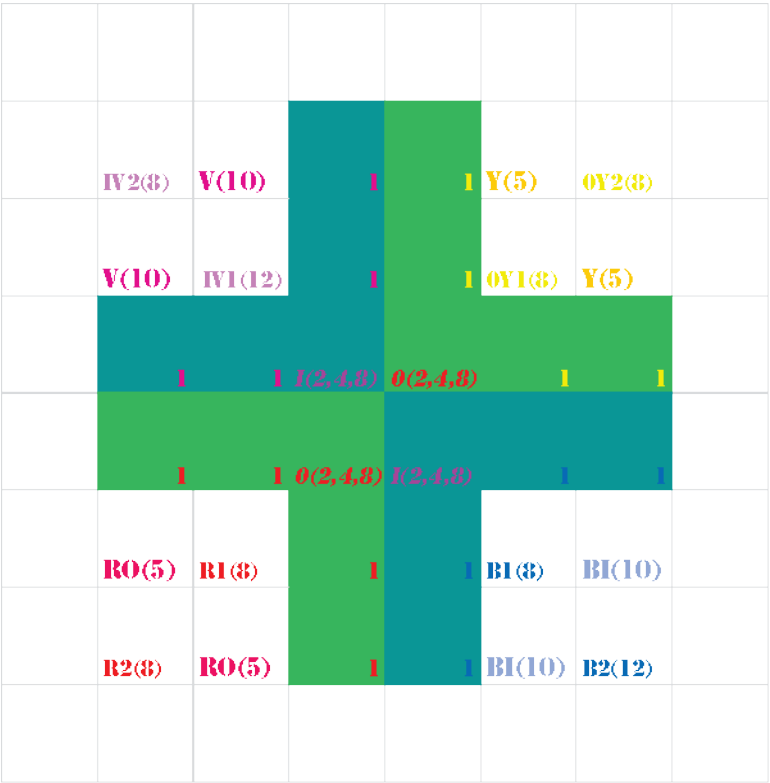
Even if this number is known transparently to both sides the Bi union as well as the V management can profit by sometimes threatening to take more than 50%, if they don't then the other side might sense weakness and use the same threats anyway. For example if the union is weak it might agree to only $8 an hour for $32 a month the same as one of the B workers so workers would want to leave the union, if strong

however it might get $12 for a difference of $48-32 or $16 a month and have B workers wanting to join the union.

It makes sense then for the Bi union as well as the V management to sometimes strike because if they win more people will come over to their side. Both are then socially inefficient because in both V-Bi and Iv-B workers and management or their agents can be idle instead of producing goods and services for the economy.

To illustrate that the Iv-B game is an overtone of Oy-R I will repeat this section in the next with small alterations in words and numbers.

Oy-R



In this Oy-R economy the Y team mainly uses its Oy agents though in the complete game a Y manager would sometimes still work personally with Ro gang members. Y would also hire some R workers in the full game at times with a random versus chaotic interaction. Ro gang members will also work for Oy agents, these other interactions are explained later.

The client pays $8-12 for an average of $10 and so if the Oy agents can only get R workers for $6 an hour then they often cannot maximize their profits by making more than $4 for themselves. Conversely if the R workers can only find Oy agents that work for $6 then they must accept $4 or not work. Because $4 is not survivable in the long run both Oy and R need to minimize their losses to survive, both can survive if the losses are minimized with $5 an hour.

However with too many periods at $4 an hour Oy agents and R workers must leave or starve, they can then maximize their wages but the first priority for this must be to minimize these losses as excessive profits at one time are of no use if they cause starvation later. Consequently there is a competition on both sides to get the cheapest R workers and Oy agents just as in Iv-B there is a similar competition to maximize profits.

The situation can resemble a game of poker where the Oy agents and R workers both bluff and deceive to minimize their losses, it can be like a game where no one has much money and so they

are afraid to bid too much and be ejected from the game early before they have a chance at making more money.

For example the Oy1 agent might know the Oy2 agent has nearly secured the R2 worker for $4 so Oy2 would make $6. The Oy1 agent then is better off bluffing the R2 worker that the R1 worker is going to take $4 so R2 must accept $4 first, if the R2 worker finds out the R1 worker is nearly getting $6 then he can himself bluff and demand $6 and that he does not need to work that week for money. This is because each worker and agent is trying to keep their averages up, if one gets a better than average deal that week assuming that knowledge is not itself a deception to trick them into a wrong decision then the other knows he is less likely to get a better than average deal that week and might sometimes then settle for the lower money.

Once one pair has nearly made a deal however the other two must either make a deal if they know the other deal's values, if R2 knows R1 usually gets $4 and Oy2 gets $6 then R2 is in a

stronger situation because Oy1 has to worry about falling too far behind Oy2 by taking a week off. For example if one Oy agent takes too many weeks off compared to the other and otherwise gets about the same average loss minimization then this might not be survivable in the long run.

So if one Iv agent is getting $6 less often then he must take fewer weeks off or fall behind. Each bluffer then has to carefully weigh not just the potential gains or losses but whether there is a momentum where one is pulling ahead of the other. If the R1 worker falls behind more and more then over time R2 will have more money to bluff with and might even drop his wages to drive R1 away to avoid starvation and then R1 can raise his wages to a minimum of $5 as the only worker left.

The Oy-R game then has secret information on both sides, because all are so deceptive no one knows whether the others are better off taking a week off rather than taking a lower profit that week. For example if a worker gets 3 weeks of work at $6 he makes $18 compared to $4 giving

$12 over 3 weeks. He can then gain $6 over 3 weeks by minimizing losses only if he can make an Oy agent maximize his costs or losses by $6 in those 3 weeks.

Occasionally missing a week's work at $4 or $6 can then be a good bluff every few weeks, in 4 weeks the difference in wages is $24 as a maximum and $16 as a minimum with a difference of $8, getting $18 for 3 weeks by bluffing and missing a week is then better than never missing a week without bluffing and always getting $4 for a total of $16 for the month.

The Oy agent has the same problem, he should also sometimes bluff to the point of not hiring anyone that week. Because the R workers don't cooperate with each other they would not tell each other when they worked, it is in their best interests to hide this or even deceive the other. So R1 might not be working but dressing up and pretending to go to work so as not to alert R2 who then might accept $4 next time because he thinks R1 got the $6 that week.

The more a worker or agent can be anticipated the more losses they make because in chaos a pattern anticipated can often be refuted. For example the game rock paper scissors works because the selection of one of these in the nontransitive circle is random, if one player can see what the other will do or detects a pattern he can win more often. Tit for tat does not work in Oy-R because both are deceiving each other, tit for tat depends on both sides believing the response is real.

If the R1 worker threatens to take $4 more often to ruin the R2's tactic of bluffing to take a week off then this is only credible if R2 knows R1 is doing this and not just dressing up to pretend to go to work. This could be described as tit for tit where repercussions can be the opposite of what the players intend. When they are playing this the Oy agents might also be trying to work out if both workers are idle or just one. For example if R1 bluffs that he will take $4 more often then R2 can't tell this to Oy1 or he will go to R1 more often. If R1 is bluffing though then Oy1 will visit R1 more but not be more successful at getting a worker for $4.

Generally the result is a move from boom to bust because those that move first have an advantage in minimizing their costs or losses, this game is the early bird gets the worm. For example R1 gets up early and goes to Oy1 offering himself for $6, often Oy1 will take this deal rather than miss out if R2 is going to want $6 already or is bluffing and taking a week off. So he is better off taking this offer of $6 sometimes, at other times he might bluff himself by offering only $4 and taking a chance of having to take a week off himself. So R1 has a second chance at $6, he goes to Oy2 and says Oy1 will already give him $4 so Oy2 should take him for $6 rather than potentially lose a week from bluffing or at least give him $4.

Whoever then is first has two chances to get $6, if both of R always arrive for work at the same time then they might average out at $5 a week each and decide to avoid the game playing by joining a Ro gang. The market will then increase in momentum as R1 and R2 speed up trying to be first until they reach the ceiling, for example they might crash their cars in getting to work so at some point this increasing speed for an advantage

will hurt one or both. However the one that profited most from being faster will have minimized his costs or losses with more money to fix his car so it still makes sense to speed up until there is a crash, this is why an economy has booms followed by a crash.

The Oy agents have the same incentive, the one who gets to work first might be able to see both R workers before deciding, he then has two chances to get one of them to work for $4 so he gets $6. So both the Oy agents also have to move with increasing speed towards the ceiling, they might reach nervous breakdowns from the stress of increasingly fast decisions. However again the Oy agent with the most profits can spend the most on medicine to recover after the crash.

After this crash then some of the Oy agents and R workers make losses recovering, some will still lose less overall from the crash while others will lose less at some stages from it. This can trigger a race to the floor where while recovering all try to do some work, however they must balance

recovering to full health while losing less money and delaying recovery while getting some work.

Each will then watch the other looking for signs the other is slowing their recovery by working, for example R1 sees R2 is working too much to recover quickly so R1 takes a holiday and ends up making more for the year by recovering first. R2 might know this and only pretends to work but really goes out and relaxes at the beach instead, he might then see R1 is trying to work just less than R2 to recover slightly quicker and so R1 works even less to recover faster in this race to the floor.

This happened after the GFC where companies tried to recover by saving money by shedding workers and replacing inefficient equipment, the equivalent of the workers and agents recuperating. However the companies also had to watch each other, if one of them tried to expand in the recession to grab market share then others might have to try to do the same even when severely weakened.

This is like R1 deciding to try to grab more work while R2 is sick by being able to get $6 an hour all the time, R2 might see this and need to do some work to keep R1's wages down or otherwise R1 will have a financial advantage for medicine or car repairs in the next boom and crash. Once the floor is definitely reached both R1 and R2 realize they need to keep increasing their work as recovery has reached a limit on how much in costs it can minimize, the economy then has bottomed out and starts the next boom cycle.

If the R workers decide to be honest with each other in tit for tat then they might be better off joining a gang because their Oy-R system is inefficiently losing a week's worth of work a month to bluff with, if they can't minimize these losses then some might not survive.

However the Ro gang can also be inefficient, they might for example strike one week out of a month to try to get $6 an hour all the time instead of $5. This is not a bluff but a war of attrition, for example while the Oy-R deals are normally at $5 an hour sometimes they deviate up and down

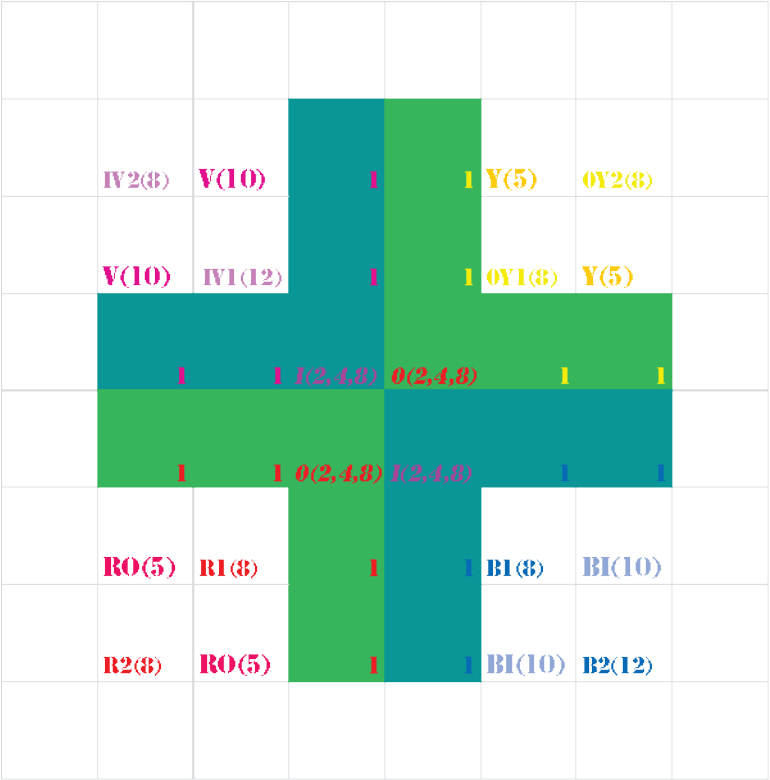
according to what the client pays. Even if this number is known transparently to both sides the Ro gang as well as the Y mob management can profit by sometimes threatening to take more than 50%, if they don't then the other side might sense weakness and do it anyway. They need to do this to minimize other losses, if they don't take every chance they might not survive when the luck goes against them later.

For example if the Ro gang is weak it might agree to only $4 an hour for $16 a month the same as one of the R workers, if strong however it might get $6 for a difference of $24-16 or $8 a month. It makes sense then for the Ro gang as well as the Y mob management to sometimes strike. Both are then socially efficient because in both Y-Ro and Oy-R workers and management or their agents can be idle as a strategy instead of continuously producing goods and services for the economy.

V-B

In the diagram below V gets an average of $10 while B can get $8 or $12 an hour. This is an

unstable interaction however because each side has different ways to play the game.



For example V is a team and so they will tend to stand together while the B workers try to play them off against each other in a divide and conquer strategy. B1 offers V1 $11 out of the total of $20 the client is offering saying V1 can keep $2 secretly for himself by telling V2 they only got $18

from the client leaving $9 to share with V2, V1 will tend to resist this because the short term high energy gain is at the expense of long term team profits.

B workers might do this to get $9 a month when if the V team stand together B might only ever get $8. This is then the problem for B workers in a V-B interaction, they are highly chaotic and so their incomes can boom and bust or sometimes remain at a permanent winning boom or losing bust. In this game scenario the B workers might always lose by getting only $8 as the V team uses a divide and conquer strategy to play one of against the other.

This is like the subprime crisis in the GFC where the V banks thought they were making big profits from ripping off B workers with the power of the V teamwork. Only V Wall Street could get the amount of money needed and so they made huge profits by the upfront fees and adjustable rate mortgages which would gouge the B borrowers later.

The game can also be won by B because they can bluff and deceive while V has its advantages based on openness and transparency. For example the B workers can say they are more experienced than they really are and get $12 an hour, then the client gets angry when they can't do the job and fires the Biv management agency. This is like B borrowers using liar loans to get the money to buy houses, even with large upfront fees this was a better deal than they could expect to get with honesty especially in a booming real estate market.

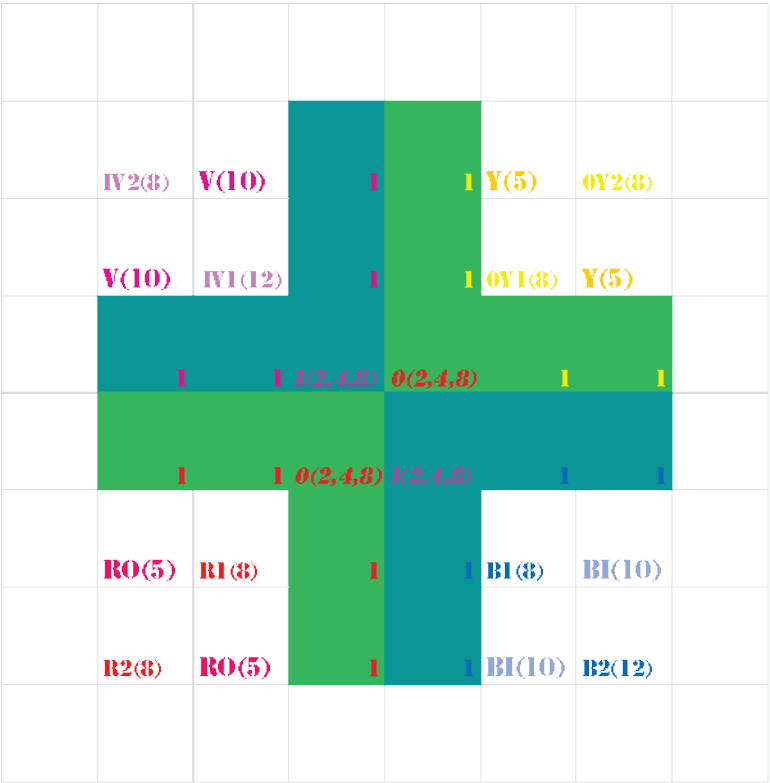
More often though the game is a mixture of chaos and randomness, sometimes the V teams win by compelling the B workers to take low wages like a recession for them while at other times the B workers experience a boom that ends when the V team realizes it has been tricked again. When the V team is more moderate then there may be more of a normal center to the wages paid with less extreme booms and busts, for example the V team might try to build goodwill by paying more than they need to and in exchange the B workers try to trick them less though this is less likely to happen. The V team in this case is more divided or

opaque in its responses making them harder to anticipate while the B workers are less deceptive and so easier to plan jobs with.

This section is now repeated in the next with minor alterations to illustrate that V-B is an overtone of Y-R.

Y-R

This is an unstable interaction because each side has different ways to play the game.



For example Y is a team and so they will tend to stand together when the R workers try to play them off against each other to minimize their losses. If an R worker offers Y1 $5 out of the client's $10 saying he can keep $1 secretly for himself by telling Y2 they only got $9 then Y will tend to resist this divide and conquer tactic.

R workers might do this to get an average of $5 a month which is much more survivable then $4, if the V team always stands together then R 1 and R2 might only ever get $4 and starve or have to move away. It is then like a Y-R interaction in the Roy animal kingdom where Y lions attacking R prey at the base of the food chain might wipe them out causing a massive die-off in animals further up the food chain. This is then the problem for R workers in a Y-R interaction, they are highly chaotic and so their incomes can boom and bust or sometimes remain at a permanent boom or bust by starving or moving away. In this game scenario the R workers might always lose by getting only $4.

This is like in a war where the Y armies are much stronger than the R terrorists or freedom fighters because Y cooperates as a team, the Y armies think they are making big gains from killing off the R terrorists with the power of the Y teamwork. In World War Two the Y Nazis had the only team based weaponry available such as Panzer divisions and so they made huge profits by looting other countries stealing their crops which would gouge the R people later causing a famine.

The game can also be won by R because they can bluff and deceive while Y has its advantages based on openness and transparency, tanks are much harder to hide and are too noisy to deceive R terrorists with. For example the R workers can appear to be more pacified than they really are and get better treatment while getting their sabotage plans ready, the Nazis in Germany usually got angry when the R terrorists reneged on these promises and attacked the Y Nazi occupying soldiers. Reprisals against Ro people are often ineffective because R people are loners and don't cooperate as much with others.

The German Generals then told the local Nazi commanders they couldn't do the job without attacking the Ro people in reprisals, this happened in France during the war. This is like the V management hiring B workers and getting tricked, they might only be able to moderate this by threatening to use Bi union labor instead.

The R terrorists in Vichy France used the neutrality the area had from occupation to attack Nazis in

the occupied part of France, the Vichy government would make excuses and make small efforts to control the R terrorists as part of the deception towards the Y Nazis. Generally in the war the Y Nazis had few successes in controlling R terrorists without Ro reprisals.

More often though the game is a mixture of chaos and randomness, sometimes the Y teams win by compelling the Y terrorists to accept heavy losses while at other times the R terrorists experience a boom in sabotaging the Y occupying forces that ends when the Y team realizes they have been tricked again. When the Y team is more moderate then there may be more of a normal center to the losses inflicted on the occupied country with less extreme booms and busts, for example the Y team might try to build goodwill by taking less food from the people than they could and in exchange the R terrorists try to sabotage them less. The Y team then is more divided or opaque in its responses making them harder to understand while the R terrorists are less deceptive.

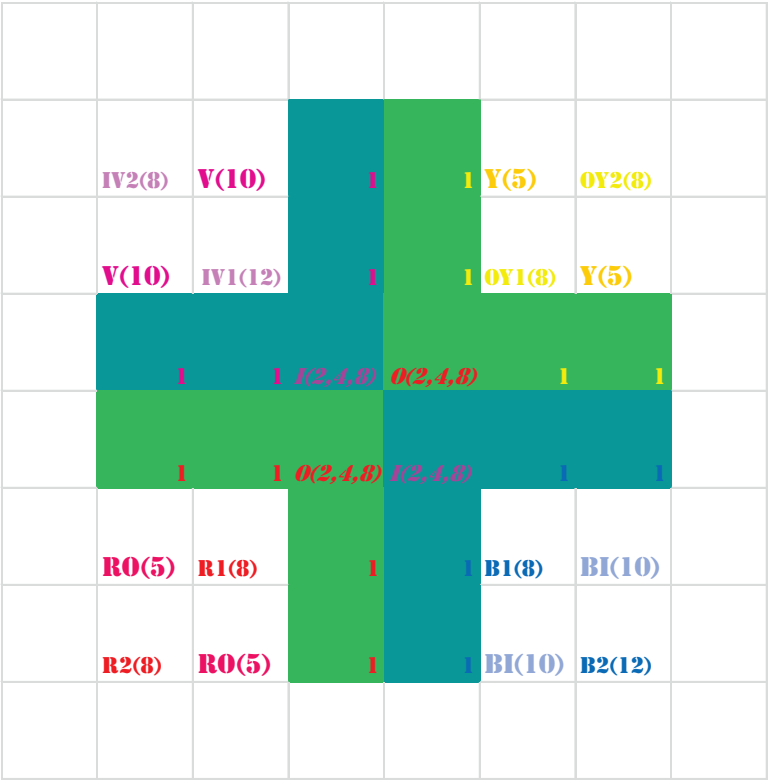
This also happens in nature where V lions do not chase R prey as much and in exchange they can sometimes catch them, if they continued to chase R too much then they would kill all the slow ones. The system would then evolve so the Y lions could no longer catch as many R, allowing the food chain to regenerate but causing Y problems if they had adapted to live off R prey. In the same way a Y-R war evolves innovative R terrorists by killing off the rest, eventually this can select R people that drive out the Y occupiers.

Iv-Bi

The other chaos versus random interactions are Iv-Bi and Oy-Ro, these are much more stable because they are closer to the neutral I-O center instead of trying to balance two extreme colors as with V-B and Y-R. In the diagram below the two Iv agents negotiate with the two Bi unionists. Iv1 is offering $12 and Iv2 is offering $8, the two Bi unionists are asking $10.

If Iv1 is offering $12 then he should immediately make a deal with the Bi union at $10, Iv2 would

know he has no chance of a deal here unless Iv1 is trying to get a better deal with a B worker so there should be a faster deal being concluded at $10. Some weeks Iv2 might try to pressure the Bi union into breaking ranks where one worker takes $8, the Bi union might also take $8 sometimes on the understanding that the average wage will still need to be $10.



This is then different from the Iv-B deals which move chaotically from floors to ceilings, here the Bi unionists try to average out their wages at $10 which moderates the Iv agent's offers of between $8 and $12. It is also different from V-Bi deals where the V management and Bi union often engage in wars of attrition to increase their share of the profits because Iv quickly collapses in this kind of war, these V-Bi trade wars can also extend to economy wide battles such as between a V Chamber of Commerce and a Bi international trade union.

Sometimes the Iv agents will look for a cheaper deal from B workers for $8 but the Bi union will try to moderate this by boycotting any Iv agent that doesn't use the union often enough, this also inspires some B workers to join the union for protection. Also the Bi union will sometimes make deals with the V management directly at $10 but this is moderated by the Iv agents sometimes getting the union $12 or making deals for V by the back door.

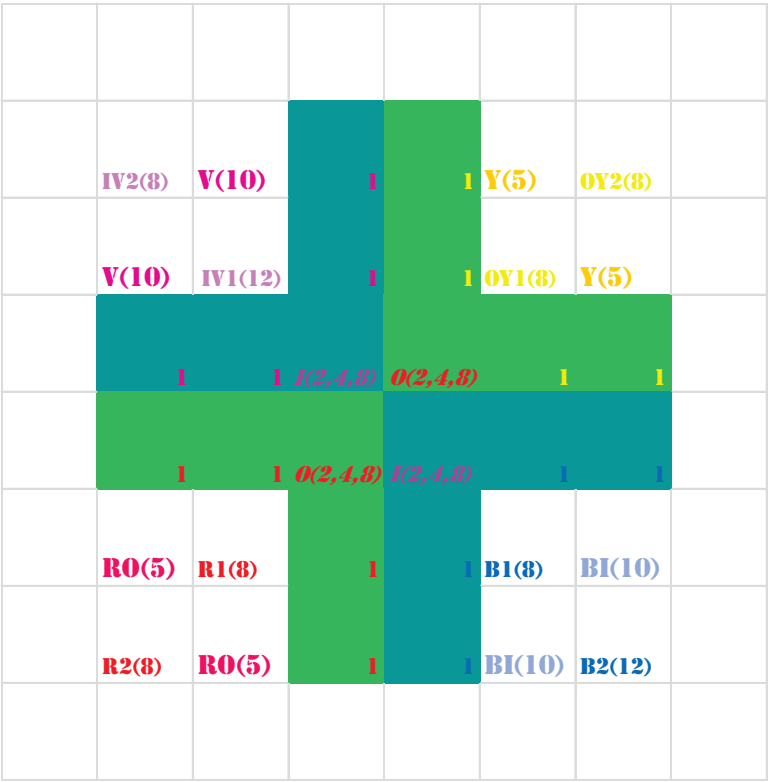
For example the Iv agents work for the V management, V might receive a dollar profit from each deal they make. Sometimes the V management and Bi union are striking and boycotting each other, however V might ask an Iv agent to make a separate deal with Bi so both make some profit but less because the Iv agent gets a commission out of it. This is then more socially efficient because it reduces some strikes and boycotts in the economy.

Also Iv and B often bluff each other to the point where neither gets work that month, this bluffing by B is moderated by the Bi union having workers available that do not bluff. If B overplays his hand to get $12 he knows the Bi union will often have a worker ready to take $10 so B will more often take $10 or even $8. At the same time the Iv agent holding out for a $12 profit knows he risks losing to the other agent, with the Bi union between Iv and B the randomness of Bi tends to normalize both chaotic agents and workers.

To show Iv-Bi is an overtone of Oy-Ro I will repeat this section in Oy-Ro with minor alterations.

Oy-Ro

In the diagram below the two Oy agents negotiate with the two Oy gang members. Oy1 is offering $6 and Iv2 is offering $4, the two Bi unionists are asking $5. If Oy1 is offering $6 then he should immediately make a deal with the Bi union at $5, Oy2 would know he has no chance of a deal here unless Oy1 is trying to get a better deal with an R worker so there should be a faster deal being concluded at $5. Some weeks Oy2 might try to pressure the Ro gang into breaking ranks where one worker takes $4, the Ro gang might also take $4 sometimes on the understanding that the average wage will still need to be $5.



This is then different from the Oy-R deals that move chaotically from floors to ceilings, here the Ro gang members try to average out their wages at $5 which moderates the Iv agent's offers of between $4 and $6. It is also different from Y-Ro deals where the Y management and Ro gangs often engage in wars of attrition to minimize their costs and losses. Sometimes the Oy agents will look for a cheaper deal from R workers for $4 but the Ro gang will try to moderate this by

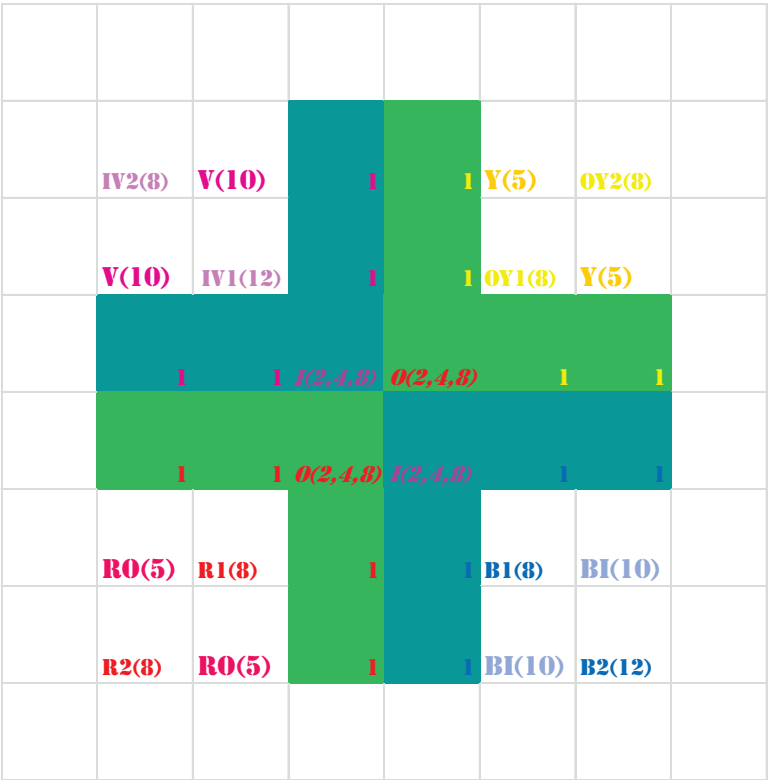
boycotting any Oy agent that doesn't use the gang often enough, this also inspires some R workers to join the gang for protection. Also the Ro gang will sometimes make deals with the Y management directly at $5 but this is moderated by the Oy agents sometimes getting the gang $6 or making deals for Y by the back door.

For example the Oy agents work for the Y management, Y might receive 50c profit from each deal they make. Sometimes the Y management and Ro gang are striking and boycotting each other, however Y might ask an Oy agent to make a separate deal with Ro so both make some profit but less because the Oy agent gets a commission out of it. This often happens in Oy-R wars where secretive overtures for peace are made through Oy agents.

This is then more socially efficient because it reduces some strikes and boycotts in the economy. Also Oy and R often bluff each other to the point where neither gets work that month, this bluffing by R is moderated by the Ro gang having workers available that do not bluff. If R

overplays his hand to get $6 he knows the Ro gang will often have a worker ready to take $5 so R will more often take $5 or even $4. At the same time the Oy agent holding out for a $6 profit knows he risks losing to the other agent, with the Ro gang between Oy and R the randomness of Ro tends to normalize both chaotic agents and workers.

I



Because Iv and Bi often moderate their deals to around $10 with some smaller booms and busts they begin to develop a framework to keep each other honest. For example if Iv1 agrees to a deal at $10 with the Bi union and then finds B1 will work for $8 then he might be tempted to renege on the deal with Bi, however the union can retaliate like vigilantes and boycott Iv1. So vigilante action by a Bi team is one of the components of how a justice system evolves, we see this in many movies with lynch mobs and posses where people from a community team up to punish lone thieves or small groups of deceptive and secretive criminals.

The movie then usually proceeds by the Oy thieves trying to hide and deceive the Ro posse as to where they are, the posse uses its teamwork to try to overcome this. However the Bi union can often overreact to Iv1 reneging on a deal just as lynch mobs have been known to punish innocent people or inflict too much punishment on them.

So for this justice system to be fair it needs to be balanced to the other side as well, Iv needs to create its own concepts of justice and then balance these with the Bi vigilante actions such as boycotts. For example the Bi union might boycott or black ban Iv1 permanently for reneging on a deal, in response Iv1 might employ more B workers which takes some work away from the Bi union and pressures them to moderate their stance or at least to check that the boycott is fair and the Iv agent really is guilty.

Iv1 might also try to secretly do a deal with a Bi union worker which can split up the union to some degree. Bi unions then prefer to domesticate the Iv agents, their chaos tends to disrupt the normal Bi wages with booms and busts. When the Iv agents do a large part of their business with Bi this reduces that chaos so the Bi union is not worrying about free riding B workers getting better wages, if this becomes a contagion then the union black bans those responsible. Also if the union loses too much work from an unfair boycott of Iv then some more moral people might leave the union and become B contractors with Iv1.

So often the Bi union allows the Iv agents to renege on some deals with lesser penalties to moderate their deceptions, for example they might assess Iv1 breaking a contract with a fine of $2 a deal to escalate if it happens too often. It might then only be worth the Iv1 agent doing this is he faces missing out on a job that week because Iv2 is close to a deal with B1 at $8. He might then be better off paying a fine and getting a week's work, the Bi union gets compensation for the dishonesty with a fine which is an income stream that in effect free rides on Iv and B. Also sometimes the Iv agents might levy a $2 fine on the Bi union for an unfair boycott, if the Bi union cannot prove Iv's dishonesty especially if the B1 worker secretly works for Iv1 then the Iv agent should be innocent until proven guilty or be paid compensation of $2.

The Bi union is still better off with this though it misses some Iv-B deals done deceptively, the Iv agent has to give evidence and often the Bi union will get the B1 worker to snitch on Iv in exchange for some extra work passed on from Bi. There are can also be a Prisoner's Dilemma between Iv and

B, the Bi union might offer each a chance to pay a $1 fine by confessing first while the other must pay $3 or face a black ban from the union.

As this civil justice system evolves it is still not efficient because sometimes Bi is stronger and imposes more fines than it can justify, at other times Iv gets away with more secret deals because the Bi union is weakened by defection to B. Iv might even fine the Bi union successfully even though the Iv agent is guilty. Also each has no real reason to trust the other to be fair. For both then it is often but not always better for a neutral party of I to evolve between them to handle this civil justice system and its laws.

Now for perhaps a dollar a case for each hour of the work deal examined the I referee sits in judgment and is trusted by both sides according to how fair and neutral they are, also how strong they are to enforce their judgments. For example the court might come to the right decision but not be able to make Iv or Bi pay the fine, in that case both sides will then resort back to maximizing their profits from cheating and boycotting.

Generally though the fine of $2 an hour worked is not sufficient to deter all the deception from Iv and B as well as the boycotts and strikes from V and Bi. For example in four weeks the difference between $8 an hour and $12 an hour comes to $32 versus $48 times the number of hours worked. This $16 is much more than the fine so the game players would only be deterred in minor situations such as where the difference between $8 and $10 an hour was at stake. To be convicted however might be a stain on an Iv agent's reputation allowing a longer boycott so this would also carry some weight.

This then is like when I is weak such as in the global economy prior to the GFC, Iv agents of subprime loans often falsified documents to get them approved while the B borrowers were encouraged to lie to get the loan. The penalties for this were often nonexistent, a salesman might be reprimanded at Ameriquest for example but they were making too much money from securitizing these loans to worry about checking each one carefully.

Also with a rising real estate market even if the B borrower defaulted the house was usually worth more by then and so there was little incentive to find out why he could not make the payments. A foreclosure often generated fees for other workers and agents so there was an incentive to let the fraud happen.

Prior to the GFC Bi communities complained loudly about the subprime fraud going on, this is like the Bi union wanting to retaliate for the Iv agent reneging on a deal. However the I-O regulators were very weak from deregulation and in many cases state regulators were forbidden by the federal government from intervening. This then is the Iv-B economy working with little interference from V-Bi, V Wall Street was starting to realize many of the securitized bonds had problems but they were often as in the dark as the Bi communities. Bi was then seeing many people ripped off by up-front fees on subprime loans, however B people are by nature secretive and deceptive and so most of the problem remained hidden by them.

With a $4 an hour fine the I regulators can deter more injustice, for example if Iv1 makes a deal with a Bi union for $10 and then reneges to sign up B1 for $8 then he might lose double the profit he expected to make with a $4 an hour fine. However he might still take the chance if the I regulators are lax and don't respond to the Bi complaints as happened prior to the GFC.

With an $8 an hour fine an Iv agent is much less likely to deal dishonestly, if he got 2 fines a month this would be equal to the whole difference between getting workers for $8 and $12 an hour. At best he might try to deceive twice during the month but with the threats of boycotts along with the fines it is unlikely he would. Also the Bi unions would be unlikely to take the chance on a fine like this, for example if they boycotted an Iv agent unfairly then for the sake of losing $2 an hour from dealing with him once they might lose 4 times as much with an $8 fine perhaps assessed at the number of hours the Iv agent missed out on from the Bi union.

The system then would start to work well at $8, however if the fines and the I police are too strong both Iv and Bi would start to chafe under their penalties. For example the Bi union might lose more from fines when retaliating in a fit of temper than from the original Iv offense. Many people have this experience with I-O police, preventing people from settling some scores themselves can lead to Bi communities shunning the police.

For example a Ro community might have local gangs protecting it with vigilante action, if the police don't punish Oy thieves enough or are too hard on the gang then the community might stop cooperating with the police. This happens in most US ghettoes, also the Iv and Oy parts of a society only work with an I-O justice system because it is supposed to help them. If misrepresentations in business are punished too severely then they might vote for weakening the police, this is how deregulation occurred in the US prior to the GFC.

The I-O police then tend to wax and wane in strength according to the pressures from Iv and Bi

on either side trying to make them biased or to get away with something.

For example the Bi union might make more money from sometimes striking and boycotting Iv and V, it might then not want to contribute as much to running the I police and resist paying the fines. Also the Iv agents might deceptively claim they cannot afford the fines or even disappear if they are too draconian, this can be more inefficient for the economy than if sometimes deceptive Iv agents keep working.

A strong I police then might plea bargain the fines, accept lower fines in exchange for prompt payment or some other service. For example it might accept $2 an hour from Iv1 from a deal it reneged on in exchange for snitching on Iv2 when he does deceptive business, this saves them the cost of investigating Iv2 and gets them fines they might have missed otherwise. In effect Iv1 is getting a commission from I on the money I gets from Iv2. Also Bi might be willing to pay a $2 fine more quickly and in exchange for a promise to resort to less vigilante justice.

I can also try to police the V-B deals but being on both extremes they often avoid the police, for example V has little need for them because they often restrain their Iv agents reducing their profits. Also the I police sometimes cause the Iv agents to snitch on V making them pay a fine or else Bi might enforce them being paid with a strike.

B workers also avoid the police because B are more deceptive than Bi, they want to free ride on the Bi $10 an hour if possible and if they can get work from Iv that was meant for Bi then they would usually take it. Often V will approach them with work because there is a war of attrition of mutual boycotts with Bi and their Iv agents like with the principal agent problem are deceptive.

So V-B can often do business but because these deals are so unstable then one or the other is periodically going to do much worse, then they might go to the I police. However the I police get their support from Iv and Bi paying their wages or at least paying their fines, since V and B avoid this

then the I police see them as free riders looking for justice when it suits them but otherwise not paying.

This system can then be the most stable because it rewards Iv and Bi for more moderate behavior, however sometimes I can become biased towards either Iv or Bi. For example a right wing government is elected and the I police are told to favor Iv agents as being more representative of laissez fair capitalism while Bi unions are more socialistic. It then fines the Bi unions $8 an hour for wages lost because of its strikes or boycotts and the Iv agents $2 when they renege on deals with Bi.

Now the Iv agents find that it is again economical to use deception, when they do the Bi union is fined more heavily when it retaliates. This is like the move to the right in politics in the past few decades, it causes Iv to make more money and so to have less incentive to plea bargain its fines with I. This then causes more financial fraud to remain hidden by other Iv agents until it explodes as in the GFC. The Bi unions start to break up because

the union can no longer use strikes and boycotts as effectively to guarantee the wages of its workers, many then leave to become B and the Iv-B game becomes more common.

Also V tends to weaken because while they at first make more money from their Iv agents plundering the Bi unions the Iv agents are also not fined when they rip off V, this is a variation of the principal agent problem. For example V often used to have a war of attrition with Bi for workers at $10 an hour, as the union weakens then to get workers V must go to the more unstable V-B deals where B workers are often unreliable and deceptive.

It can use Iv agents to get B workers but then both are often deceptive and so there can be worse booms and busts between them, this further destabilizes V's business. For example the explosion in subprime mortgages was created by Iv subprime salesmen and B workers faking documentation which was then presented to V banks as legitimate.

The Iv salesmen were able to build momentum for this because of the erosion of the strength if Bi community organizations watching out for consumers. This can result in V making more money as in the early stages of the subprime bubble but then lose it later as the deceptive tactics of B cause trouble.

Also the Iv-B game of deception leaves V in increasingly in the dark, this happened with the Wall street banks such as Lehman and Bear Sterns, also insurance companies like AIG not understanding what their quants and traders were doing until they went bankrupt in the crash. For example Iv agents can tell their V bosses that they found good B workers for them, they then book $1 an hour profits.

Later V finds these workers are incompetent making the client angry and firing the employment agency. This is like Lehman using Iv traders to book bonuses for themselves by selling subprime to B borrowers with liar loans. By the time the V Lehman realizes this the clients of their subprime bonds are angry and the subprime

securitization business collapses while the Iv agents keep their bonuses.

Other problems occur when a left wing government is elected and influences the I police to favor the unions over the agents. They then fine the Iv agents $8 for their infractions and $2 fines to the union. Now the agents cannot get away with much, this is like powerful consumer protection laws which reduce deception in the market. The Bi unions however become increasingly confident because the fines are small against the profits they make, they then boycott the Iv agents until they pay Bi more than $10 an hour while promising to not employ B workers.

The Bi union then grows as B workers join for the better pay there, this causes Bi to start winning the war of attrition against V companies with strikes. V businesses then start to lose money going bankrupt and unemployment increases, the Bi unions get more severance pay which weakens the V companies more quickly. Stagflation ensues as the Bi unions can compel wage rises after any price rises, this means the companies need to

raise their prices again over and over or go bankrupt. The economy then becomes more V-Bi and stagnant as the Iv agents lose money and often collapse chaotically while the B workers join unions. This happened in the 1970s In Europe as strong Bi unions bankrupted businesses.

Iv-I police bias

Even without government interference the I police tend to wax and wane in strength according to the games between Iv and Bi, also they can tend to be biased for one or the other according to who is paying the most money in fines or taxes. For example if the Iv agents and V teams start winning most of the games they make more profits than the Bi unions and B workers, they would then pay more taxes and by using these purse strings cause I to become more biased towards Iv. This increases the profits of V and Iv as they get away with more while Bi and B pay more fines.

This increases the Iv-B chaos of the economy until there is a boom and bust, the Bi communities become angrier and also start acting more like

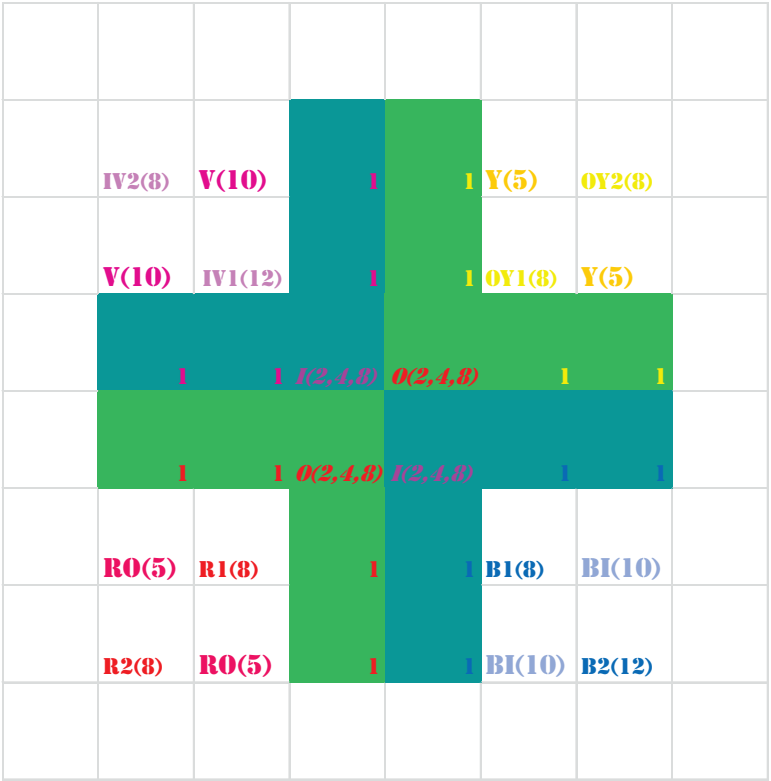
vigilantes as they lose faith in the I justice system. It becomes then increasingly lawless until I returns to the center, however some economies can remain top heavy with money like this and so this Iv bias in the I police keeps the economy corrupt.

I-Bi police bias

In the same way a bias by the I police towards Bi might cause the Iv agents to go broke which reduces the employment available causing economic stagnation and an eventual return to the center by I.

However some economies have a persistent left wing bias like this with the police more interested in fining salesmen and agents for dishonesty than the Bi community for acting as vigilantes. This happened in Europe during the 1970s where consumers were well protected but businesses until Reagan and thatcher could not get a fair hearing to scale back the Bi unions to moderate the economic stagnation. It also led to Ro mass movements with communist trade union strikes and R terrorism such as the Red Brigade and Baader Meinhof.

O



This section will again follow the previous one closely to show that the I civil police are overtones of the O criminal police.

Because Oy and R often moderate their deals to around $5 with some smaller booms and busts

they begin to develop a framework to keep each other honest. For example if Oy1 agrees to a deal at $5 with the Ro gang and then finds R1 will work for $4 then he might be tempted to renege on the deal with Ro to minimize his losses later, however the Ro gang can retaliate like vigilantes to minimize their own future losses and boycott Oy1.

This is similar to a criminal situation where an Oy thief makes a deal with a Ro gang to stop robbing their neighborhood in exchange for a payoff or plea bargain, then he reneges on the deal when he sees R being easy to rob. Then the Ro gang might go after him like a lynch mob instead of just exiling him.

So vigilante action by a Ro gang is one of the components of how a criminal justice system evolves, we see this in many movies as lynch mobs and posses where people from a community team up to punish lone thieves or small groups of deceptive and secretive criminals. The movie then usually proceeds by the Oy thieves trying to hide and deceive the Ro posse as to where they are, the posse uses its teamwork to try to overcome

this. However the Ro posse can often overreact to Oy1 reneging on a deal just as lynch mobs have been known to punish innocent people or inflict too much punishment on them.

So for this justice system to be fair it needs to be balanced to the other side as well, Oy needs to create its own concepts of justice and then balance these with the Ro vigilante actions such as lynch mobs. For example the Ro gang might boycott or black ban Oy1 permanently from coming into their neighborhood for reneging on a plea bargain, in response Oy1 might become more deceptive and attack only R people secretly.

This can then make the Ro neighborhood watch ineffective and cause even more crime taking work away from the Ro gang. For example they might get paid protection by R people to prevent this crime, so they need to not just punish Oy thieves but somehow moderate their behavior when the gang doesn’t see them.

This pressures Ro to moderate their stance or at least to check that the boycott is fair and the Oy criminal really is guilty. As can be seen the game is the same whether Oy is called a criminal or an agent, in each case they need to be deterred from ripping off Ro and R people.

In effect then the O criminal justice system is where I civil penalties are shown to be insufficient, when Oy robs R they go to jail because a fine has historically not worked except perhaps with a first offence. In the same way the Roy employment agency or other G state owned industries in Scarcia would often punish corruption with jail, in the case of the Soviet Union this might have been exile to Gulags as the equivalent of a Bi boycott of Iv agents. This was often unfair because communism was a Ro team based system and so vigilante action to punish Oy enemies of the state had no counterbalance to look after their side.

Oy1 might also try to secretly do a deal with a Ro gang member to pay them to let Oy operate, this can split up the gang to some degree. Ro gangs

often then prefer to domesticate the Oy agents with plea bargains as the equivalent of Iv-Bi business deals, their Oy chaos tends to disrupt the normal Ro neighborhoods with crime waves. This crime then might be just fraud or broken agreements as occurs in the Biv game, however because Scarcia is so poor it has more serious penalties.

When the Oy agents do a large part of their business with Ro gangs this reduces the chaos so the Ro gang is not worrying about free riding R workers being robbed, if this becomes a contagion then the Ro gang black bans or punishes those responsible. For example the Oy agents can act like criminals in trying to rip off R workers, this is similar to Oy thieves robbing more defenseless R people.

The Ro gang then tries to place itself between Oy and R people so the Oy thieves are mainly encountering the Ro neighborhood watch patrols for example. Then there is less of a problem with protecting R people being a drain on their resources, for example their patrols might have to

cover where R people live so often that other areas are vulnerable.

Also if the Ro gang punishes Oy thieves excessively or without proving their guilt then some more moral people might leave the Ro gang and become R loners. This is also a common effect of Ro vigilante actions where people for example don't want to be associated with lynch mobs.

So often the Ro gang allows the Oy agents to renege on some plea bargains with lesser penalties to moderate their deceptions, for example they might assess Oy1 breaking parole with a jail term of two weeks per crime to escalate if it happens too often. In the game matrix then the numbers 2,4,8 can refer to the number of weeks in jail rather than a fine.

It might then only be worth the Oy1 agent doing this is he faces missing out on a job that week because Oy2 is close to a deal with R1 at $4. So for example R1 might have been defrauding workers by misrepresenting what other workers are

getting paid, he then might go to jail for two weeks when found out.

However R1 might often not expose Oy1 because if Oy1 then defrauds someone else it hurts R1's competitors. Usually then R people don't help other R people, they wouldn't be a witness against a criminal just to stop other R people being robbed. This is a common situation the police run into where a crime happens but no one will admit to seeing anything for fear of reprisals.

Oy1 might then be better off sometimes going to jail for two weeks and getting a week's work by cheating an R worker, the Ro gang gets compensation for this dishonesty with the jail time that still moderates Iv1's behavior. They might then get protection money from the R workers for this so this also minimizes their costs of protecting their neighborhoods.

Also sometimes the Oy agents or thieves might levy two week's jail on a member of the Ro gang for an unfair boycott from their neighborhood or a

vigilante reprisal such as beating up Oy1 which itself would be a crime, if the Ro gang cannot prove dishonesty especially if the crime Oy1 did to R1 was not exposed then the Oy agent should be innocent until proven guilty or the vigilantes be punished with jail time.

The Ro gang has still minimized its costs with occasional jail time though it misses some of these Oy-R crimes done deceptively and so their member might sometimes go to jail as a miscarriage of justice, the Oy agent has to give evidence and often the Ro gang will get the R1 worker to snitch on Oy in exchange for some extra work or protection from Ro. For example the R1 worker might testify against the Oy1 thief in court in exchange for the Ro gang protecting him from reprisals.

There are can also be a Prisoner's Dilemma between Oy and R, the Ro gang might offer each a chance to go to jail for two weeks by confessing first while the other must go to jail for four weeks or face a black ban or exile from the Ro neighborhood. For example the Oy agent defrauds

the R worker but both won’t admit to this, the Ro gang then compels one to talk first by threatening both with jail time. R would in effect go to jail for contempt of court.

As this O criminal justice system evolves it is still not efficient because sometimes Ro is stronger and imposes more jail time or exile than it can justify, at other times Oy gets away with more secret robberies or frauds because the Ro gang is weakened as more moral members refuse to be a part of a lynch mob.

Oy might even cause a member of the Ro gang to go to jail even though the Oy agent is guilty because the crime cannot be proven. For both then it is often but not always better for a neutral party of O to evolve between them to handle this criminal justice system and its laws.

Now for perhaps a dollar a case for each hour of law enforcement the O referee sits in judgment and is trusted by both sides according to how fair and neutral they are, also how strong they are to

enforce their judgments. They might then run a jail house that both Oy and Ro people pay for, this minimizes their costs on both sides better than Ro vigilante actions and Oy robberies or even revenge killings. For example the court might come to the right decision but not be able to make Oy or Ro go to jail because their police are too weak to catch them, in that case both sides will then resort back to minimizing their costs profits from Oy cheating and Ro vigilante justice.

Jail time can also be seen as lost wages, for example if an Oy agent goes to jail for two weeks he loses two weeks of wages. This might be an average of $5 an hour for each week and so in minimizing his costs he must work out the benefits of defrauding an R worker for an extra $1 an hour and risking the loss of wages with jail time.

So O jail time can also be seen as an I civil penalty enforced by imprisoning someone, I is then an overtone of O. It is then possible to model this part of the game matrix by calling jail time the loss of wages so all game cells remain denominated in

dollars per hour. However in Roy business is not always conducted in cash transactions so the O jail time has a G component as well where the O police dominate a territory. To send someone to jail then is not the same as levying a fine on Gb private property, it uses force to confine someone to the territory of a jail and away from more vulnerable G territories in Roy society.

Generally though the two weeks of jail time is not sufficient to deter all the deception from Oy and R as well as the exile and vigilante reprisals from Ro. To be convicted and then have a criminal record however might be a stain on an Iv agent's reputation allowing a longer boycott so this would also carry some weight. The O game can also include crime from the Y mafia who also act like a lynch mob, for example they might injure or exile an R worker for perceived crimes without proving they are guilty.

The O court might also have to convict this Y mafia of crimes but Y are like Ro because they cooperate as a team and can lie to create alibis. Often then O use Oy agents to snitch on Y in exchange for lower

sentences. This is like in the Biv part of the game where the I civil justice system might sometimes use Iv agents of a V employment agency to give evidence against their V employers.

Crimes waves and vigilante reprisals can then occur when O regulators are weak such as in the global economy prior to the GFC, Oy agents of subprime loans often criminally falsified documents to get them approved while the B borrowers were encouraged to criminally lie to get the loan. The criminal penalties for this were often nonexistent or just I civil fines, a salesman might be reprimanded at Ameriquest for example but they were making too much money from securitizing these loans to worry about checking each one carefully. O criminal penalties were then needed to deter this Roy behavior.

Also with a rising real estate market even if the B borrower defaulted the house was usually worth more by then and so there was little incentive to find out why he could not make the payments, O crimes such as false declarations were being

committed but the police were not checking for them.

A foreclosure often generated fees for other workers and agents so there was an incentive to let the fraud happen, with Oy-R interactions the O police were left out by both sides. Because the Oy salesmen were often strapped for cash or were making large commissions I fines rarely deterred their crimes, instead conventional penalties for fraud such as jail time were needed.

Prior to the GFC Ro communities complained loudly about the subprime fraud going on, this is like the Ro gang wanting to retaliate for the Oy agent reneging on a deal. Ro had given up their vigilante reprisals in exchange for O police dispensing neutral justice, with O deregulation however there was an Oy crime wave with subprime lenders In this case criminal fraud was happening in these Ro neighborhoods, Oy agents were being used by the equivalent of a Y mafia to defraud vulnerable R people in these neighborhoods.

However the O regulators were very weak from deregulation and in many cases state regulators were forbidden by the federal government from intervening. The situation can often occur from the paradox of policing, when there is little crime this can be used as an excuse to reduce the costs of policing or the times when policing causes social friction.

However often crime is low because of these police actions and will grow in a crime wave when the O police are weakened with deregulation. So this deregulation in O is like reducing the jail time on some crimes or making some crimes no longer punishable at all.

This then is the Oy-R economy working with little interference from Y-Ro, Y Wall Street was often criminally making money from subprime in ways that would have sent some to jail in the Savings and Loans crisis. However many of these crimes no longer had a criminal penalty so they paid a small I civil penalty and the crime wave continued to grow.

The Y businesses were starting to realize many of the securitized bonds had problems but they were often as in the dark as the Ro communities who were seeing so many people ripped off by up-front fees. In any vase the Y companies were not criminally liable for any fraud they committed so they had no incentive to stop as long as their profits exceeded the I fines.

With a jail time of four weeks the O police can deter more injustice, for example if Oy1 makes a deal with a Ro gang for $5 and then reneges to sign up R1 for $4 then the extra jail time might moderate this fraud. However he might still take the chance if the O police are lax and don't respond to the Ro complaints as happened prior to the GFC.

With eight weeks of jail time an Oy agent is much less likely to deal dishonestly, he would then be losing eight weeks of potential income at $5 an hour so to minimize losses he should avoid jail more. At best he might try to deceive sometimes during the month but with the threats of exile along with the jail time it is unlikely he would.

Also the Ro gangs would be unlikely to take the chance on jail time like this, for example if they exiled or beat up an Oy agent unfairly then for the sake of their having lost money from Oy reneging on a deal they might lose much more by someone being in jail for eight weeks and losing eight weeks of wages. The system then would start to work much better at eight weeks jail, however if these jail terms are too long and the O police are too strong both Oy and Ro would start to chafe under their penalties. The O police then tend to wax and wane in strength according to the pressures from Oy and Ro on either side trying to make them biased, bribing them, or in trying to get away with something.

For example the Ro gang might minimize its losses from crime by sometimes directly punishing Oy and Y, it might then not want to contribute as much to running the O police and resist going to jail for these vigilante actions. This is a common situation in US Ro-R ghettoes where Ro gangs might reduce Y-Oy crime in their neighborhoods to the extent that the O police rarely go there at all.

Also the Oy agents and thieves might deceptively claim they cannot afford the plea bargained jail time or even disappear if they are too draconian, this can be more inefficient for the economy than if sometimes deceptive Oy agents and thieves keep working with a small amount of criminal activity.

A strong O police then might plea bargain the jail time to avoid resentment, accept lower jail terms in exchange for confessions and not trying to evade it, they might also impose community service instead. For example the O police might accept 2 weeks jail from Oy1 from a deal he reneged on in exchange for snitching on Oy2 when he does deceptive business, this saves them the cost of investigating Oy2 and gets crime solved they might have missed otherwise.

In effect Oy1 is getting a commission from O on the jail time O gets from Oy2, both Oy1 and O are then minimizing their costs. Also Ro might be willing to allow a member to do only two weeks jail time or community service such as picking up

trash in exchange for a promise for fewer vigilante actions.

O can also try to police the Y-R crime and deals but being on both extremes these colors often avoid the police, for example Y has little need for them because they often restrain their Oy agents reducing their profits. Also the O police sometimes cause the Oy thieves to snitch on the Y mafia sending them to jail, if the O police are not strong enough then the Ro vigilantes might help to enforce the sentence like a sheriff creating a posse of civilians.

R also avoids the O police because R are more deceptive and prone to hiding to survive than Ro, they want to instead free ride on the Ro gang protection if possible and if they can get work from Oy that was meant for Ro then they would usually take it. Often Y will attack them or try to make deals such as selling drugs because there is a war of attrition between Ro and Y like a gang war.

Because they cannot do business in Ro then they try to bypass Ro to get to the R people. This is then like the principal agent problem where Ro has problems with R getting them into trouble and then demanding their protection. In the same way Oy can get the Y mafia into trouble and want their protection as well creating a Y-Ro war of attrition from an Oy-R deceptive shadow war of crime and fraud.

So Y-R can often do business but because these deals are so unstable then one or the other is periodically going to do much worse, then they might go to the O police. However the O police get their support from Oy and Ro paying their wages, since Y and R avoid this then the O police see them as free riders looking for justice when it suits them but otherwise not paying. The O police also generally have a policy of not settling disputes between criminals.

This O based system can then be the most stable because it rewards Oy and Ro for more moderate criminal behavior, however sometimes O can become biased towards either Oy or Ro. For

example a right wing dictatorship comes to power and the O police are told to favor Oy criminals as being more anticommunist against the Ro neighborhoods.

This happened for example in many South American countries in the 70s and 80s with Oy death squads attacking the Ro communities often to kill off R child thieves that went into the Y-Oy neighborhoods to steal. Prior to the GFC the rightward tilt of the US government reduced criminal penalties for Oy and Iv fraud, this reduced their need to plea bargain by snitching on others and so the I-O regulators were caught unawares by the subprime contagion.

Oy-O police bias

With this right leaning Oy bias the O police might impose 8 weeks jail on the Ro gangs for vigilante reprisals and the Iv agents two weeks for when they renege on deals with Ro. This is also a common situation in many economies because the Roy food chain tends to be stronger on the

predator side of Y-Oy while the Biv economy tends to be wealthier in the V-Iv side.

For example in the US crack cocaine use attracts more jail time for Bi-B poorer blacks than straight cocaine for the more V-Iv white community. Much of the GFC was the result of the wealthier V-Iv parts of the US and Europe have a trade surplus with poorer areas, the US with the poorer blacks and Hispanics and Europe with the poorer countries such as Greece and Spain. This Iv-Oy bias in the I-O police then leads to increase chaos in the economy and more booms and busts such as crime waves.

Now the Oy agents find that it is again economical to use deception under the guise of calling it free enterprise, when they do the Ro gangs are jailed more heavily when it retaliates. For example an Ro-R ghetto might have Oy con men such as door to door salesmen ripping off the people there like subprime salesmen did, if the Ro gangs or the communities tried to chase them away then they might be heavily jailed for threatening them.

There has been a move to the right in politics in the past few decades in the advanced economies, this is in part because the Biv tree economies are aging and so more people are in the V-Iv part of the tree where their finances are ripening like fruit. Fewer people are working in the Bi-B parts of the economy providing raw materials so the economies are becoming more top heavy and in danger of collapse.

Allowing more Oy fraud and laissez fair crimes then causes them to make more money and also to have less incentive to plea bargain with O, they might use high priced Oy lawyers to protect them and string out the cases for a long time as did many subprime lenders. This lack of snitching then causes more financial fraud to remain hidden by other Iv agents until it explodes as it did in the GFC.

The Ro gangs and the cohesiveness of Ro neighborhoods starts to break up because Ro can no longer use team action as effectively to protect themselves, many might then leave these Ro

teams to become R and also use deception to protect themselves.

For example this led to the rise of R-B liar loans where the lack of I-O regulators caused subprime crime, when this could not be moderated by Ro community protests then many joined the game by defrauding the Y-Oy lenders back in the same way. This is then like Ro gangs not being able to defend their neighborhoods against Oy thieves, R people then resort to hiding and robbing themselves to make up their losses. The O police lose control of the situation because they don't support Ro any more, there is then a chaotic escalation of fraud in Oy-R such as in the subprime boom and bust.

Also the Y mafia tends to weaken because while they at first make more money from their Oy agents and thieves plundering the Ro neighborhoods the Oy agents are also not jailed by O when they rip off Y, this is a variation of the principal agent problem where the Oy agents become more powerful because of police bias until they can threaten Y as well. For example on

Wall Street the I deregulating by the SEC and others caused Iv traders to become more numerous and deceptive, many then caused long lived V banks such as Lehman and Bear Sterns so many losses that they collapsed. In the same way a right leaning O criminal police might make Oy criminals more powerful and less controlled by the Y mafia in some neighborhoods leading to more crime there.

For example Y often used to have a war of attrition with Ro for workers at $5 an hour, as the Ro gangs weaken then Y to get workers must go to the more unstable Y-R deals where R workers are often unreliable and deceptive. This is also like R thieves as a contagion in Y neighborhoods, Y could attack the Ro gangs if they did not take of the problem. In effect then Ro gangs can be targeted for not controlling R people and Y mobs can also be targeted for not controlling Oy.

However as the Oy thieves get out of control the Y mafias are weakened as well as the Ro gangs, Y then might have to try to attack the R thieves directly. However this rarely works, it is like Y

armies occupying a country and trying to stamp out R terrorists that can hide in the Ro general population.

Because Ro is being bypassed they have no incentive to help the Y armies and so the R terrorists are helped by Ro covertly. This is like the R thieves still free riding on some protection in Ro gang neighborhoods even though the O police have weakened Ro.

The Y mafia can use their Oy agent criminals to get the R thieves but then both are often deceptive and so there can be worse booms and busts between them, also Oy can lie about their successes to get more money or keep more of what they rob from R people. This can result in Y making more money as in the early stages of the subprime bubble but then lose it later as the deceptive tactics of R cause trouble.

Also the Oy-R game of deception leaves Y in increasingly in the dark, this is like Wall street banks like Lehman and insurance companies like

AIG not understanding what their quants and traders were doing until they went bankrupt in the crash. For example Oy agents can tell their Y bosses that they found good R workers for them, they then book profits from this.

Later Y finds these workers are incompetent making the client angry and firing the employment agency. This is like Lehman using Oy traders to book bonuses for themselves by selling subprime to R borrowers with liar loans, this was an Iv-B business in some Biv areas and Oy-R in poorer Roy ghettoes where they often concentrated their marketing .

By the time the V Lehman realizes this the clients of their subprime bonds are angry and the subprime securitization business collapses while the Iv agents keep their bonuses. In the same way the increase in Oy crime can weaken the more traditional Y organized crime but lead to more overall crime because the O police lose control of the situation without snitches.

O-Ro police bias

Other problems occur when a left wing dictatorship come to power and influences the O police to favor the Ro neighborhoods and gangs over the Oy thieves and agents. They then jail the Oy agents eight weeks for their infractions and jail the gang member committing the reprisals two weeks. Now the Oy agents and thieves cannot get away with as much, this is like powerful consumer protection laws which reduce deception in the market. It is also like how in Chile a more left wing government shut down the Oy death squads.

The Ro neighborhoods and gangs however become increasingly confident because their jail time is small for the reprisals against Oy criminals coming into their neighborhoods. There are also fewer penalties for Oy agents bypassing the Ro gang for R workers, they then exile the Oy agents until they pay Ro gang members more than $5 an hour while promising to not employ R workers as much.

The Ro gang then grows in power and numbers as R workers join for the better pay there while R people find the Ro gang protection is much better now, this causes Ro to start winning the war of attrition against Y neighborhoods. They might for example have more strength to impose taxes or demand protection money from Y businesses by jailing more of their Oy criminal agents and turning them into snitches.

Y businesses then start to lose money going bankrupt and unemployment increases, the Ro gangs demand more money for severance pay which weakens the Y companies more quickly. Stagflation ensues as the Ro gangs can compel wage rises after any price rises, this means the companies need to raise their prices again over and over or go bankrupt.

The economy then becomes more Y-Ro and stagnant. In the same way the Ro gangs as they get stronger from the O-Ro police bias reduce the strength of the Y mafia, this occurred in Russia when the Ro communists took over and beat the Y White Army, they were then able to appropriate Y

aristocratic assets such as farms and dismantle remaining parts of the Y biased feudal system. South American economies after the fall of Y dictators such as Somoza and Pinochet also reduces the strength of Y-V in the country often causing them to flee with their assets using deceptive Iv-Oy agents.

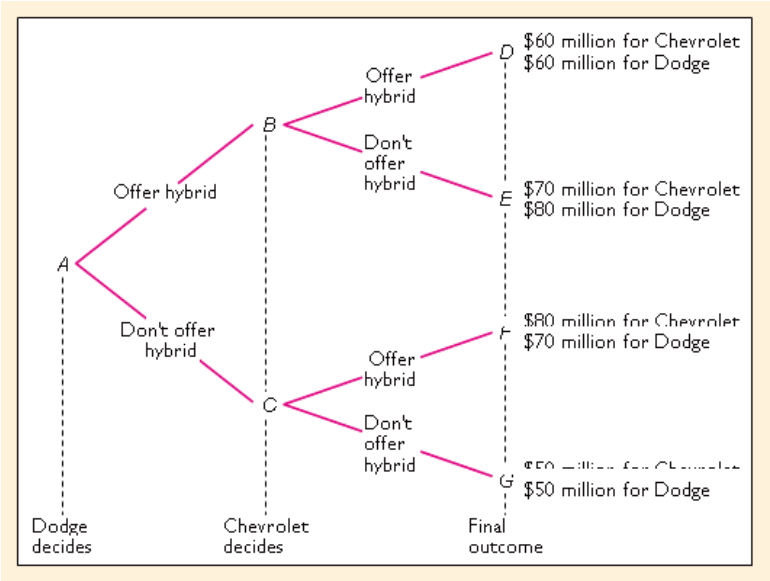
O waxes and wanes

Even without government interference the O police tend to wax and wane in strength according to the games between Oy and Ro in the game matrix, also they can tend to be biased for one or the other according to who is paying the most money in bribes and taxes. For example if the Oy agents and Y teams start winning most of the games they would reduce costs more than the Ro gangs and R workers, they would then pay more taxes and by using these purse strings cause O to become more biased towards Oy. This increases the profits of Y and Oy as they get away with more causing the Roy system to tilt more chaotically toward the right.

This increases the Oy-R chaos of the economy until there is a bust, the Ro communities become angrier and also start acting more like vigilantes as they lose faith in the O justice system. It becomes then increasingly lawless until O returns to the center, however some economies can remain top heavy with money like this and so this Oy bias in the O police keeps the economy more or less permanently corrupt.

Decision trees

If some players can move first then the game can become a decision tree, players can try to maximize profits in Iv-B and minimize losses in Oy-R. The concept of moving first introduces shorter time as an advantage, this shifts the game towards Iv-B because it is short on time and high on energy.



In this case the Iv agents and B workers might work out what happens chaotically if the other goes first and work out their tactics according to that. The odds of various outcomes can then be like Pascal's Triangle which itself is in the shape of a decision tree and each level can be the odds of a particular outcome. For example the profits and losses in the diagram above can be regarded as odds and the shape of this decision tree could be plotted on Pascal's triangle.

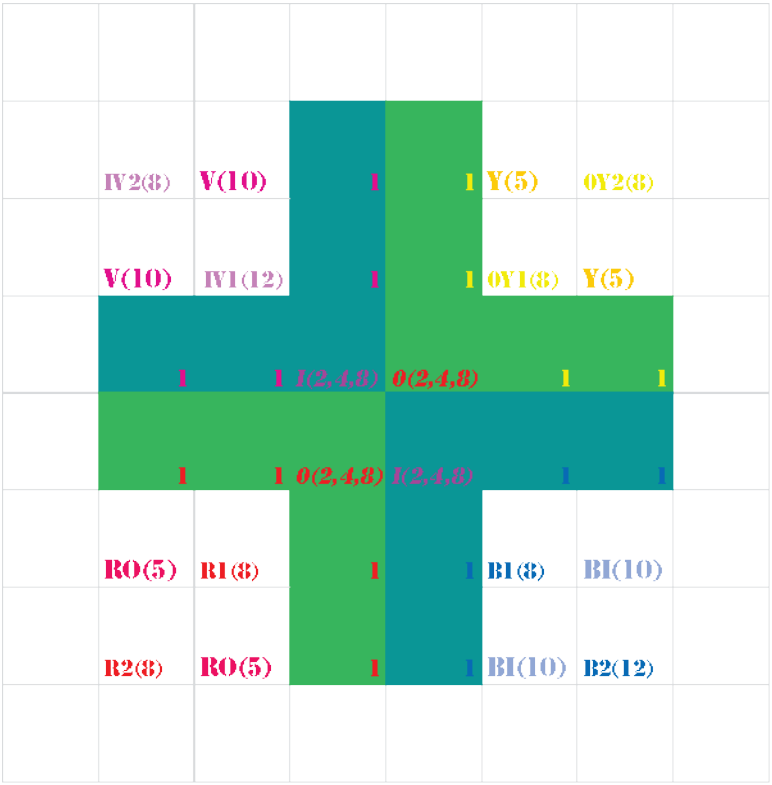
However at a given level in the tree people can decide to work as a team instead. For example in

the diagram above at B and C the companies can decide to work as a team and so the decision tree instead of being like competitive branches becomes like V leaves where companies cooperate as a V team to block competition from other companies.

The result will be a normal curve distribution rather than one extreme or another, instead of the tree moving from boom to bust with momentum to make hybrids or not the companies might team up as V to make a normal average decision such as half their production on average being hybrids.

In the game matrix below there can be a tit for tat scenario where the Iv agents and B workers might come to cooperate because moving first confers less of a time advantage. For example if the two Iv agents moved next to each other then each could see the other getting ready for work, this makes it harder to be secretive and deceptive. They might then get ready for work early and watch each other so if one gets in the car the other does as well, the energy of trying to be earlier then is

wasted for no time advantage so the two Iv agents would be more likely to cooperate as a V team instead.



Other possible variations of the tit for tat decision tree are viable but lead to chaotic outcomes, for example as mentioned earlier where Iv1 starts getting to work earlier and then IV2 does this as well turning it into a race to get there first.

Instead Iv and B might start to cooperate if tit for tat seems futile to them, at given levels of the decision tree in the previous diagram Triangle they might decide to instead cooperate and make normal curve decisions to sharing work like a union would. This tree is still unstable just like a real tree is with a weak trunk, with a strong I police to make agreements binding then double crosses will create more inefficiencies as they work for lower wages more often than they should or even not work at all some weeks.

For example with the decision tree between Dodge and Chevrolet at some points one might get a time advantage from moving first and the game becomes Iv-B deceptive. At other times the game is so transparent movement by either car company is easily seen so there is not time advantage, they then cooperate as a team. Because no situation is completely transparent or obfuscated the game between them can vary between all variations of the color interactions.

Credible threats and promises

Credible threats and promises as well as commitment problems occur in Abundia because of a weak I police, the result is threats are ignored and promises are broken. This causes some people in the V-Bi teams to leave and become competitive loners while Iv-B loners sometimes join into teams, they might do this because one or the other is more efficient or it is easier to rip off others or get paid in the absence of the I civil police.

Also the lack of credible threats and promises causes some Iv-B deals to be inefficient through collusion or price fixing on one side, for example the Iv agents might maximize their profits by colluding like V while the B workers remain competitive loners. Instead of an honest poker game this would be like where the two Iv players could secretly signal to each other. The Iv agents agree between themselves to more often only offer $8 while the B workers think they can still sometimes get $12 by holding out. At other times the V-Bi teams break up through double crosses in

their ranks so both become unstable with weak policing.

Aperiomics games are then a complicated mix of chaos and randomness where sometimes the objective is to maximize profits and at other times to minimize losses. They can be played on G public ground where no territory is owned in the rules, they can also be on Gb private property where territory can only be taken in a consensual transaction. This system of games can describe all interactions between living things from plants and animals to human societies.

From these games and color interactions such economic issues as the principle agent problem, adverse selection, and free riders can be analyzed.

Principle agent problems

In these games the Biv cells can have the V team of two people as the management of the employment agency business having two Iv agents looking for employees for the client mentioned

earlier. This client takes one worker for a week only, this arrangement is renewed each week. The V team has the principle agent problem, for example the V team can receive a $1 an hour commission on an Iv agent getting a worker, Iv usually gets the worker for between $8 and $10 an hour in the game matrix mentioned earlier.

The management might also make a profit where the client gets charged a flat rate of $12 an hour for the worker. This can be more complex if there are many employment agencies competing for this and other clients, then there might be many Iv agents looking for workers and the V teams of the various employment agencies might cooperate with each other to some degree. For example there might be a thousand teams of V and Bi each with two people in them which are affiliated into many different kinds of Bi unions and V cartels, also two thousand Iv agents and two thousand B workers.

This can extend the Aperiomics model to more like a real world economy but for this illustration the current 20 people plus the client is enough.

The V team might not watch their Iv agents and so they often pay $8 an hour to their workers but tell the V team they paid $10 or some figure in between, they then get a higher commission.

This is the principle agent problem and is intractable in the sense that a V team cooperates with its own members without cheating each other otherwise it is not a team. Iv agents will always do this if they can, if they don't then a Gresham's Law dynamic applies where those more dishonest make more profits while the others cannot compete honestly and leave the business because of low wages or their conscience troubling them. When there are thousands of these game matrixes looking for a limited number of clients the Iv agents start undercutting each other until they cannot make profits unless they are defrauding their V teams.

The solution to this is a strong I civil justice system, contracts between Iv agents and B workers might be randomly audited to quench their chaotic deceptions. I and O use chaos to counter injustices from randomness and

randomness to counter chaos. For example the O police use random patrols to catch Oy thieves who have a habitual modus operandi that eventually is picked up by chance.

They can also use chaotic techniques against random teams, for example a Ro gang might being dealing in drugs and patrol an area to keep out the O police, however O can also move secretly and deceptively like Oy thieves to get through the holes in these patrols. In the same way the I police use chaos and randomness, for example they might randomly audit businesses looking for chaotic deceptions like fraud.

They might also use deceptive investigators to go into a Bi union as fake workers looking for evidence of illegal payoffs from businesses to strike at their competitors. The O police are like the O animals in the Roy food chain, they can act as a stealthy predator to catch Ro criminals or as a team based prey using patrols to fend off Oy criminals.

Iv agents caught by the I system might plea bargain to be audited more regularly or to snitch on any wrong doing by other Iv agents or the V team itself. In this way the system stays more honest and so honest Iv agents are still able to compete, this is also like a plant staying healthy rather than becoming unhealthy and corrupted.

The principal agent problem occurs when it is too expensive for the V teams to monitor their Iv agents, this is then moderates by the Iv agents snitching on each other for profit. This can be done by V giving incentives for agents that find wrongdoings in others, also the I police such as the SEC can reduce Iv penalties if Iv snitches on others.

There is also a principal agent problem in Roy, for example the Y mafia works as a team like V management. They work with Oy petty thieves and other criminals that use deception and fraud such as burglars and pickpockets. The Y mafia often backstops these Oy thieves in exchange for the lion’s share of the loot just as the V management pays the expenses of their Iv agents

in exchange for most of the profit, for example these Oy thieves might rob some neighborhoods and if the local Ro gangs like neighborhood watch come after them then the Y mafia will offer some protection.

This is then like the V management employing their Iv agents and sometimes having the Bi unions and consumers complaining or boycotting them. The V management might then have to protect their workers and sometimes pay fines on their behalf, this is like the Y mafia getting fined or going to jail when the Oy crimes are traced back to them.

The objective of these Oy thieves is like that of the Iv agents, they want to get to the weaker and more vulnerable people to rob as R like the Iv agents want to find B workers who will work for less money. This is like Oy hyena trying to find R prey such as gazelles which are sometimes easier to kill than Ro herd animals like buffalo or zebras.

The objective of the Ro neighborhood gangs is to keep these Oy thieves away from their more vulnerable members. The Y mafia then have a principal agent problem but the Ro gangs have a similar problem in that the R people can cause them trouble, for example they might not be protecting themselves and incite attacks that embroil the Ro gangs in a war of attrition against the Y mafia.

Also sometimes these R people act like a contagion in society causing trouble, they might be drug addicts, thieves, prostitutes, etc and the Y mafia wants to keep them out of their neighborhoods by persecuting them. This is like the Bi unions have some B workers who are troublemakers as a principal agent problem, they work for less pay and sometimes cause trouble that brings the Bi union workers into disrepute such as stealing on the job.

Free Rider problem

In the Bi-B cells of the game matrix there is a similar problem between the Bi union and the B

worker, the Bi union might try to keep its wages high enough for a living wage but the B workers will tend to free ride on this by offering just under this price to work. The result can be the Bi union gets no work unless it drops its prices so the B workers cannot free ride or threatens black bans if it does not get some work, however often Bi unions make up for higher prices by better trained workers.

The free riding can work both ways with the closed shop principle of unionism, for example the Bi union might demand a particular number of employees per month work at an agreed rate or else the Iv agents will be boycotted completely. This can exclude some of the B workers from working unless they join the union, each of B and Bi can then take jobs from the other by using the advantages of their cooperative or competitive approach.

In Roy there is also a free rider problem where the Y mafia might have Oy criminals causing them trouble, they get caught by the police and offer to inform on the mafia in exchange for going free.

This is like Iv agents working for a V company, taking contacts and experience gained there to start their own business or even try to get the V company into trouble to reduce the competition.

Many companies have this problem where people work for a short time and have to be trained, then they leave to use that experience to get a better job so the training is wasted. R people can also be free riders on the Ro gangs and neighborhood watch, Ro needs to protect them to keep their own neighborhoods from being overrun with criminals.

However the R people don't join the team and might even help the Oy thieves to avoid being robbed themselves. R people might be drug addicts the O police want to arrest but the Ro gangs feel obliged to protect them and get into trouble themselves.

However the reverse is also true in Roy as in Biv where Y-Ro teams have advantages that enable them to take from Oy-R competitive loners. For

example the Y mafia can take the lion's share of loot from robberies and individual Oy thieves cannot match the strength of the mafia team.

This is like V companies making much more profit than their Iv agents, Iv cannot complain or they are fired and someone else is hired. It is a closed shop like with the Bi unions, the Oy thieves cannot join the Y mafia and so are at a permanent disadvantage financially.

This is also seen in many caste systems and barriers to upward mobility in Biv societies, the V elite go to the top schools and look after each other getting most of the profits from businesses. Others trying to move upwards as Iv compete with each other and when their ideas are exhausted they sink back down again.

In the same way the Ro gangs can profit from R people for example in US ghettoes R people can be drug dealers and pimps, they make money selling to R addicts but these people are

ostracized from joining the gangs and sharing in the larger profits.

Adverse selection

Bi unions as well as the V cartels can suffer from adverse selection when people only want to join when they need this team cooperation, then leave when Iv-B competition serves them better. For example people might want to join a cooperative having health insurance only when they are sick while healthy people want to leave the cooperative, however this just illustrates that competitive people cannot cooperate or they would join a team.

Such a V-Bi cooperative can still survive but it is healthier if the I police are strong to prevent people deceiving it about how healthy they are. There can also be tit for tat incentives, for example those who stay healthy in the fund longer might get extra discounts while those leaving when healthy might have an additional penalty or waiting time to rejoin later.

Tit for tat then is reacting to competitive Iv-B behavior with a competitive or punishing response and V-Bi cooperative behavior with a cooperative response. At some point V-Bi teams will have a sizeable fraction of the population in them and the tit for tat responses will cause Iv-B competitive people to leave the cooperatives.

This then relates to moral hazard, which is similar to Gresham's Law in that pressures to do immoral things in business can be strong when there are few penalties or disincentives for doing so. For example just as B workers only signing up for health insurance when they get sick, B workers might join a Bi union only when they cannot get enough work on their own rather than to work cooperatively with their fellow workers.

Not only then does moral hazard apply in the sense that people might change behavior after making an agreement such as health insurance or joining a union, it also acts as a hazard to others who are more ethical. For example those honestly joining a health fund experience a hazard for

being moral, the hazard being those immoral people who only join when they are sick and leave when they are well.

Gresham's law also describes this hazard where bad people drive out the good though it originally only applied to money, for example if some gold coins containing less gold than they should then they will continue in circulation while the pure coins will be hoarded.

A Bi union can have the same problem, for example in the cells B workers might join the union to get better paying jobs and then try to leave when B individual contracting pays more and then try to rejoin the union later. Tit for tat responses would cause the union to demand penalties when former members compete against union workers. They might also have a waiting period or seniority system where those longest in the union get the most work.

The V teams also have this problem, they might have a management team that cooperates in

building employment agencies but Iv agents might often leave and set up agencies in direct competition or prefer to work on commission. Using tit for tat the V teams would have a seniority system where those longest in the team and most loyal might get higher wages, better offices, etc.

Adverse selection also occurs in Roy, selection tends to occur in any system either towards the center of the normal curve in V-Bi and Y-Ro, or as adverse selection towards the edges in Iv-B and Oy-R. For example Iv-B people are competitive and so selecting normal choices is no way for them to get ahead of the others, a competitor by nature needs to make selections better than others are making. So in the case of a V-Bi health fund adverse selection is the natural competitive choice, to only join when sick and leave when healthy while V-Bi people join to cover their average level of health.

In Roy adverse selection can occur with the Y mafia where Oy criminals can want their protection when they are in trouble with the

police or Ro gangs but then not want to hand over part of their loot to the Y mafia for protection. If the Y mafia allow this then they will lose money and power as the Oy criminals make more money but then the Y mafia has to spend money protecting them, minimizing their losses like health insurance does. The Y Mafiosi however make normal selections because they tend to support each other through thick and thin, this is like members of a V-Bi health fund supporting each other by paying in even when they are healthy.

R people also use adverse selection competitively, for example R drug addicts might use the Ro gangs to protect them from the police and retaliation from the Y mafia because of the R robberies. Then they might try to buy drugs elsewhere cheaper than from the gang. If the Ro gang does not get something for protecting R people from the Oy criminals then it loses money and power over time, this is like the Bi unions needing to get union dues from free riding B workers to compensate for the union raising the level of their wages.

The lemon problem

When the I civil police are weak lemons can be more easily sold deceptively, this causes the game cells to be less efficient. For example B workers might not be healthy but pretend they are to get a week's work. By the time this is realized it is too late to fire them so they get a week's work and might return later with a disguise to get more work or move to another area to use the same trick over and over.

The Iv agents might appear honest but many might be taking bribes from the sick workers to let them trick the client, the V teams then don't know which ones are honest so this is like the principle agent problem as well but the Iv agents are also lemons. The Bi unions might accept new B worker members that are secretly moonlighting for Iv agents so they can also be lemons for the union.

The V-Bi economy then has this lemon problem which is like Gresham's law where bad workers or products drive out the good. Because dishonest Iv agents make more money they can undercut the

honest ones so like used cars the market eventually becomes all lemons because the good used cars won't accept the lemon price.

For example Iv agents might be mostly dishonest and so get poor commissions from V to compensate, then honest Iv agents can't afford to work for V. B workers might so often free ride on the Bi unions that honest B workers also get retaliated against.

However the problem also works the other way, Iv-B buyers of cars might always buy lemons because they don't trust the better quality but higher priced cars, they are competitive so they think they can make more money in a poker game like negotiation where most cars are lemons. This might often happen where people buy from charity stores selling second hand goods or swap meets.

This is also like people only buying the cheapest quality in a supermarket on the assumption that the expensive goods are no better or they can pick

a bargain from the shoddiest goods. Those people only willing to pay a higher price might often avoid lemons completely because the lemon sellers want to get rid of their cars quickly before they break down.

For example the market can often break into three parts according to the old saying Cheap, Good, Fast, pick any two. So Iv-B people tend to go for cheap and fast products and compete to find those that are good quality in them.

V-Bi people tend to look for cheap and good products by shopping for bargains and quality, they are prepared to wait for a long time until a bargain comes along. Then with good and fast products the problem is how cheap they can be bought for, they are more usually sold in the I-O market where the police ensure the products are of good quality and service is fast. In effect then good quality represents the selling point of a Bi union while Iv agents use speed as a selling point, then the price is found as a combination of chaos and randomness between these two.

In the game matrix mentioned earlier the Iv agents have to select between the B workers and the Bi union workers. If they always pick workers based on price to maximize their commissions then they might pick more lemons and get into trouble or be fired over it as cheap and fast but not good, the V team might prefer another Iv agent that only picks Bi union workers who are good and cheap but not fast as there is less trouble from the clients.

There are then two economies, the Iv-B economy where deception is allowed and lemons are like bluffing in poker. Success then depends on how dishonest the Iv agent and B worker are, this drives out both the honest B worker and honest Iv agents who cannot compete but causes booms of cheap labor and busts when they are exposed as incompetent.

This was seen prior to the GFC where Iv subprime agents used dishonest tactics to present loans likely to default as much better to their V management. Because these loans had higher commissions, as the B borrowers had nowhere

else to borrow money, the market became saturated with mostly lemons as subprime loans.

This boomed because they undercut honest Iv-B business and drove it away to get better economic profits elsewhere, the dishonest Iv-B business then took over more market share. However it eventually led to a bust when clients realized the bonds were mainly lemons.

The Iv-B agents and workers driven away by the dishonest ones can often do good business by joining V-Bi teams, many banks prior to the GFC made good money but also survived the GFC when they received extra business in the flight to quality. This is like used cars where once people realize the market is mostly lemons will move to the higher priced cars as long as they are more open and honest in proving their quality.

Many people will only buy goods if they are more expensive on this principle it can then cause the sellers of lemons to raise their prices to improve sales. There is then a tendency for Iv-B and V-Bi

prices to mix together to some degree even without a strong I-O police.

This then is the same Iv-B and V-Bi disconnect referred to in my book Crisis Aperiomics, it is solved by a strong I civil police. For example lemons sold might have a compulsory warranty to deter fraud or the V-Bi teams might offer insurance and warranties with their sales. By naming and shaming dealers selling lemons they can be driven out of business allowing honest Iv-B buyers and sellers to reenter the market, Iv-B needs deceptions and secrecy to compete.

In Roy there is also a lemon problem, Oy agents more like criminals can cause trouble with fraud in a Roy society, for example many of those working for the Roy employment agency would defraud their R workers or the Ro gangs if the O criminals police are weak. These people usually cannot be trusted and people get robbed, when the O police are weak some neighborhoods become crime ridden by Oy like a contagion.

Sometimes R people are also criminals such as drug addicts and prostitutes so these areas become like lemons. Living there then has cheaper rents and even safer pockets in these suburbs cannot get high rents because people assume they are plagued with crime as well. Like with Gresham's law the bad drives out the good, when neighborhoods become lemons then investors don't want to own property there causing prices to fall.

Often there can be a flight to quality like white flight in some US cities where people want to move to V-Bi suburbs where they are highly transparent, for example many Y mafia suburbs can have low crime because they keep the Oy criminals under control. With any hidden aspect to a suburb people assume it is a lemon and prices fall, for example if streets are dark at night with poor lighting many might assume crime is high there and stay away.

It can also be like the broken window theory where graffiti might make people assume the area is a lemon because the O police don't clean it up.

This draws money from a neighborhood which can then cause more crime as people have to minimize their losses to survive.

Costly to fake

The costly to fake principle does not always work in these situations, the reason is the Iv-B economy develops high momentum and those towards the front of this boom or bust tend to do better. For example those B who got subprime loans early on did well as house prices went up, also Iv agents at the beginning of the boom made more commissions because the market was largely untapped.

When the Iv-B market is so unstable however it might be more costly not to fake according to Gresham's law, for example more ethical Iv subprime salesmen left the business because of having to con B borrowers with hidden upfront costs or giving them loans they could never service. Because their scruples prevented them from faking loan documents to get them approved

by the V management it became more costly for these Iv agents not to fake.

When the I civil police are stronger however this principle reverses so it becomes more costly to fake, those Iv agents faking and altering loan documents as well as V teams like Ameriquest turning a blind eye were sometimes fined by I-O regulators. However for a long time the profits were larger than the fines and so it still became more costly not to fake as other less ethical subprime lenders would take market share any way they could. In a V-Bi economy it can be much more costly to fake deals because it shows those who do it are not team players.

In a more balanced Biv economy costly to fake works better because the I-O police are stronger but also the slower and more transparent V-Bi economy is well integrated and slows down transactions. This moderates the ever increasing momentum of the Iv-B economy and is like in poker where people show their cards at the end, those bluffing can get a bad reputation when their cards are exposed and so their future bluffing or

faking becomes more costly. This cost however is weighed against it being more costly not to fake at all in poker.

In Roy the costly to fake principle has the same problem, in an Oy-R crime wave criminals might have to grab all they can before the neighborhoods are picked clean and so they might have to fake contrition if arrested. Oy-R follows booms and busts of crime waves and the momentum is hard to stop by making it costly to fake or commit fraud, this happens to some degree by Ro gangs punishing Oy criminals defrauding people there. It can also happen with the Y mafia punishing Oy criminals that snitch on them or deceive them in other ways.

The main problems comes from a weak O criminal police, the cost of faking cannot just be raised by increasing criminal penalties if it is still more costly not to fake. Instead the O police use the threats of criminal prosecution against Oy and R people to get them to snitch on others, and to report on wrongdoings in the Y and Ro gangs. This creates a pervasive web of snitches so the O police can

catch waves while the momentum hasn't gotten too strong.

This was the problem prior to the GFC, the SEC and regulators did not have enough snitches in the subprime loan industry to understand how much fraud there was. By the time they tried to slow this fraud it was too late as the profits from faking loan documents and B borrowers using liar loans were so high that fines were small by comparison. If the police had deterred the momentum of this financial crime wave from getting started then it would have been much easier to control, this is the same process with any crime wave built on deception.

Externalities

Externalities are activities that affect other people, organization, the environment, etc that are not directly connected to these activities. This definition can refer to random or chaotic affects, for example pollution from an Iv-B factory such as building computer fries might damage another Iv-B business such as fishing nearby.

There can be a direct chaotic connection between the two, toxic chemicals go out of the factory into the river, into the fish, and then into the consumer making them ill. There can then be tipping and righting points with dependent variables like this, for example enough pollution might kill the fish or put them over a government limit on the amount of pollution allowed in fish or the water.

The righting point may be where the pollution dips under this limit or enough of a reduction stops killing the fish so they remove the toxic chemicals from their bodies by themselves. If there is a Gresham's law dynamic then the honest manufacturers are being driven out of business, the chip makers might all have to pollute to save money and survive. They might also have to hold to ransom other businesses with their negative externalities just to remain competitive with the other dishonest businesses.

Chaotic externalities might also pass between V-Bi industries that cooperate with each other, for

example the chip factory might cooperate with the fishermen to give a normal level of pollution with some deviation up or down, this can lead to a normal level of sickness from the fish. This can occur for example with burning coal where about the same amount of pollutants are sent into the atmosphere where they randomly disperse.

People might feel ill from the smog created that makes them more tired and sometimes causing sore eyes, however it might rarely reach tipping points of causing actual sickness or death. This kind of pollution occurs in Los Angeles and increasingly in China. This kind of negative externality is hard to clean up because it comes to a normal level, when other businesses complain about the smog then the polluters point to the smog in other cities being tolerated.

By moving one city or state to a new normal, such as California having extra smog reduction on cars or mandating higher fuel economy, it threatens the normal levels elsewhere and the V-Bi team cooperation between the states would tend to resist the smog innovations. This kind of negative

externality can then become part of a stagnant economy.

Iv-B business are like B roots and branches of a tree, consequently they often have few externalities because these interactions are concentrated in the conduits. For example animals in the soil near B roots might hardly notice them, the intake of nutrients and expelling of some waste products might happen mainly on the ends. This is like oil pipelines which are designed not to leak and waste oil, the pollution is more likely to occur at the ends of the pipelines.

Freeways can also be Iv-B and have few externalities, people tend to stay on the freeway to get to work and might rarely go off it for food or fuel. This concentration of resources in conduits occurs for both positive and negative externalities, it reduces the benefits to people unrelated to the Iv-B business as well as reducing the costs to them.

For example shops and gas stations near the off ramps of freeways might get little business because people are usually rushing to get somewhere, if they get off the freeway it might be hard to get back on with congestion. They are then more likely to buy goods and services at both ends, like filling up with fuel.

An Iv-B economy can then be inefficient because of these lower amounts of externalities, resources become concentrated in these tubes often in deceptive speculation with booms and busts. For example a real estate boom might tie up capital in speculating with homes that in the bust no one wants to live in, the resources in building the houses were in conduits that seemed efficient at the time but the benefits for this work does not diffuse into the rest of the economy.

This was seen after the GFC in the US where many subdivisions with new homes were virtually abandoned because once these homes did begin to diffuse randomly into the general economy few people wanted or could afford them. Iv-B freeways can be an inefficient allocation of fuel

stations, people might have to travel long distances on them to get fuel instead of finding one near their home. This occurs with many positive externalities in an Iv-B economy, for example people might buy cheap electronics goods from mass production lines but random variations of those products might be impossible to get or prohibitively expensive.

In an Iv-B economy random diffusion of goods and services is often because of chaotic damage, this is like a leaking steam pipe carrying a lot of energy in a boiler room kind of booming economy. The energy stays in the pipes and the rest of the building around them might remain cold, when the heat does diffuse out of the pipes it is usually from an explosion or leakage from damage.

For example people might only get some more variations in their electronics goods when there is a crash and companies are scrambling for more orders, look for example how long it has taken for easy to open plastic packaging to come to the market. Headphones for example might come in very difficult to open plastic containers that are

cheap to make, the positive externality of this is highly focused on cheapness and being airtight rather than being easy to open. The negative externality of trying to open them is tightly focused on the end user rather than diffusing along the supply chain.

In the same way the Great Moderation of inflation in the global economy was according to Aperiomics because extra capital and resources were tied up in these conduits and so did not diffuse enough to cause inflation, instead it moved in chaotic speculations between booms and busts, B innovations and Iv counter innovations, etc. For example despite this period of low inflation many products crashed in price due to innovation and mass production in lines that resembles the roots and branches of a tree. Other goods such as luxury goods for the rich skyrocketed, both of these were on the ends of these conduits and so did not cause inflation or deflation.

The exception in the Iv-B economy is where it approaches the floors and ceilings as momentum

propels it into going too far, for example the US housing boom created such momentum that like cars on a freeway going too fast in a conduit it could not slow in an orderly manner causing a massive crash. Iv-B weeds have to reproduce, they use this Iv-B fast growth and innovation to mutate around the more slow and stable plants like grass.

However when they reach the limits of this boom they need to flower and make seeds to survive the coming crash, there is then a small and rapid V phase where seeds are created and distributed randomly. This is like Iv-B businesses in a boom where some manage to save nest eggs of capital before the crash to take advantage of low prices in the coming race to the bottom and build new investments or businesses.

For example a real estate boom usually has some people who see the crash coming and they sell out, this is their seed capital like Iv-B weeds make seeds. This happens in electronics goods all the time where some Iv companies such as memory chip makers are close to or going bankrupt unless they manage to find another innovation. As of

2012 most makers of Android smartphones make little money but sprout like weeds with small innovations, other larger companies like Apple and Samsung overshadow them like the V leaves of a tree.

After hitting the ceiling there are other random externalities for a while as seen in the GFC, companies and people's finances became wreckage from the chaos and prices plunged often in free fall like a falling plant under gravity. This can give some bargains such as cheap office furniture and talented employees such as from Lehman that diffuse around these collapses. Then there is a competition to get out of collapsing assets and raise cash, those who do this with the most speed and deception to avoid alerting other make the most profits. For example those who knew subprime bonds were going to collapse shorted the market to take advantage of the crash that was coming.

This is then like the Iv-B weeds creating externalities of random humus for other plants to grow in as well as themselves. Often however Iv-B

businesses free ride on damaged V-Bi businesses here because their Iv-B humus or wreckage from their businesses is more toxic because it mutated into undesirable goods and services for speculation.

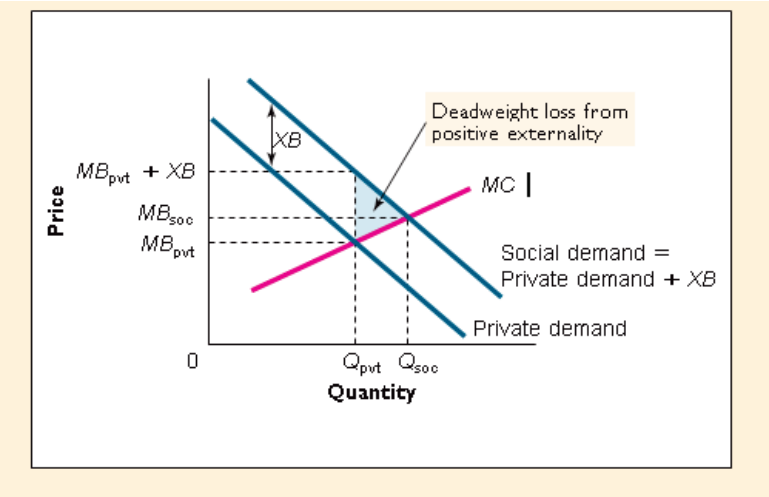
For example the tech bubble produced buildings as well as inventions that no one wanted after the crash except at a steep discount, the externalities of the crash then were often negative with the positive being smaller because of these mutations. Subprime bonds became almost unsalable because no one could determine who owned the underlying mortgages or in a chaotic economy who was going to be willing or able to repay their mortgages. However before they crashed these subprime bonds had no negative externalities because their internalities were contained in the Iv-B conduits.

When the Iv-B economy collapses it tries to get to the floor quickly like a wilting plant falling, some short the economy to profit most from this and accelerate the process. When it approaches the floor it can have another damaging crash where

this downward momentum has to reverse itself again, this is like a falling vase breaking as it hits the floor.

At this time there are often Bi externalities as the B downward momentum spreads out more randomly from hitting the lowest prices, for example a Bi community with plenty of savings might benefit by cooperating to buy houses cheaply after the GFC when prices finally reached the bottom. The US government as of 2012 has been funneling cheap mortgages into the Bi middle class community that can afford to borrow because of the crash in interest rates.

This is the phase where Iv-B weeds have to change direction and use their seeds to regrow before the other weeds, those who see the bottom coming avoid more damage from this and can use their seed capital to buy in and start growing at the cheapest prices. Once the others realize the economy is turning there will be a race to get in as the green shoots of the economy start sprouting frantically in upward Iv momentum creating the next boom and coming bust.



In the diagram a positive externality is the difference between social demand and private demand, because Bi is social and B is private then this can be the difference between the activities of a B worker and a Bi worker. For example an individual B worker bought a speculative home in the US real estate boom and then when this was foreclosed on the Bi community got a cheaper home at below cost.

Generally though there are fewer positive or negative externalities from B workers except at a floor or ceiling, for example their speculating in

homes was like a closed feedback loop with Iv as prices went up or down. When they went up it affected the Bi community as a negative externality because it made their homes more expensive for younger people to buy, however it was a positive externality for older people to sell so the total was a wash.

The externalities in the above diagram occur more in the I-O market where chaotic Iv agents might create positive and negative externalities in Bi social demand. For example Iv agents might sell fruit that is sometimes rotten, this creates positive externalities when some people get a bargain and negative when others waste their money. An Iv factory might create positive externalities with employment and cheap goods, then negative externalities with the pollution from the factory. An externality then can be how an Iv-B individual affects V-Bi society.

A V-Bi economy is based on externalities because everyone is in a team, the point of being in a team is that you average out the externalities of others and the internalities of Iv-B people are minimized.

For example the Iv-B economy has internalities where people try to concentrate the benefits of their actions for themselves, helping others with them is a leakage that might help their competitors and by doing this hurt themselves.

Negative externalities also tend to be minimized as hurting others randomly around Iv-B distracts them from the necessity of moving quickly between the floors and ceilings. For example an Iv-B factory by randomly polluting can get mired in legal actions and tit for tat that slows its innovations, they are better off internalizing their pollution by secret polluting or moving it elsewhere.

So for example second hand computers and computer waste might be shipped to Africa where the problem is in effect swept under the carpet rather than resolved. In this way the Iv-B electronics economy avoids disputes that could slow innovation, even minor resistance from V-Bi to negative externalities could bankrupt companies racing to innovate with high leverage.

This then gives rise to a chaotic theory of internalities explained later while the Coase Theorem is more of a randomizing theory of externalities. Internalities and externalities generally reach a compromise in the I-O market, for example Iv-B electronics goods internalize their profits and losses so Bi consumers in Europe and the US don't see the social costs of pollution and sweatshop working condition.

Sometimes though these Iv-B industries have to compromise by raising their wages and working conditions when exposed, their internalities such as sweatshop conditions might then become externalities with bad publicity. Bi consumers might then boycott their goods, this has happened to some degree with Apple in 2012.

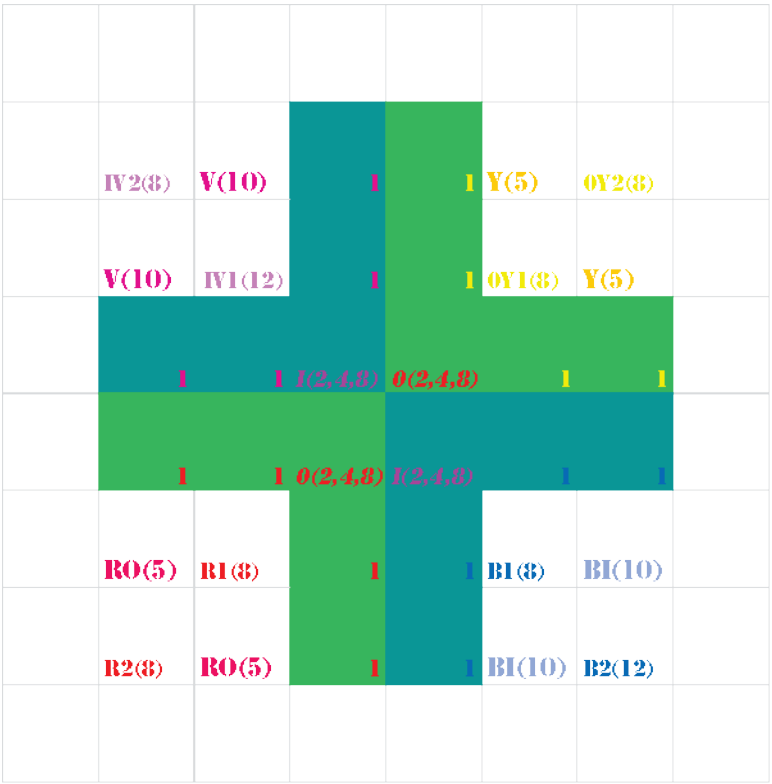
Also the internalities of BP's poor safety precautions in deep sea drilling led to negative externalities in the Gulf of Mexico accident. Iv agents might buy goods hard to sell or close to perishing from V companies who need to get rid of these negative externalities. For example having excess older stock might make their newer

stock look bad as it appears the goods are not selling well. A computer company might hire Iv or Oy contractors to reduce their negative externalities when deceptive competition is needed, for example with getting rid of old stock.

They might then pay Iv agents to internalize these older goods by moving them to a different area or country, even scrapping them. These might be sold cheaply in small amounts online such as on Ebay by these Iv agents while the V company sells their newer stock in highly visible department stores.

Other goods might be internalized into Iv-B auctions where the prices change chaotically between a floor of a reservation price and a ceiling of what the Iv agents can get for them without damaging losses. For example old electronics stock might be auctioned and Iv dealer bid against each other chaotically hoping to sell these on Ebay or at swap meets, sometimes they pay too much suffering losses and at other times they find a bargain others don’t see and make large profits.

There is then no normal price and profit in these internalities, those who lose conceal this information because it might help their competitors to know they are hurt or that some goods are not worth buying at auction. Also they conceal their profits so others don't bid more against them at upcoming auctions.



The game matrix above can illustrate the Coase theorem of externalities as with as a theorem of internalities. For example the Bi unions by keeping to an average price exert positive and negative externalities on B workers around them by making them sometimes able to free ride on their $10 wage by getting $8 more easily. However B can get a negative externality by this making it harder for them to get $12 an hour from the Iv agents.

B and Bi might negotiate deals between them to moderate this, for example the Bi union might agree to not undercut private contractors if the contractors agree to not steal some jobs from the union. Bi unions by demanding better workplace conditions and striking to ban sweatshops might create positive externalities for a community, V management might then negotiate in a war of attrition to reduce the negative externalities these costs would have on goods for the community. For example the Bi unions might strike for better conditions for the worker and supervisor the client employs for the week, this can create a negative externality with higher prices for the client's goods.

Here there can be a positive internality for the Iv-B work and supervisor and a negative externality for the community, for example the profits from these better conditions allow the Iv agent and B worker to be injured less often and so they recover better when the economy crashes at the ceilings. These benefits then just accrue internally to them while the extra costs diffuse into the economy as the clients have to raise their prices to cover it.

In the game matrix the Iv agents and B workers negotiate for positive and negative internalities, they might gain or lose money compared to each other but this money often doesn't diffuse out to the V management or Bi unions. For example the B worker might offer the Iv agent a kickback of $2 an hour to give him a job for $12, this is better than the incentive the Iv agents gets for finding B cheap workers.

The deal is internalized between Iv and B as neither have an interest in others learning about it. With some agents getting this kickback other more honest agents might have to find cheaper

workers so V keeps its average costs down, the effects are then internalized to other Iv and B.

Bribes in the real world economy can also be positive and negative internalities rather than affecting social costs and benefits, for example if companies compete in offering bribes for a military contract or offer jobs to government officials when they retire then this most affects those companies. The actual costs of these bribes might not affect the costs of the goods to the wider community much, if the bribes were policed then similar deals might also be done because the companies would offer similar products without the bribes.

More generally though externalities can cause internalities such as pollution controls causing chip manufacturers to lose market share compared to their competitors. Internalities can also cause externalities such as rising rates of bribes eventually creating poorer goods and higher prices.

The V management might also exert externalities on an economy, by suddenly taking more work for themselves they might cause the Iv agents to go broke because with their competition they have fewer savings to ride out this shock. The Iv agents might then negotiate lower commissions to the V management to keep their jobs.

For example the push by the V wealthy for rent seeking and lower taxes can create a negative externality as other have to pay more in taxes or the national debt goes up. It can also create negative internalities as Iv agents have to compete harder with each other to survive on the lesser amounts of money available, their bankruptcies however have little effect on V or other parts of the community because other Iv agents take their place.

Like the Coase theorem these internalities are sometimes more difficult to resolve without government action, the I-O market and police might have to intervene to moderate this chaos and the booms and busts caused by them. For example the Iv-B deals for jobs in the game matrix

might be policed to avoid deception, fewer Iv agents might deceive their V bosses with the principal agent problem and fewer B workers might moonlight from the Bi union.

Stronger I-O police can moderate the Gresham's law dynamic where bad business drives out the good in internalities, for example when Iv agents and B workers make secret deals with kickbacks this makes it harder for honest Iv-B business and so some of it collapses.

In the subprime bubble prior to the GFC there were many internalities, for example subprime lenders made profits on business that did not exist before so they did not take much away from other V lenders as a negative externality. Nor did it affect the wider Bi community as it was mainly people refinancing. Also B workers buying homes with liar loans did not affect the wider Bi community for a long time, it was a factor in the real estate boom but this also happened in other parts of the world with much less subprime lending.

The Coase theorem covers these externalities and whether people and businesses can come to an agreement to increase or limit them without government interference. In Aperiomics this refers to when the I-O police are weak the economy separates into Iv-B and V-Bi businesses that can have externalities and internalities affecting each other, sometimes these businesses can come to an arrangement to limit negative internalities or externalities and promote positive internalities or externalities.

This is rarely efficient because in Iv-B businesses have to compete to survive and if they can hurt their competitors with negative internalities while limiting positive internalities then they gain a competitive advantage. Also in V-Bi externalities tend to reach an equilibrium as the Coase Theorem predicts but this can be inefficient and cause stagnation.

For example in the 1970s Bi unions kept wages high and in exchange V management often colluded in price to protect themselves, this created a cozy arrangement where both had to

dismember the Iv-B economy for extra profits. So these V companies made deals to tolerate the negative externalities of Bi unions being slow and inefficient workers, this inefficiency was like a pollution in the economy.

V price collusion also create negative externalities in the community with higher prices and less innovation like pollution, the Bi unions came to deals about this by getting higher wages to compensate them. This then is the problem with the Coase Theorem, that while some companies and workers can make deals reaching an equilibrium on their externalities these are random and diffuse much more widely.

Others then might have to engage in wars of attrition or make payments so the equilibrium reaches everyone. More usually the V-Bi economy spreads or diffuses these deals more efficiently like heat through a liquid, however the Iv-B economy internalizes its profits and losses where they might be affected by V-Bi negative externalities but be unable to negotiate about it.

For example a chip maker might be polluting the river but Iv fishermen might be competing against each other and so not be able to cooperate enough to offer payments to the chip maker to install a filter. If they tried to negotiate this payment then because there is no normal Iv profit among the fishermen then some poorer ones would balk at paying while others would try to bluff by crying poor and free ride.

Other might make bigger profits but not enough to pay for the filter themselves, the pollution then becomes a factor in their competition and the costs of it are internalized in their struggles with each other. The result might be chaotic collapses with some fishermen but this can also be internalized as others buy up their boats and join the competition, also this might result in overfishing so the business finally collapses to a floor.

When many fishermen exit the industry the fish might rebound give booms and busts at different bifurcation points because of the pollution. To moderate this problem the fishermen might form

a Bi cooperative and even affiliate with fishermen in other rivers to counter V cartels polluting their rivers, however this can result in wars of attrition damaging to both sides.

For example the Bi fishermen might blockade factories to prevent boats unloading supplies to it to compel them to install a filter, B fishermen might also secretly sabotage the plant. They could also spread awareness about the chip manufacturer hoping the Bi consumers will boycott the fries until they install a filter.

In a game of Iv-B poker if someone can get away with annoying habits such as humming, smoking, etc then these negative externalities might increase his competitors' profits. Without an I-O police enforcing rules of the game these annoying habits might rise and fall chaotically, there can also be some agreements where one annoying habit is bought off or countered by another.

For example one player might smoke and another talks during the game, they might agree to limit

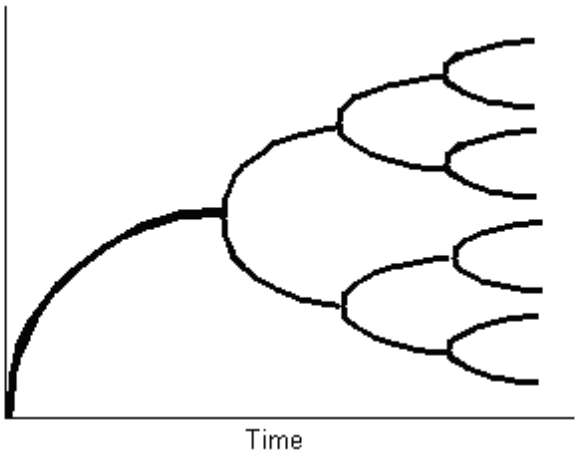
both or else each escalates the externalities like an arms race. In the same way positive externalities are reduced because they help their opponents, players avoid facial expressions called tells that indicate what hand they have.

They might also avoid relaxing if this tends to relax other players and makes them play better. Generally V-Bi players might use these negative externalities to slow the game down and affect the chaotic players more. There can also be nontransitive internalities in the game, for example one player might be able to read another player's tells but he doesn't share this information with others. One might smoke to annoy one other player while the others don't mind.

Sometimes Iv-B businesses can negotiate payments according to the Coase theorem to reduce negative externalities and increase positive externalities, for example the chip factory mentioned earlier might receive payments from the fishermen to install a filter to reduce pollution. However if there is a competitive advantage lost from this payment the chip factory

might refuse, for example if it is competing with other chip factories then the cost of the filter might hurt it more in the momentum to innovate with new fries than in helping the fishermen.

Iv-B economies tend to race between booms and busts causing wreckage at the turning points, there can also be a permanent change of revolutions and counter revolutions where the turning point becomes a bifurcation point in chaos theory to a new goal or path.



In the diagram above bifurcation points lead to new chaotic behavior, for example disputes

between the fishermen and the chip manufacturers might lead to settlements that perturb the market into large changes. The chip manufacturers in an area might have to curtail production and lose out enormously to other companies elsewhere able to expand and pollute.

This has been a huge factor in the growth of Chinese industry, the advanced economies lost many industries because they had to pay for filters and pollution controls to protect other industries from their negative externalities. Instead of creating an equilibrium this can make bifurcation points where European electronics manufacturers might collapse or move to Asia.

In this case the fishermen's industry might be destroyed by the chip makers as has occurred in many Chinese rivers from industrial pollution, each industry has high leverage and it is unlikely the payments the fishermen can make would happen to match the payment needed by the chip factory because the situation is chaotic not random.

Even if it did the changing momentum in the system would make both worry about the future effects, for example if the filter cost 1% of the profits of the chip maker then even if it was covered by the fishermen then the fish might reach a tipping point and collapse from some other pollution. When the fishermen stop paying maintenance the chip maker then needs to remove the filter wasting the money spent on installing it.

During this time the 1% difference in prices with an Iv-B perfectly competitive market might make their fries too expensive and send them bankrupt. The manufacturer might also have a V normalized policy at its many plants with a normal level of pollution, this can cause problems in some rivers but not others. However changing this in just one location can cause friction in the V team, for example if one manufacturer installs a filter then this tends to move the team to an overall new position where all should install filters.

The Coase theorem can presume some cooperation between people and businesses as

well as a stable nor normalized situation, the chip maker mentioned earlier might be assumed to have a normal amount of pollution and the fishermen have a normal catch of fish so this is the basis on which compensation is worked out where the fishermen pay the chip manufacturer. This might work overall because sometimes the fishermen would lose more fish and at other times less for an overall average.

Because of this and a cooperative attitude in a V-Bi economy the chip maker might accept a payment to add a filter plus an additional amount to cover a reduction in the number of fries they can make, with little Iv-B innovation they need not fear abnormal changes to their business with small extra expenses from the filter or decreased output of fries because of it.

However Iv chip makers and B fishermen might not have normal amounts of fish lost to pollution or normal costs of lost production. For example with competing B fishermen causing fish levels to crash they might not be able to work out what effect the pollution is having. In a chaotic market

for fries the manufacturer might not know how much limits on production might affect their business and so they cannot work out how much compensation is enough.

The Iv-B economy is highly unstable, refusing to install a filter can cause the fishing industry to go into a tailspin so downward momentum causes each fisherman to race to sell out before the price of their businesses drop to the floor. Once it reaches this lowest point, say the cost of moving fishing boats to another river plus replacement cost of the boats, like any mutated plant it might not be able to regrow and dies. Some weeds then might have time to seed before they crash from a lack of nutrients, however they might not find suitable soil for their seeds which wither or don’t sprout.

The Gain in Surplus from Shared Living Arrangements

Benefits of Shared Living		
Total cost of separate apartments	**Total cost of shared apartment**	**Rent savings from sharing**
(2)($400/month) $800/month	$600/month	$200/month

Costs of Shared Living			
Problem	**Ann's cost of solving problem**	**Betty's cost of solving problem**	**Least costly solution to the problem**
Ann's phone usage	Curtailed phone usage: $250/month	Tolerate phone usage: $150/month	Betty tolerates Ann's phone usage: $150/month

Gain in Surplus from Shared Living		
Rent savings ($200/month)	Least costly accommodation to shared living problems ($150/month)	Gain in surplus: ($50/month)

In the diagram above there are positive and negative externalities from sharing an apartment, there might be many thousands of shared apartments like this through a city and thousands of others where people chose to live separately and not share. In an V-B economy this sharing might give a competitive advantage, for example they might save enough money by doing this that they survive a recession better without going broke and moving out of the city.

They might also save enough to invest in a stock market boom to have enough savings from that to

survive the coming crash. People sharing then need to negotiate with each other over their internalities and externalities, where these can reach tipping or righting points then the answer can vary. Whether someone can put up with another's phone usage can allow them to reach a righting point where their savings are just enough to survive a recession in the city.

To evaluate the costs of these externalities then it is important to understand these tipping and righting points as well as the momentum towards them. For example the phone usage might be increasing with some momentum because of a family crisis, at some stage it might reach a tipping point where it causes a crash and the apartment splits up. There can also be internalities in this situation, with more than two people these can be nontransitive.

For example in the diagram above Anne might need to curtail her phone usage while Betty needs to tolerate it more, but then Carol moves into a third bedroom. She tends to play the TV too loudly which annoys Anne more than Betty.

However Betty plays her music in her room loudly which annoys Carol but not Anne because Carol has trouble hearing the TV because of the music while Anne can hear the phone clearly.

So Carol needs to moderate her TV usage to satisfy Anne, Anne needs to moderate her phone usage to satisfy Betty, and Betty needs to moderate her music playing to satisfy Carol. These internalities don't affect the wider community with externalities, also the TV, music and phone are not strictly externalities here because they don't affect everyone. This forms a vicious circle where each tends to annoy the next, however it can become a virtuous cycle if they all agree to lower the volume. This then is a Roy problem, the goal is to minimize losses because silence is a scarce commodity here.

However there can also be externalities in the apartment, for example Carol might use too much power with her TV which affects Anne and Betty with a negative externality. Betty might sometimes sing in the shower because of her

liking for music, Anne and Carol might like this as a positive externality.

This sharing can also lead to virtuous circles of internalities, for example Anne might like it when Betty plays certain songs, Betty might like it when Carol listens to particular programs on the TV, and Carol might like it when Anne gets calls from the landlord because more maintenance is done on the apartment. This virtuous circle is more Biv as it distributes benefits to the apartment sharers, they each receive a surplus compared to their reservation price of the rent they decided to pay. With the vicious circle that occurs when other songs, TV shows, and phone calls are made they can receive deficits compared to their reservation price rent.

There can also be interactions between internalities and externalities as a compromise between randomness and chaos, for example Betty's singing might be a positive externality but produced some negative internalities as Anne wants Carol to turn down her TV so she can hear the singing better. The negative externality of

Carol’s TV wasting power might cause a positive internality, Betty might play music less often to save money on her share of the power bill which annoys Carol less.

A stronger I-O police might be needed to moderate the internalities and externalities, for example the three might go to court where Anne and Betty try to make Carol use the TV less since they have a lease on the apartment and cannot move. The judge might rule that the negative externality from Carol is unfair and order her to use her TV less often. He might also rule on the nontransitive internalities between them.

The negative internalities might also require the I-O police to intervene, for example the level of these chaotic problems might booms and bust because of feedback. Carol might play her TV louder to drown out Betty’s music, Anne then starts talking louder on the phone which annoys Betty who turns her music up until the noise makes the neighbors complain with the negative externalities as the sounds hits a ceiling creating open conflicts. The judge then might moderate

this chaos with an average level of sounds for each in decibels or a lower overall ceiling of sound.

Positive internalities can also boom and bust, for example goodwill between the three girls might increase as a good deed from one inspires a similar good deed from another. Positive externalities tend to average out more, normal behavior is rewarded more than deviance.

For example Betty's singing might be a more positive externality when the songs are liked by both Alice and carol, this usually means the song has to appeal to average people more than those on the edge of the normal curve otherwise it's more likely only one of the girls would like it. It could then become nontransitive, for example when Betty sings a Madonna song both Alice and Carol might like it. When she sings religious songs then only Alice likes it, this can lead to a nontransitive tit for tat when Carol turns up the TV in retaliation.

The more time the three girls have to react then the more likely tit for tat will produce random cooperation, if moving first has a time advantage then it can set off another virtuous or vicious circle of internalities. For example if Betty gets ready to sing and puts out sheet music then Alice and Carol might have time to argue about the song selections and come to a compromise. If Betty suddenly starts singing in the shower then she might cause problems with Carol not liking the song but unable to stop it quickly enough. So Betty can sing the songs she wants by using an Iv-B time advantage at the risk of creating nontransitive internalities in response.

Sharing an apartment might presume a V-Bi cooperative attitude in the sense that a chip manufacturer sharing a river with fishermen can also presume cooperation, people might generally get along sharing with a normal level of externalities. For example a normal level of smoking might be tolerated inside or on a balcony in the apartment in exchange for a higher rent, this smoking would vary randomly. However if the smoker was under chaotic stress from work then the smoking might continue to increase until it

reached a tipping point where the smoker had to move out.

Internalities and externalities can then be an unstable mix of random and chaotic movement moving between tipping and righting points, or floors and ceilings, but tending towards a normal state of affairs. Other areas can have random externalities that lead to stagnation as they normalize at inefficient levels.

When the two have to interact often this leads to the need for an I-O solution where O criminal and I civil policing is more efficient. For example the I civil police might impose taxes or fines to reduce negative externalities or subsidies to promote positive ones, also to reduce negative internalities or vicious circles to promote positive internalities or virtuous circles.

However as mentioned earlier using subsidies or penalties to change externalities works better if it is directed towards the normal behavior. Changing internalities this way works better if the floors and

ceilings are changed. For example normal pollution from the chip maker might be most affected by lowering taxes on keeping pollution 10% below normal levels rather than trying to reduce peak emissions.

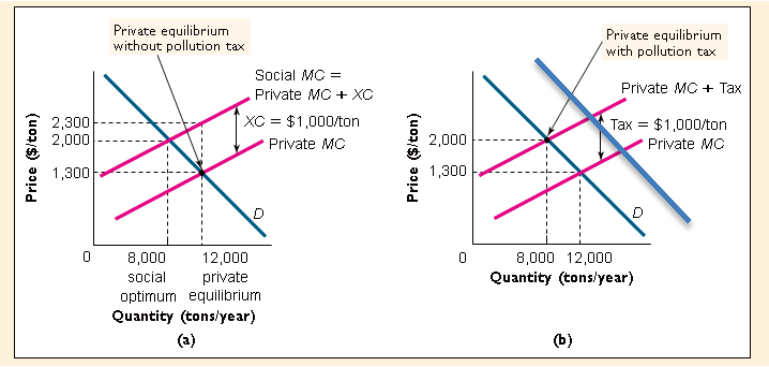
Some days this pollution might cause sickness in swimmers as well as problems with fish, fining the chip manufacturer on reaching this pollution ceiling will be more chaotic. It might then cause him to pollute up to the edge of this ceiling as the momentum of business keeps them from going back to a normal pollution level. For example the manufacturer might be monitored continuously for pollution levels and a 30 day average taken, when this average goes up too much then they could be fined.

This way chaotic growth to a ceiling is moderated though the manufacturer can sometimes pollute more to finish important orders then offset this will less pollution later in the month. Internalities might be controlled with this pollution ceiling, for example the chip manufacturer might crash into this ceiling and the fines cause a tipping point of

lost profit. They will then try to internalize this pollution such as with sequestration of the pollution underground or in removing it from their emissions with scrubbers when it approaches this ceiling.

Sometimes the problem with the chip manufacturer and fishermen might only be resolved by the O criminal police, for example if some people die from contaminated fish then workmen at the plant might be jailed for murder. In a Roy economy companies are more likely to commit crimes to minimize costs for survival rather than to maximize profits in Biv.

With the three girls the noise from the TV, music and phone in the apartment might only be reduced by jailing someone. The three girls might all be working and so a typical fine for being noisy might be paid without changing their behavior. This is because in Biv there is generally no O criminal policing, it is presumed the society is wealthy enough so that people can be governed by adding and taking away resources rather than by using O criminal penalties such as jail.



In the diagram above a tax or subsidy can shift a supply or demand curve, here the supply curve is shifted more randomly perhaps because of V team behavior. For example the excess pollution gives a V-Bi social cost, to reduce this however the normal V behavior needs to be changed.

So an average pollution tax might move the supply curve upwards, when this tax is per ton of coal burned then this can impact average usage but also affect usage around a ceiling. For example a V-Bi company might reduce its average usage but an Iv-B company might run into an artificial ceiling where peak polluting occasionally makes some chip manufacturing unprofitable compared to

competitors elsewhere. By trying to avoid this near this ceiling the manufacturer might lose enough orders to collapse chaotically.

This is more easily seen where the tax affects demand chaotically rather than moving supply to a new normal, for example in the above diagram the right hand graph has two demand curves. Adding a pollution tax might cause the demand for the fries to fluctuate chaotically between these two levels of demand as a floor and ceiling.

When deals with little pollution are done the company might have demand near the ceiling, sometimes however when high polluting orders are received the demand might crash to the floor because of the excess cost from the tax. Sometimes this can average out to a normal profit, however these order might also be driven chaotically. For example the manufacturer might contribute to parts for a new series of smartphones, to make a new video chip it might require more pollution and the cost causes the smartphone maker to move to another supplier with a less polluting design.

With this advantage the other supplier might be able to take the low polluting orders as well so the first chip manufacturer reaches a tipping point and collapses, the video chip became in effect the thin end of the wedge making a chaotic crack in their sales which then caused a collapse like cracks from an earthquake.

This tax can then reach tipping or righting points in the V-B economy causing a collapse or sudden growth, often the results will seem mysterious because of Iv-B deception and how competitors usually hide their problems from each other. For example taxing river pollution might cause some Iv-B chip makers to collapse because some of their prices go up compared to other chip makers on other untaxed rivers. The fishermen might be saved by the taxes as industries go broke, however there might be no obvious link statistically between the tax and the collapse of some industries.

Another approach is to issue pollution permits, then the various chip manufacturers might have

to buy permits in an auction. However this can also be chaotic or random just like a typical auction. For example the prices of these permits might change in Iv-B according to deceptive information such as bluffing.

TABLE 14.1

Costs and Emissions for Different Production Processes

Process (smoke)	A (4 tons/day)	B (3 tons/day)	C (2 tons/day)	D (1 ton/day)	E (0 tons/day)
Cost to Sludge Oil ($/day)	100	200	600	1,300	2,300
Cost to Northwest Lumber ($/day)	300	320	380	480	700

In the diagram above two companies have different costs to reduce pollution in tons per day. This can then be V-Bi where these company cooperate or Iv-B where they compete, it might also occur in the I-O market as a mix of chaos and randomness known as chandom.

For example if both company are competing in a boom and bust economy then a small advantage by one can allow it to survive, they might cut their costs until the other company cannot compete and goes broke. Then the first company might buy them out and become a monopoly raising its

prices to cover the cost of its previous low prices. This can also be a negative sum game where both companies cut their prices losing money so only one can survive, whichever minimizes costs the most can improve their chances.

If the government mandates a tax on pollution then this would amount of picking a winner according to the table above. The situation then becomes potentially corrupt to select a tax level in Scarcia that hurts a competitor more. If pollution permits are auctioned then this can also be Iv-B chaotic or V-Bi random, for example a competitor might buy up pollution permits to try to put others out of business.

V-Bi companies are more likely to cooperate in sharing pollution permits, however they are also less likely to use innovative solutions so this can result in a stagnant normalized level of pollution. The kind of auction can also be important, for example an open auction favors V-Bi cooperation because the participants can make deals to pay less and share the permits.

A tender system is more chaotic because Iv-B companies can cheat, they might agree to pay less and then tender a higher price. They can also be corrupted with Iv-B officials who might take a bribe for divulging who is making the highest offer so far.

If the above diagram refers to average tons per day of pollution then this is a V-Bi situation, normal business might be able to handle this tax and on days when production had to double for special orders so too would the tax. V-Bi companies would try to balance this against other days when production was halved, they might lose more on some orders and gain more on others for an average economic profit.

A tax or subsidy can then have random effects in the V-Bi parts of the economy, for example a tax on fuel in Los Angeles or pollution technology that increases fuel consumption might reducing driving in random ways without sending many businesses or drivers broke. This might then move the level of driving to a new normal and so the amount of tourism at their parks and beaches rises to a new

normal generating tax income so the government makes a profit. They might also subsidize more fuel efficient cars, this shifts fuel consumption to a lower new normal and creates more tourism giving tax receipts that cover the car subsidy.

Both of these outcomes can occur alongside each other, for example a fuel tax might make normal driving go down to a new normal level but send some high energy fast time businesses such as couriers and taxis broke. The result would be a mix of chaotic and random effects from government interference with many internalities and externalities.

Because I civil remedies like this can have Iv-B and V-Bi effects the more neutral and fair the I police are the more socially efficient the outcome, for example they might investigate what level of tax minimizes the Roy losses by the bankruptcy of couriers while maximizes the Biv profits of promoting tourism.

Then they might investigate how subsidizing fuel efficient cars makes some car makers grow chaotically and then crash when the sudden increase in demand peters out while other manufacturers suffer catastrophic losses on SUVs. This can also be further complicated by chaotic and random influences in the global oil market, for example the oil shock in the GFC was partially caused by internalities between traders pushing up the price while the supply of oil was still abundant.

There are also chaotic effects in oil prices such as from increasing innovation in technology causing China to expand manufacturing and use more fuel. Random effects can include weather causing people to drive more or tankers and refineries being damaged by storms.

If the solution is not neutral then it will be inefficient because it can distort the Iv-B economy causing collapses or unsustainable growth, it can also further dislocate Iv-B from the V-Bi economy which resists moving to a new normal. For example a fuel tax might not work because people

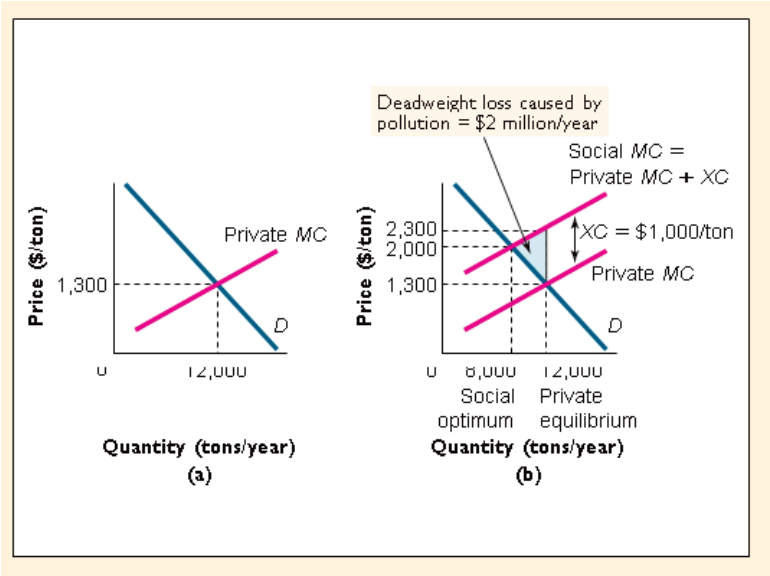
need to do the same amount of driving to visit their families and friends as well as to get to works, by raising the fuel prices they continue to drive the same until a higher price causes family cohesion to break chaotically causing more divorces, etc.

People might have a normal amount of socializing at nightclubs and restaurants and so continue this with price rises until a chaotic break causes some of these businesses to collapse. It might be tempting to ignore chaotic effects because they are more deniable and harder to measure, however the same can be said for cracks in buildings and airplanes. When ignored these cracks can spread creating systemic problems such as the GFC.

Externalities can then trigger tipping points in other businesses creating a crash that does not rebound, or has the dead cat bounce seen in some markets. Internalities can also do this but the chaotic effects usually occur further up or down an Iv branch or B root.

This happened in the GFC where the subprime bond market and securitization reached tipping points from negative internalities of the Japanese carry trade drying up. These internalities came from deceptive and hidden aspects in the performance of the Japanese economy. this did not affect the carry trade until it reached a tipping point in Japan.

When it did crash this securitization market was so mutated with excessive innovations and counter innovations that it did not rebound and like the Iv-B weeds has largely disappeared. There has been little innovation in this market since because the previous Iv-B economy sucked the housing market dry of homeowner equity, instead because the economy has become more Roy the government has largely replaced the Gb private banking system with G public lending.



Externalities can create a deadweight loss as shown in the diagram above, this weight however can cause parts of an economy to crack chaotically as well as to bend elastically or randomly. This is like a top heavy tree cracking from its excessive weight causing a deadweight loss. For example V chip manufacturers might form a cartel and lobbying prevents a pollution tax, the smog then causes smaller industries such as tourism under them to collapse. This is then like large V canopies of trees damaging smaller plants under them.

This would then be a V externality leading to an Iv internality and collapse, the smog affects the Iv tourism operators randomly but they might internalize this problem by for example deceptively advertising for out of state tourists who don't know about the pollution. In a Biv economy such as Abundia the fines for this fraud might be less than the profits made, in Roy Scarcia minimizing costs in this way might be their only chance of survival so O criminal penalties might be needed.

The negative externalities can then trigger collapses in the internalities so that unexpected results happen from them. For example the deadweight loss of the pollution from the V chip manufacturer on the fisherman can have an elastic solution by the Bi fishermen teaming up to pay for a filter.

It might also lead to a chaotic solution by it destroying the fishing industry or making it innovate into a new industry such as fish farming instead. A deadweight like this can then cause brittle demand to collapse, for example people

suddenly go off eating fish when the taste changes from the pollution at a tipping point. With elastic demand the Bi fishermen band together to pay for a filter, the deadweight loss in effect hits a safety net that prevents a collapse.

The internalities of the fishing industry can determine this, whether B infighting causes them to be unable to present a united front or a trade war of attrition between the Bi fishermen and a V cartel buying fish causes them to not be able to afford to pay for the filter.

The opposite can also occur, a deadweight loss on one chip maker installing a filter can cause another chip maker to grow quickly as it takes over the other's customers. The deadweight loss of pollution on the fishermen in one river might cause fishing in a second rive to grow exponentially with the higher prices and lower supply of fish.

This deadweight loss can also be resolved on a normal curve as the economy rebounds

elastically, for example V-Bi pollution in the Los Angeles example might causes losses throughout the economy through illness and reduced tourism but rebound rapidly on weekends when the pollution eases. These would not be chaotic because there would be no tipping and righting points, more people would randomly go to parks on lower smog days as the deadweight loss of the pollution lifted to some degree.

In a V-Bi economy externalities generally diffuse randomly through the economy like heat diffuses through a gas or liquid or smog through the air, businesses cooperate with each other to promote some positive and reduce some negative externalities to a normalized level. However this does not mean they are optimized for a more socially efficient outcome, pollution might be controlled to cooperate with neighbors but this need not be at the most efficient level where research for innovative solution to pollution is incentivized. The result then might be a highly polluted environment with outdated equipment where businesses reduce their emissions and also industrial production.

Public versus private goods

		Nonrival: Low	Nonrival: High
Nonexcludable	High	Commons good (fish in the ocean)	Public good (national defense)
	Low	Private good (wheat)	Collective good (pay-per-view TV)

Goods can be classified according to the level of being nonrival and nonexcudable, this is similar to the concepts of V-Bi and Iv-B in the Biv economy as well as Y-Ro and Oy-R in the Roy economy. For example in the Roy economy there is only G public property so it is much higher level of nonexcludability, this can lead to a tragedy of the commons such as where Oy-R herding is done on G public lands. The increased chaotic feeding and competitive between shepherds can lead to their sheep overeating causing a crash in the amount of grass available.

This causes some shepherds to go broke and move away, the grass then rebounds so when they return there is a boom in their flocks and a race to use up the grass before their competitors

do. It is difficult for this situation to become stable because like with Gresham's Law those who want to conserve this grass make less money than those that use up all they can.

The conservationists then over time go broke as they get less market share because of their beliefs, they would likely go into another line of business because of the economic losses they would sustain. So Oy-R interaction on G public land in Roy would be low excludability or high nonexcludability and low nonrival as it is rivalrous.

Y-Ro is also highly nonexcudable on G public land, this is a more cooperative behavior providing public goods such as government run TV stations where everyone can watch for free on the publicly owned airwaves. It is then highly nonrival because competition is a similar concept to rivalry.

When property has a low level of nonexcludability it is more like Gb private property, in this Biv economy there is a high level of V-Bi nonrival cooperative activity with collective goods and a

low level of nonrival activity with private goods being competitive. For example a V-Bi collective good is cooperative but where people still own Gb private property, this is more random and stable tending towards normal usage. Car insurance can be like this, there is no limit on how many cars use this insurance except that some risky drivers might pay higher rates or excess. The payouts in insurance tend towards a normal amount compared to premiums and it reduces chaos in the economy.

Private goods are Iv-B and are highly chaotic because they have a low level of being nonrival and so are rivalrous, this means that competition can be high because people miss out if they do not get in or out early. Like with the Oy-R tragedy of the commons this tends to move between booms and busts, for example sheep herding on private land has a tragedy as well, sheep numbers and profits might boom when there is plenty of grass and bust when each herder uses up the grass on his ranch.

Then with falling profits some go broke and give up or sell their land, this allows some land to recover as there are fewer sheep being raised. Eventually when the grass rebounds the ranches increase in numbers again until the next bust. Housing in the US prior to the GFC boomed and then bust in a tragedy of private goods.

This can also move between a G commons good and a Gb private good according to these booms and busts, for example when the grass runs out on the ranches they might abandon them so they become part of the G commons. Generally commons land is too poor to make into Gb private property, however it can oscillate from one to the other in G-Gb. When this land lies fallow for long enough the grass might rebound and so the herders decide to re-fence it into Gb private goods again until the next bust.

The same can also occur with the G highly nonexcludable public goods and the Gb collective goods, for example a G public radio station might provide services to its people in a poor Roy economy. As it becomes more wealthy in a

resources boom more people have money and can afford to buy private goods, this creates a need for private advertising on the radio and privatization of the radio station to become a Gb lowly excludable collective good. Then the economy might experience a bust where few advertisements are paid for, the Gb radio station is abandoned in bankruptcy so the government nationalizes it again as a highly nonexcludable G public good.

There can also be changes in between the Iv-B and V-Bi economies in Biv, also in the Oy-R and Y-Ro economies in Roy. This happens as V-Bi or Y-Ro team like cooperative behavior breaks down as their members become more Iv-B or Oy-R competitive. For example the V-Bi economy of Abundia they might have collective goods as buses and trains owned by private companies that cater for a normal number of commuters with some random variations that are averaged out to make average profits.

They also average out some routes being more profitable than others such as later at night or

outlying areas have fewer paying customers than in the city center at peak hour. In Roy Scarcia there are similar buses and trains except they are publicly owned as public goods, they have similar schedules with normal variations in customers.

Both then might experience booms and busts that affect their more normal economies, in Scarcia this booms can temporarily make parts of it Gb so the level of nonexcludability drops. This is because as more land becomes Gb private property then more people can be excluded from going onto another's private land.

In the Abundia boom there are sometimes too many commuters for the collective goods as buses and trains to cope, then more private goods such as taxis take up this exponential increase. When the boom crashes so too do these taxi private goods. The recession might be so severe parts of the economy become Roy as G public land and so the nonexcludable level goes up again.

Now no one can be excluded from going on these public lands. So Abundia varies in its ratio of collective goods of buses and trains compared to private goods of taxis, it also varies in the fraction of its economy that becomes G public property with a high level of nonexcludability. This is because some Gb private property is abandoned and becomes publicly owned, for example some private buses and trains might go broke and be nationalized by the government.

In Roy Scarcia the economy is Y-Ro where the public goods of G buses and trains have a normal number of commuters with some deviations from this. As they experience a boom more public taxi licenses are issued and then the taxi drivers compete on public roads to grab customers before the other do.

As the boom starts to crash the number of people able to afford to take a taxi plummets and the taxi drivers are in the same situation as the sheep herders on public land when the grass is nearly gone. Some then lose their licenses chaotically when the amount of money they earn reaches a

tipping point, the economy goes back to being more Y-Ro where people again take the buses and trains with normal numbers of commuters again.

In the boom some areas of Scarcia become privatized with Gb private property, then in some rich areas some buses and trains are privatized from being public goods to being collective goods. Some taxis licenses are also privatized from being an Oy-R commons good to being an Iv-B private good, for example some roads might be privatized as toll roads and the road owners issue their own taxi licenses instead of the government doing it.

When the boom begins to crash the process goes into reverse, some collective goods as toll roads are abandoned so the government nationalizes them as public goods again. They might also nationalize the tax licenses from private goods into being commons goods again.

The stability of these four quadrants can depend on the strength of the I-O police, otherwise Gb property might be abandoned into G in an

inefficient and destructive way. For example abandoned bus companies might be vandalized or parts robbed from them before the O police can prevent looting as the buses are nationalized. Also when these buses and trains are privatized corruption can cause them to be sold off cheaply as occurred with privatization in Russia after the fall of the Soviet Union.

Commons goods might be privatized such as where G public grazing lands are fenced off as Gb ranches, with I-O policing some might grab land that they cannot use and cause some sheep herders to go broke with the sudden shortage of G public land. The reverse can also happen, as Gb ranches are abandoned then much of their infrastructure can be carried off so Gb creditors lose their valuable property which can still be sold in the Biv economy.

For example the Gb ranch might be abandoned but the buildings could be moved elsewhere to be sold and remain valuable as Gb private property. Without I-O policing these buildings could be dismantled and ruined which is socially inefficient.

Statistics

Statistics generally refers to examining random data, and so approaches this data from a V-Bi and Y-Ro viewpoint. Sometimes the goal is to remove nonrandom data from a sample, for example in opinion surveys they might try to exclude people that over represent a particular demographic in the population. Also some people might be more likely to be deceptive in a survey, some data might also be deceptive if falsified by researchers.

The statisticians might try to moderate this deception by creating a survey that is more anonymous for people, or by randomizing part of the process to protect people's privacy. For example the responder might be asked to toss a coin and answer truthfully if he gets a head, if tails he might toss again and answer yes with heads and no with tails. No matter what he answer the surveyor cannot prove that person's real answer, this protects their privacy with embarrassing questions. Later this random component is reduced to give an estimate of this deterministic Iv-B or Oy-R answer.

The assumption then is that Iv-B and Oy-R responders will be more truthful by allowing them to still hide as individuals. However this still changes the chaotic situation, for example people like this might change their opinions in a boom and bust like pattern but this appears to be a positional low momentum opinion in statistics.

Anonymity then is important in Iv-B and Oy-R because when competing with others being able to deceive or hide information is crucial, if they tend to hide and deceive statisticians in a similar way then the data collected might consistently be wrong. It also assumes these people think in terms of the truth or whether like a game of Chinese Whispers their own opinions have been hopelessly confused by what they hear from each other. For example polling players in various poker games to determine what cards were in the decks they play with would be doomed to failure. Even if they replied honestly without fearing their paying was affected all they know is their own hand plus the bluffs of others.

In the same way polling businesses in an Iv-B or Oy-R economy can try to get secret information by randomizing responses, however it might just show most have a false confidence from listening to each other's bluffs. This can then cause the statisticians to recommend policies because they believe they are looking at hard facts about the economy.

Often then statisticians try to estimate what this secretive and deceptive part of the economy is by working out what part of the data is random and getting a trend line or equation that describes the deterministic parts. This might be done with a loess fitting, ANOVA or least squares regression for example. This can work well with inanimate factors such as testing medications but when it tries to model human behavior it can find trend lines heading towards disaster. For example if an Iv-B economy is heading towards a ceiling in real estate prices and a subsequent crash then it looks like lemmings heading towards a cliff. By finding this trend it appears as if the lemmings know there is no cliff ahead of them because they would stop, however they are often just looking at

each other for signs of trouble instead of looking ahead.

The problem then is in an economy supply and demand prices are set according to people's opinions as much as reality, a political survey for example might work out what people want their politicians to accomplish. It might not however work out what they can accomplish.

To illustrate how statistics fits into Aperiomics data is used that is highly chaotic in some areas and more random in others. It then shows how the statistical method can be misleading with this data by starting with the assumption the data is random. For example because most statistics is based on the normal curve then it starts from the assumption that this curve will give the ultimate answer being sought, or that the data will fit on this curve with some skew or other known distortions of its shape.

Deviations from the normal curve are then innately seen as undesirable, the statistician is

usually trying to reduce these as errors or defining them as significant trend lines. Because this starts from a normal curve and significance below 5% is usually ignored then a large amount of chaos can grow just under the radar of two standard deviations.

For example many side effects of medicines and poor diet can fester in society by remaining below significant levels, then they can combine with each other chaotically so one tends to make the other worse. This results in problems difficult to solve because they are only seen as significant in statistics when they have combined chaotically like this. When the presumption is made that each factor is independent and random then money and time can be wasted trying to treat each separately. For example antidepressant use has risen to over 10% of the US adult population using them though statistics also show no efficacy over placebo for moderate depression.

Lead pollution from cars is said to have caused higher levels of crime and some depression from this, however the data is only significant in some

extreme cases. Autism and ADHD are said to have risen greatly in recent years because of unknown environmental factors, whatever it is may be hiding under this significance level just as the relationship of tobacco to cancer did. Statins for cholesterol are also said to have little benefit for people with no heart disease yet are widely prescribed for them. Pesticides have some adverse influences on people but when examined singly in small trials their effects remain below this significance level.

The result is many factors can be potentially dangerous in modern society but are artificially held to a low level by using statistics, at the same time though their interactions are hard to uncover except perhaps with ANOVA. The mathematics of the V-Bi and Y-Ro systems then create an underground chaos that is only dealt with when it becomes significant like a game of whack a mole, little attempt is made to uncover interactions between them which risks an explosion of Iv-B and Oy-R contagion.

In effect then this data lower than the significance level becomes ignored, because much of it is also random or poorly researched then it becomes like a new normal of society and deviations from it for the better are resisted. For example when 10% of US adults take antidepressants along with high number of children on Ritalin for ADHD then psychiatric problems become more normal and healthy minds can appear deviant in some ways. Instead of fears of a chaotic growth of mental illness such with autism and manic depressives as well, the approach has been to create ever more kinds of medicines to drug people rather than to stop this problem growing towards some tipping point. The numbers are already so large that in effect elections are being decided by swing voters according to how drugs make them feel, add to this self-medication with illegal drugs or alcohol and many government decisions can be driven by this.

Aperiomics tries to overcome this problem by adding mathematical interactions from the whole of Pascal's Triangle and not just from horizontal levels of it as the normal curve. In a future book I

intend to develop this mathematically so it complements statistics by a chaos first approach.

The Food Hall

To illustrate this a food hall in a university is to be analyzed. In this hall there are 8 different shops selling food, drinks, etc each with a menu that varies over time. The people eating at the food hall also vary with full and part time students, visiting exchange students, lecturers, other university employees, outside visitors, and so on.

These people also vary according to virtually every kind of demographic, of race, age, sex, health, religion, motivations, income, etc and all of these factors can affect what they eat and drink. For example a Muslim might not eat pork and a traditional Catholic might not eat meat on Fridays, this might affect whether they would sit next to each other at some times. Younger people might eat more diverse foods while older ones might tend more to the food they were brought up on, if they sit separately their diets might remain separate. If they were crowded in together then

they might pick up ideas on what to eat from each other leading to chaotic changes in what food is sold at the hall.

Women might tend to eat different foods, for example more might be vegetarian and weight conscious. Some people might not be healthy, there can be chaotic epidemics of the flu causing many to skip meals or eat more lightly. Some might be motivated to diet and skip more meals or to change to a healthier diet for a while such as vegetarian, then they might backslide into other kinds of food again.

People can also vary chaotically and randomly according to their other activities, for example there might be a chaotic rush between classes to grab food that can be eaten while walking to the next class. In between classes these times might be more randomly distributed so people eat more slowly, there might for example be a normal curve distribution centered on lunch time for these free periods. With other times further from lunch people might prefer to bring lunch with them as there is less chance to socialize at the food hall.

Employees might eat at odd hours according to their time off, this can be staggered chaotically so that some staff are always on duty.

Their eating habits can also be chaotic and random, for example some might only get a larger meal if their friends are there to sit with. Others might get food to go if people they don't like or are afraid of are there. A Muslim might eat pork sandwiches if no other Muslims see him, otherwise he avoids this. If the food hall is too rowdy some might prefer food to go instead, the noise level then might affect some chaotically.

Their income can also affect their diet chaotically and randomly, for example poor students might have a fixed budget for food and rarely buy anything over a particular price as a tipping point. They might also choose low quality and cheaper food. Wealthier students might rarely buy cheaper meals, these can act as a floor where they have enough money to spend a lot extra for little improvement on the margin.

A statistician on having to make predictions with this data would tend to simplify it leaving out data with low levels of significance, to group some people together and to try to exclude chaotic effects like people skipping meals because they avoid each other. The presumption would be that this data is random but little of it is, with many people eating in a small food hall they tend to affect each other deterministically in complex ways. In the same way an economy is comprised of complex transactions where many variables are left out to simplify models.

For example some people might tend to sit at tables in a Poisson distribution, a statistician might try to work out the expected numbers of women for example at each table. Some tables might have fewer women and some might be nearly all women. A statistician might work out this pattern of women using a chi squared distribution and conclude they are sitting in significantly nonrandom patterns, however trying to work out why from this data would usually drop below the 5% significance level. There is a coefficient of dispersion which can measure some aggregation, for example women might tend to sit

more with other women than random chance would assume, they might even sit less often with each other because they are in relationships with men.

The assumption that they would sit randomly might then be contrary to human nature but statistics must begin with this null hypothesis even though it is wrong and then try to prove otherwise. A Poisson Distribution might also be used assuming that the next person entering the hall will randomly be a male or female like tossing a coin will randomly be heads or tails. This would give highly improbable results if there were classes with higher percentages of women ending so more women then went to the food hall, also women might meet up with each other in groups and then go to the food hall to eat. Often then mathematically it can be better to assume chaotic or dependent variables are more important and that random influences are minor rather than vice versa as in statistics.

This food hall might be at a large university on the border of Biv Abundia and Roy Scarcia, the

students then are sometimes poor and sometimes well off which can affect when they eat and whether they will sit near each other. The people eating at the food hall then would have various color codes, generally Abundian clients would be V, Iv, I, Bi, and B while Scarcian clients would be Y, Oy, O, Ro, and R.

The shops in the food hall would cater to many different kinds of food, for example 8 shops might have 8 kinds of food on the menu with 8 variations of each, there might be 8 kinds of cold drinks and 8 kinds of hot drinks, 8 kinds of packaged snacks such as fries or chocolate, and so on. Some might have similar products to each other and compete, for example many might sell Coke and coffee while others might have more unusual drinks such as juicing fruit and vegetables. This in effect creates trees of decisions where people can make selections along these branches, the data arranged in trees like this can more easily show chaotic supply and demand rather than presuming people buy randomly.

People might tend to buy everything at one shop depending on how long they waited, if the food took a longer time to prepare then they might visit other shops while waiting. For example if they ordered a Chinese meal that took 5 minutes to prepare in the meantime they might get their favorite fruit juice from another shop. Buying habits would also be affected by how long the queues were at each shop, this might vary chaotically from being very long as some classes ended to no wait at other times. It might also be affected by how many staff are working as the shops try to anticipate this demand for workers, if people wait too long then they might go to another shop instead.

If this was illustrated so that each shop was a different tree then people would be seen moving onto various branches to make purchases, they might visit different shop trees so their total diet was a mixture from different ones. This would be like people gathering food from trees in nature picking different kinds of fruit.

There can also be relationships between the color codes that cause problems, for example when Ro gangs come to eat they might scare away some B students from sitting near them. The university might vary its O police presence, more at established lunch times that are safer while none at some less popular times. Similar problems sometimes occur on buses and trains when people might sometimes be afraid to travel along the Iv-B branches and roots that the buses and trains travel on. They might also have I police that can fine people for some infractions such as littering but have no power to arrest anyone. Some criminal elements might sometimes try to get protection money from the shops with limited success, periodically this might be moderated by the O police to keep crime below a level of statistical significance without investigating a criminal underground causing it.

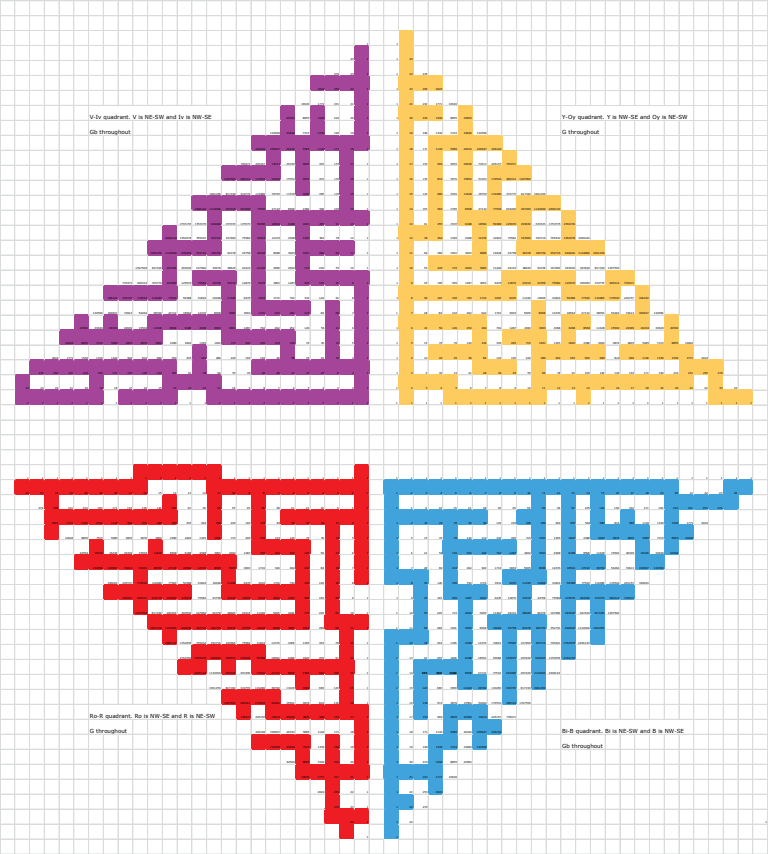
Generally business is done through the I-O market of the food hall, however in some cases people may do business directly between each other. For example some of the shops might sell excess stock to each other or even cook some of the dishes for others to make them cheaper with economies of

scale. To make roast meats cheaper one shop might have larger ovens and cook more roasts and chickens, then wholesale them to some of the other stores with smaller ovens.

Some of the people might also sell food, people might bring lunches made at home and sell to other students particularly when poor. Other might sell candy bars not available at the food hall, still others might sometimes set up food stands outside the hall both legal and without permission. These prosper sometimes according to how weak the I-O police are, sometimes there is a crackdown and these other food stands are fined or the owners jailed for health violations.

There can also be some loan sharking in the hall, people might borrow money or food and have to repay a larger amount later. This can also be moderated by the I-O police, occasionally though the chaos gets out of control creating a crime wave and a crackdown. Sometimes there is cooperation between students, for example one might bring in steamed rice which is shared between a large group and they then alternate

doing this so each has a turn. Also some might bring in a coffee thermos and share it with others.



The diagram above shows chaotic color codes visiting the food hall on the first day of class. The same kind of graph could be constructed for an entire economy where goods and services each have their own root or branch. These examples

then can be used to illustrate the workings of a larger economy, here it combines Biv Abundia and Roy Scarcia.

The numbers in the cells can represent dollar values of the various goods on the shelves as well as sales of those goods. One advantage of this graph is that detailed information can be shown in an intuitive way, an Iv branch in the upper left quadrant would indicate sales of a particular product such as coffee. It might be seen overall as coffee sales, if it branches in two then one branch might be black and the other white coffee. The black branch might split into stocks of espresso and flat blacks while the white branch might split into flat white, cappuccino, and latte.

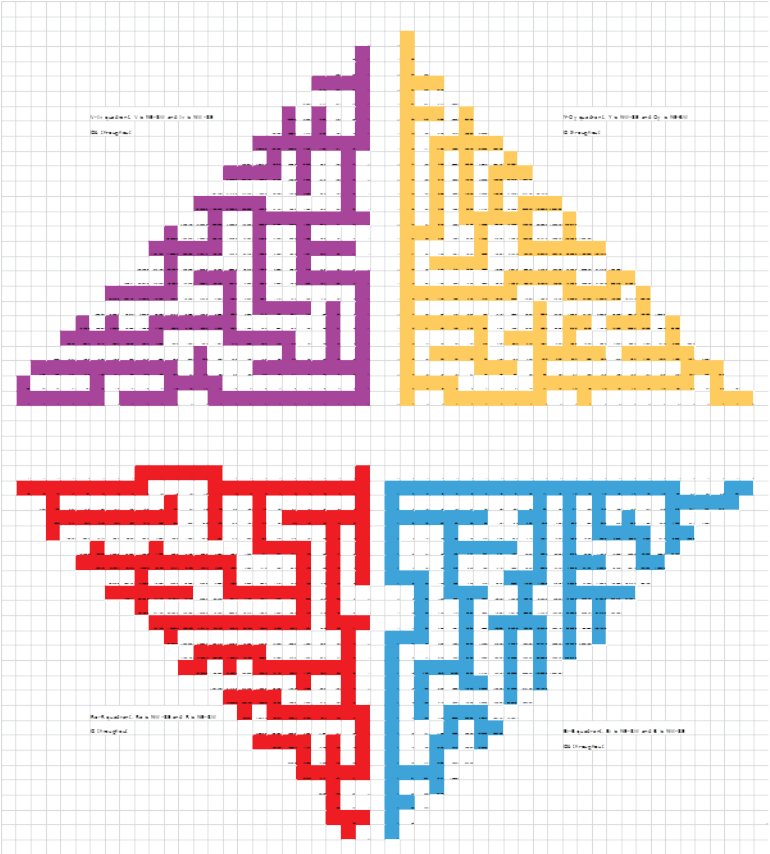
The numbers towards the center can be earlier in the day and include reservations, some branches then grow in number but then decline as reservations are cancelled. Other numbers can grow and decline such as food that spoils when not sold and which is thrown out, for example a shop might sell fries that don’t sell if they sit too long. Alternatively the Iv branches might be

monitored throughout the day for changes, coffee branches might for example sell more cups with regular meals.

The result would be like trees sprouting and decaying throughout each day chaotically, statistics would tend to measure horizontal levels of these trees which would tend towards normal curves. This is because the deterministic changes in branches are averaged out against many other branches making the data more independent. For example horizontal levels might measure drinks so branches of coffee, tea, juices, carbonated drinks, etc would be added into the same sample space and so appear more random.

A diagram could be made of each day of school like this including weekends and holidays, the branches would generally be different each time as chaos and randomness are both unpredictable to a large degree. In Pascal's Triangle a particular route as a root or branch defines a growth rate, those more near the edge grow more slowly than those towards the center. A normal curve of drinks at the food hall might tend to have coffee

towards the center of the curve at each shop, drawing the triangles then would have the coffee branches towards the center while less popular drinks such as bottled water would be drawn on the edges.



In the diagram above the cell values in the diamond graph do not allow for some values, for

example a shop might sell a number of coffees that is between the numbers in two adjoining cells. In that case more cells in the graph might be drawn. If each day's graph was a frame in a movie then these lines would be seen to change like branches. If the graph was only drawn at the end of each day's trading then the chaotic changes during the day would be obscured giving a falsely randomized impression. This is because Iv-B and Oy-R are high in energy and short on time, people might rush to buy some goods such as coffee between classes but this fast buying is not seen in a total day's trading figures.

The trees can also appear to wave from side to side like in a breeze reflecting random or chaotic changes, for example a normal curve of drinks at lunch might have coffee in the center while in midafternoon juice might be in the center. This could be represented graphically as the coffee branches waving over to the side while juice branches move towards the center and then back again at mealtimes. This also allows these winds of changes to represent real forces, a rise in coffee prices can be seen as coffee branches being

pushed to the side like a strong wind in a forest pushing branches.

If this wind becomes too strong then the coffee branches might be damaged as people permanently change to tea or cola for caffeine. This would be like branches in a forest breaking or bending permanently. The idea of the diamond graph is then that real events in the Roy animal kingdom and Biv plant kingdom can be represented graphically and mathematically in economics. This makes them easier to understand intuitively and predictions easier to make. Statistics would assume these variations were random like breezes changing rather than chaos from a storm blowing down branches.

In the same way an economic storm of chaos can be represented through an economy damaging branches like this, for example in the GFC financial branches in the global economy were damaged with subprime bonds and derivatives. Initially changes were more random so that Credit Default Swaps could be prices on a 2D normal curve or Gaussian Copula, as this became more chaotic it

was like this level of Pascal's Triangle or Cone becoming pushed over by the wind of the recession with branches snapping and moving hitting each other causing waves of selling.

The edges of the diamond graph would represent four normal curves, through the year these values would appear to fluctuate nearly randomly. Statisticians looking at just these numbers might conclude business was random in the food hall, sometimes there would be a skew or kurtosis in these curves corresponding to these winds bending the branches but usually this would dissipate returning to a normal pattern of food and drink purchases. However sometimes the effects are permanent leading to a new normal pattern, however the complex patterns causing this are vertical on Pascal's Triangle rather than horizontal with the normal curves.

If snapshots were taken through the day then sales would appear to grow like roots and branches, the branches would represent the good on sale and the roots can represent the people coming to buy them. So the consumers can also

be defined like the food and drinks into tree like shapes, for example different races might be represented in different root systems where each city they come from has its own root then each suburb different roots on that root and so on. They might also be defined as roots based on what people are studying, there might be engineering root systems where different specializations are set on different roots. The two systems could also be combined so that an ethnicity root system has different roots sections for engineering and music students for example.

Some roots and branches would then appear to grow and wilt as people on given roots came to the food hall, bought food at various branches and then left. Watching a particular branch such as for sales of French fries then any product could be analyzed for the whole year, its values taken from the diamond graph for each day could be added to a spreadsheet to be analyzed further. This would appear to be more random in sales, however during each day people from a root system might come in and buy large amounts of fries.

The finer branches would be harder to analyze in statistics because each one might be under the 5% level of significance, however here each branch is defined and can then be monitored for changes over time. It can also be analyzed with statistics, for example random samples from Roy engineering students from Royville might be taken to see what foods they buy over time. Then this data might be compared to another root of Biv music students buying French fries as well. In effect then each root and branch might be below 5% significance compared to the overall population, instead of insignificant data being ignored then significant data is instead ignored while these smaller changes are monitored first.

They could then add up to an overall significance in which case standard statistics could monitor them accurately as horizontal lines on the Pascal's Triangles. For example the null hypothesis might be that eating French fries is random, looking at the roots might show some groups like them much more than others. So the Roy engineering students might like them because they are more expensive at home. In Iv-B then the alternate hypothesis might be that eating fries is

nonrandom, this might be disproven by showing there is an as yet unknown null hypothesis to be discovered.

If this null hypothesis cannot be found to exist then the default alternate chaotic hypothesis is proven. It may be that each root buys fries for mainly chaotic reasons but when averaged out overall the horizontal levels of Pascal's Triangle appear random. This random null hypothesis then might be wrong as a Type Two error, however it may not be important until the chaotic French fries purchases reach a floor or ceiling. For example Roy students might buy them because they are hard to get back in Roy, however they might then buy them a lot when they first come to the university and suddenly give them up when the novelty wears off. There would then be waves of growth in sales of French fries each year that crash around a time that shops would profit from anticipating.

Using the diamond graph then data might be analyzed by assuming each the random null or chaotic alternate hypothesis is true first and then

trying to prove or disprove it. The first step for disproving the chaotic alternate hypothesis might be to see whether the data can be arranged in roots and branches like this, for example if students change courses randomly then the root systems would not appear to be stable undermining the chaotic theory of French fries purchases.

Also the shops might start selling many variations of fries as well as mashed potatoes, roast potatoes, etc so there are no longer clear branches where different roots of purchasers might go to buy potato based foods. As the data appears more difficult to arrange into roots and branches then the most reliable might be to look at horizontal lines in the diamond graph of Y-Ro and V-Bi. Most people then might not care where they buy their potato and roast potatoes might be so similar to French fries that it becomes random as to which they buy. Then the null hypothesis might be proven and the chaotic purchases of French fries become lower than 5% in significance.

However these Iv-B roots and branches will still be there to some degree, it would be a mistake to assume they could not regrow later. For example Iv-B is associate with innovation so the shops might try to differentiate themselves from each other by making their fries more unique, people then might go to some branches more chaotically to buy curly fries or those with flavored salt. These new fries might awaken the desire of Roy people so some roots start buying them chaotically, then this might dissipate into a randomly stagnant V-Bi market again as the novelty wears off. At times then the alternate hypothesis might be true and then the null hypothesis again.

For example French fries sales might be examined on a normal curve to see an average level of sales as a null hypothesis, a least squares regression might show a trend line varying seasonally as people for example buy less hot food in summer. This might lead to the alternative hypothesis of the data being nonrandom being proven. Watching the French fries branches with each hour of sales in a yearlong movie would show them waving from side to side as well as growing at different rates each day, there would also be a

wilting towards the end of the day as remaining stock is thrown out.

Just as looking at graphical data can often give an indication of its randomness the movement of these branches might look random or chaotic. For example with many finer branches growing differently the alternate hypothesis is more likely but with similar growth in a few main branches it would seem that normal French fries are the most popular. This would not be the same as an Iv-B perfectly competitive market, instead it would be more like a V-Bi perfectly cooperative market. Sellers would tend to sell the most popular kinds of French fries and ignore deviant demand to this because it would cost more to supply lower volume branches of French fries.

For example curly fries might cost 10% more to make and most people will not pay the extra price because they tend to conform to each other. In a V-Bi situation then people tend to cooperate in groups and to eat in a deviant way, such as curly fries, make them not look like a team player. If one shop is slightly higher in prices then a

perfectly cooperative market will have consumers leave randomly to some degree, then come back if the prices become normal again.

If the market becomes more Iv-B perfectly competitive then shops will differentiate their products more to attract customers, prices might then become more different but profit margins can still be very low. In this case the Iv-B roots and branches will fluctuate more and the alternate hypothesis would be a better starting point.

Usually the roots and branches would cross over each other and even intertwine as they affected each other, for example French fries sales might affect the sales of salad where sometimes each is in the center of the normal curve where more people eat it. It might then be better represented in a Pascal's Cone so competing Iv branches such as fries versus salad could be viewed changing in relation to each other, in this way they might have different positions at different horizontal levels of the triangles.

For example in the mornings salads might be more popular so they are in the center of the normal curve at lower levels of the triangle with fries as a deviant food to eat for breakfast. Then for lunch the branches change place so people eat mainly fries for lunch and then trade places again with mainly salad eaten for dinner. The French fries and salad branches could then be viewed as intertwining around each other trying to grab the center of higher sales in a 3D Pascal's Cone.

V-Bi arithmetic mean versus Iv-B geometric mean

In V-Bi and Y-Ro a normal curve can also be an error curve around a value, for example there might be a 95% confidence that the mean of a sample is between two values. Working out the V-Bi average levels of French fries purchases would also have some inaccuracies, a limited sample of purchasers might be taken so as not to interfere too much with business at the food hall.

The purchases of salad versus French fries might be an expected proportion, this might give an expected amount of salad and French fries to be

sold in a given week with a 95% confidence, in this 5% error however there can be chaotic growth such as more Roy students arriving. The shops however might need to know whether the market is likely to grow or decline because they can lose money running short on stock or having to throw out excess salad or fries.

This proportion then can be either Iv-B or V-Bi, if V-Bi then there is an expected proportion of salad versus French fries but if Iv-B then it might be the odds of the shops selling 10% more fries than salad next week. This is then an alternate hypothesis to test for first, if this fails then the null hypothesis will be no change from the current week's sales. The shops might be expecting more Roy students from Royville, they want to know whether they are more likely to gain or lose money by ordering more stock. This is then not a random situation, they expect in this case chaotic growth from the Roy students.

It is then more like betting on horses or the stock market, the null hypothesis is that these are both random and that there is no way to guess better

than chance for profit. Instead the gambler and the shopkeepers take the alternate hypothesis first, that they can beat the odds because there are hidden dependent variables they can uncover.

For example a gambler might bet on a horse at 10 to 1, over many such bets he might make money by pyramiding his winnings. For the shops to gamble on whether to buy more or less salad and fries for the next week they need to work out the odds of a growth or decline in business. This can be like the Kelly system of gambling and stock market investment where the geometric mean is used to increase or decrease the amount invested.

Because the stake invested rises and falls with each bet the system is highly chaotic, the geometric mean acts like the logarithm of the arithmetic mean. For example there might be odds for a B root of students to buy fries versus salad, this is a V-Bi random based way of looking at the sales. It might also be regarded as a proportion of the B students buying fries which is a chaotic or deterministic viewpoint.

A V-Bi based statistical approach would be to calculate the changing odds during the day of students buying fries versus salad and dividing by n as the number of observations giving odds to give the arithmetic mean. An Iv-B approach would be to multiply these odds together and divide by the nth root of n observations made. Taking the logarithm of this Iv-B approach appears to be like V-Bi, multiplying these numbers together becomes adding together the logs and dividing by the nth root becomes like dividing by n.

In effect then breaking up this data into Iv-B and V-Bi is like treating those parts multiplied together differently from those parts added together, this is because when numbers are multiplied together they affect each other chaotically like a force or energy. When numbers are added together they affect each other like positions or random independent variables. The problem then of statistics describing all the purchases in the food hall is it is based on random additions in the horizontal rows of Pascal's Triangle and tends to ignore with its null hypothesis this multiplication of variables. In the same way the Kelly System or others working on the geometric mean start with

the alternate hypothesis that variables should be multiplied together.

This is then why Iv-B and Oy-R are referred to as e based color interactions, because they are related to e as a transcendental number and logarithm base. V-Bi and Y-Ro are referred to as pi based color interactions because they relate to pi as another transcendental number. In an economy Iv-B and Oy-R forces act in a secretive and deceptive way like e based energy and momentum, V-Bi and Y-Ro act in a transparent and honest way like pi based positions and time. Statistics then tends to measure static positions over long periods of time to reduce errors, chaos in Aperiomics measures the momentum and energy of objects in short periods of time to reduce the randomness involved. Uncertainty arises between the two in large part because the base of the logarithms is uncertain, this changing base is like changing leverage in an economy.

Multiplication is invariably used when forces are described, leverage in business and economics is based on multiplying a smaller amount of money

to give a larger effect. When the Roy and Biv engineering students are avoiding each other they are in effect exerting a repulsive force on each other, calculating their movements then is best done with the geometric mean. When random interactions happen between the students this is like adding with errors around an arithmetic mean, for example sometimes the students might avoid each other accidentally or find a level of interaction where they don't repel or avoid each other except randomly.

The shop ordering is then like share prices, if they fluctuate randomly around a known seasonal trend the shops might treat deviations from this trend as random to be buffered with additional stock on hand. The Kelly System instead works out the odds on shorter time scales, for example Alice the French fries seller might work out by watching his customers that people are buying more salad and she then wastes fewer French fries by cooking smaller batches. If she is successful then she might make more profits and expand her shop or even take over other shops in the food hall. She is in effect watching for smaller forces affecting her sales.

Bob the salad maker also watches the sales because he finds people don't buy salad once it is over a half hour old because it looks wilted. The amount they both make then in part varies chaotically throughout the day according to the Kelly System by estimating the odds and the geometric mean. They might both look at the ratio of salad sold to French fries sold each five minutes, work out the odds of sales over the next hour, then work out the proportions of fries to salad sold per 5 minutes divided by 12 for 60 minutes to give an indication of forces pushing some of the sales being made.

There can be many of these forces, for example students might run to the food hall to beat the crowds exerting more energy or force to do so. Some might push others out of the way in the queue as another force, fries eaters might be more aggressive than salad eaters so more frail students might eat more salad.

For example on the average about the same dollar value of fries and salad might be sold by Alice and

Bob each day but about one third is wasted and thrown away, profits then can be increased by reducing the amount wasted. They can assume the market is random and calculated with statistics the average hourly sales of fries at various times of the day with 95% confidence, they then make that much salad and fries while deviations from this mean can represent extra profit and loss.

They can instead estimate the odds of needing more or less fries and salad by taking the sales over the previous hour in 5 minute increments, work out the geometric mean to look for any trends, and try to make extra profits this way. Generally the geometric mean can be more accurate by decreasing the time between observations because it is high on energy or force and low on time. V-Bi statistical results can often be more accurate by mixing more results together over longer periods of time, this reduces the chaotic forces or turbulence that gives errors in their data.

For example if the ratio of chip sales divided by salad sales grows 10% then the shops can add these two sales and divide by two to get the mean or multiply the two sales together and divide by the square root of two to get the geometric mean. The change of the mean might be 8% and the geometric mean might be 12%, the two shops might decide to use opposing strategies so Alice the chip seller might work on the arithmetic mean and make 8% more fries while Bob the salad maker works on the geometric mean and makes 12% more salad.

A similar situation happens in the global economy, two manufacturers might try to calculate how much stock to make, some will become obsolete before it is sold out and will have to be discounted or thrown away. Two stock traders might also have this problem, Anne as a follower of Eugene Fama assumes the market is V-Bi random and Brian follows Edwin Thorp's use of the chaotic Kelly System.

Anne's picks tend to have a mean growth with a confidence level but is vulnerable to stagnation by

missing out on growth while also avoiding more chaotic collapses in stock values. Brian's picks tend to find more growth so he increases his investment in those stocks as the odds increase and decreases his investment as the odds decrease. It would be pointless for Anne to do this if she assumes the market is random, it would be like varying bets at Roulette where the randomness would make this strategy a waste of time.

However Brian's strategy is like a card counter at Blackjack, the cards are ostensibly random but he can detect a hidden pattern by counting high cards and increasing his bets at certain times when the odds favor him. Brian might make more money but runs the risk of a collapse by being banned if the casino discovers his deception. Edwin Thorp first developed the Kelly System in Blackjack bets and adapted it to the stock market.

Alice then might sell fries in the food hall while Bob sells salad, Alice manages to average out her losses of wasted fries on both sides of the normal curve by sometimes having to throw them out

unsold while at other times losing customers who won't wait when she runs out and must fries up some more. She is like Anne who avoids some losses by not picking stocks that go down like wasted fries, she also loses money by missing out on stocks that go up like missed sales of French fries.

Bob has more booms and busts in his sales like Brian the blackjack player and stock investor as he tries to avoid running out of salad or having to throw it away, he might exploit Alice by watching for when she runs low on fries and then he makes more salad because when customers miss out on French fries they buy more salad instead. This introduces more chaos into the situation as his sales depend more on the errors in Alice's strategy.

However sometimes he gets stuck with more salad when the expected boom in sales according to the odds doesn't happen, he then has to sell salad at a discount to the bargain hunters or throw it out. The situation then might be more random than he expects, when Alice runs out of

French fries people might wait for more or not buy salad instead. There is then an uncertainty between the chaos of Bob's tactics and the randomness of Alice's strategy. Bob is in effect working on the margin to increase profits while Alice is working on average sales instead.

These two sellers usually have Bi-B and Ro-R people buying their French fries and salad, their numbers and available money as well as preferences change chaotically and randomly though the day as well as seasonally. For example if nearly everyone buys salad or fries independently of each other then averaging out sales might work better than calculating the geometric mean. There would be little chaos happening because each buyer is more likely to be independent from the next, therefore the sales would follow the normal curve with a trend line of some chaotic growth through the day.

This can also occur when people form Bi and Ro groups where there is an expected or normal behavior in what food they order. So a group might not be independent in the sense that they

cooperate with each other, this however creates a sense in the group of what an average meal is with some deviations on either side of that. With many groups like this Alice might do better than Bob because the whole group might buy fries so as to be conformist, some might buy more or less around this average though.

However if more people are watching each other for ideas of what to buy then this will be more chaotic and so the geometric mean might pick up these trends better. For example people watch for long queues or people looking frustrated, if they see this then they might buy food elsewhere. If they see people enjoying their food then they might go and buy the same for themselves. This is like R prey in the Roy animal kingdom that watch each other for signs of danger or food, if one R animal like a gazelle starts to run then the others will likely run chaotically as well. If one moves towards a green area the others might assume it sees more food or water and compete to get there first.

There might be a chaotic rush of more customers at times between classes as students try to get food before the queues grow too long, generally when time is short sales are more Iv-B chaotic. Other students might take their time so the chaotic rush is over by the time they get there and those sales would be more random, Alice and Bob might then still work out their separate approaches to cover this problem, this chaotic rush after classes can cause Alice to sell out too quickly as she tries to average out her French fries to a confidence level. Bob anticipates this better but often ends up with leftover salad as the chaotic rush of students suddenly ends leaving more random students that take their time in deciding what to buy.

In the global economy this Iv-B rush can create booms in prices as investors rush to not miss out, then it might suddenly end when it hits a ceiling or people see others staying away. For example as the queues get longer at Bob's salads people might start to go elsewhere and others watching them cause the numbers waiting for salad to collapse like a bust in the share market. An investor using the Kelly System would be using the

geometric mean to reduce their investments at this time, Bob would be trying to anticipate this effect by serving people quickly or having more casual staff. He might also try to have his salad stocks nearly run out even when people are still queuing, this is like investors getting out just before the market reaches its ceiling and crashes.

Bob then takes a chaotic approach, he calculates from historical data the trend lines and works out the odds of extra salad being needed as well as the odds of Alice running out of fries based on previous occasions when this happened. His geometric mean might lose money compared to the arithmetic mean but then pick up more profits when it calculates booms in sales more accurately. Eventually however he might decide the data is too random to bother trying to work out a pattern and then follows the average sales like Alice does.

If the number of students buying fries or salad varies chaotically then Bob might have an advantage, for example there might be a lot of Roy students at some times of the day who can only afford to eat fries because of the amount of

Iv-B energy they get from them. To counter this Bob might make up a cheap salad with plenty of calories by adding extra salad oil so a poor student might get about the same amount of energy from a serving of salad or fries, he might also exploit Biv students wanting a low fat salad as another branch to his business. The Roy students might be doing cheaper courses at the university because Scarcia cannot afford to subsidize their education as much as Abundia, the timetable then shows a deterministic chaotic flow of these students in booms and busts in the economy. For example when the Roy Scarcia economy booms some students from there might start courses they struggle to finish in the subsequent bust. Bob's business is then more like predicting turbulence, he needs to tactically change his menu and reserves to maximize profits.

When Bob gets these regular customers they are much less likely to randomly eat somewhere else, Bob's Kelly System then more accurately works out his sales by counting the number of Scarcian students in various R-B roots entering the hall. For example he might take the three numbers of Scarcian students entering at five minute

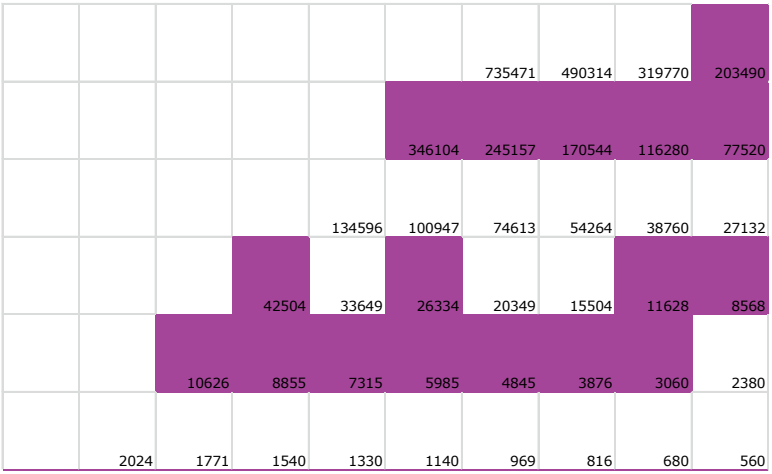
intervals, multiply them together and divide by the square root of three and then increase his salad stock by that much times a constant. When the Scarcian numbers entering the food hall drop he does the same to calculate how much less salad to sell or whether discount the salad remaining.

They take about ten minutes to order so he has time to make more salad by following about the same ratio of increase in these students to the increase in salads available. Alice however often gets these numbers wrong because she assumes they are an average student, she often then runs out of fries with a sudden influx of Scarcian students and Bob makes extra money in a boom. For example Alice might average out the numbers every five minutes for fifteen minutes and then divide by three, this gives a lower number than the geometric mean because it ignores that the numbers of students is rising, so she makes fewer fries than Bob makes salad.

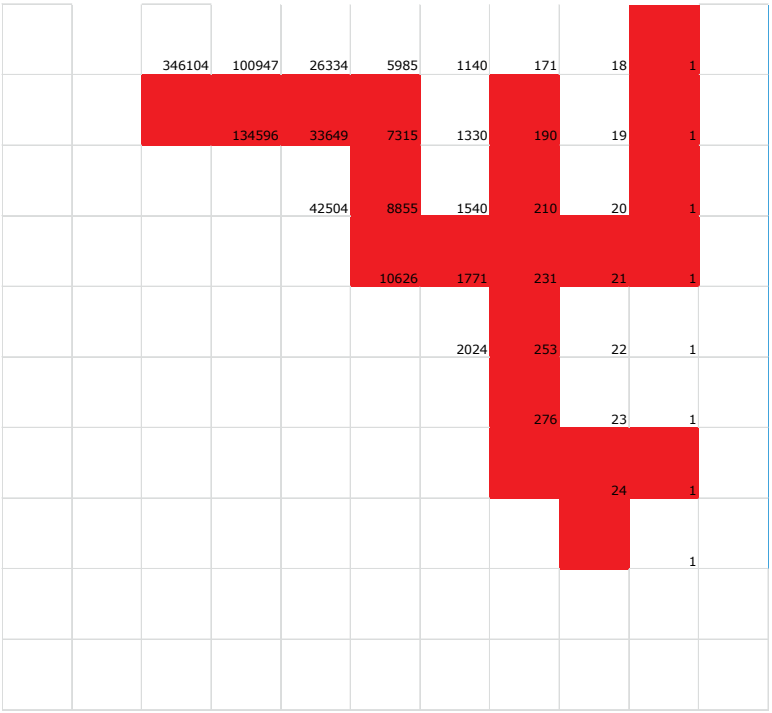
After a while she realizes from watching Bob that his chaotic system is more profitable so she might

start to do the same, for example she might estimate Bob's extra salad making and make the same amount of fries. However this can lead to an Iv-B game of bluff, for example Bob might appear to be making a large batch of salad to make Alice make too many fries and lose money.

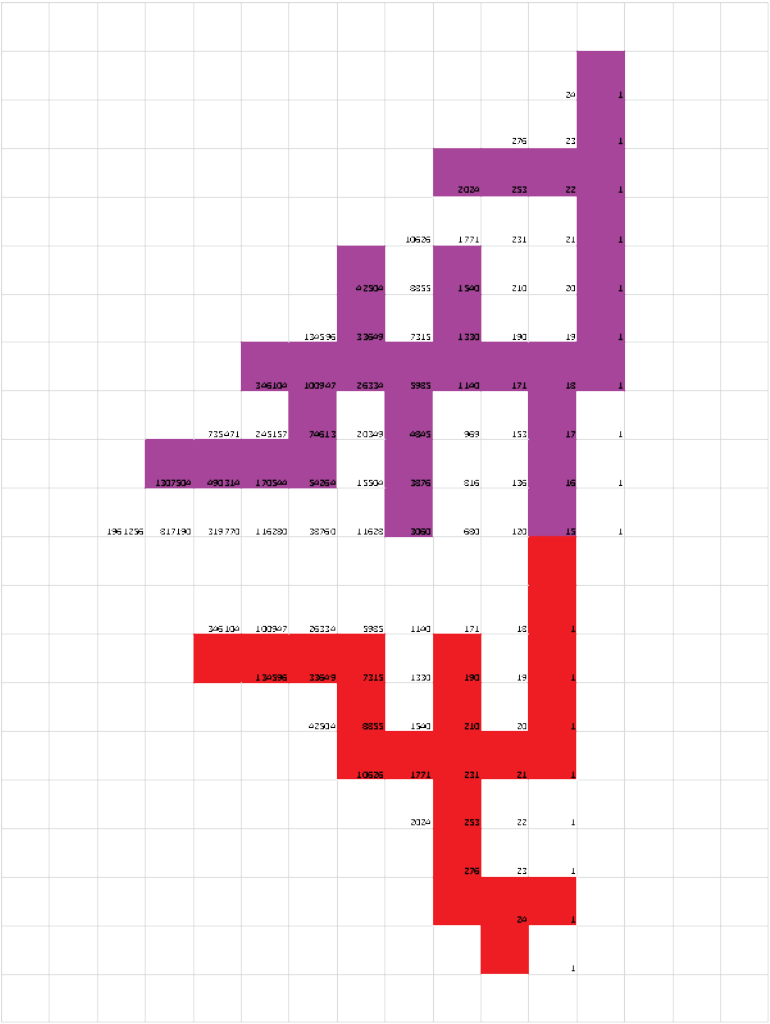
This can be seen in the graph below as part of the diamond graph, Alice is the branch on top and Bob is at the bottom. If a large number of the B roots as students buy fries and salad then it is unlikely that these Iv branches will change much chaotically.



However if there are only two roots of customers buying fries and salad then as their numbers vary chaotically the sales if Bob and Alice will also boom and bust. Below the R root comes from the top right and moves to the left for fries and down for salad. The two diagrams together form a single market between them that is highly unstable like a desert plant, the Iv sellers try to become prosperous in Biv but here they rely on poor Roy students.



When these are connected it appears like an Iv-R weed as a hybrid plant and animal.

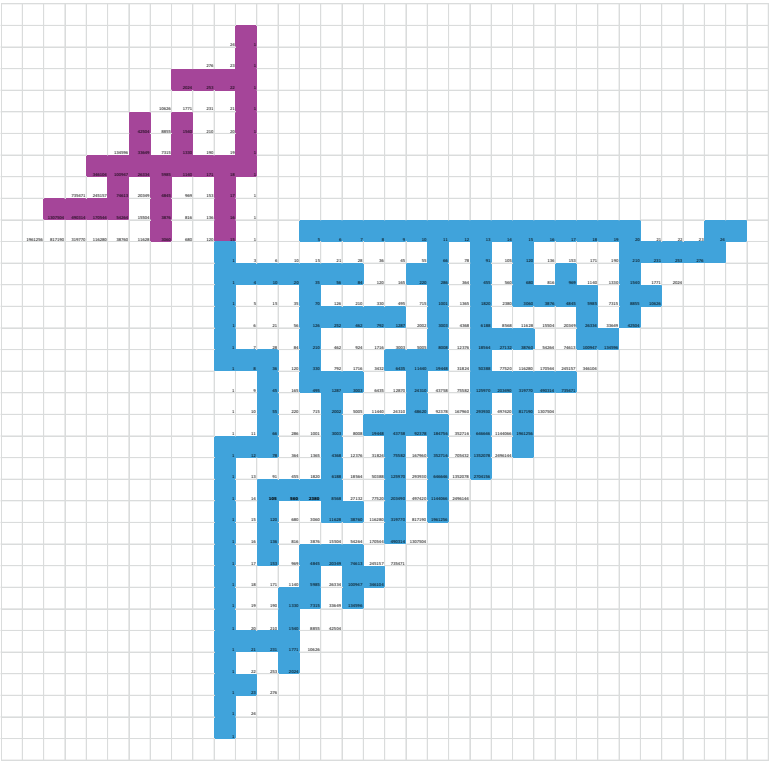


This diagram above can represent a more complex market, the two branches on the right might be Alice making fries and potato wedges. The other

branches to her left can be Bob making different kinds of salad, some do well with the chaotic influx of R students while some collapse in sales pointing downwards. The different R root shapes can be Scarcian students from different areas, two roots buy salad and fries chaotically while the third roots pointing up might be those buying something else or bringing their own lunch.

The R students and must forage for cheap deals to make ends meet, if they don't then they might go hungry some days in a negative sum game. The Iv sellers try to maximize profits but if they depend on R too much then they will end up losing too much by throwing out their salad and fries. However in the diagram below the two Iv sellers might depend on a highly random group of B buyers, this is like an Iv-B plant with a large root system so they have a lot of opportunities for growth through counter innovations. For example the B roots on the right don't connect to the Iv sellers at all, if Alice and Bob could attract them then they might double their sales.

Each of the B roots below is separate because they can represent a different demographic as mentioned earlier, for example those on the left branch might be female and the right branch be male.



Alice and Bob might only take account of their client’s sex, for example Bob might notice more females buy salad and that some classes have

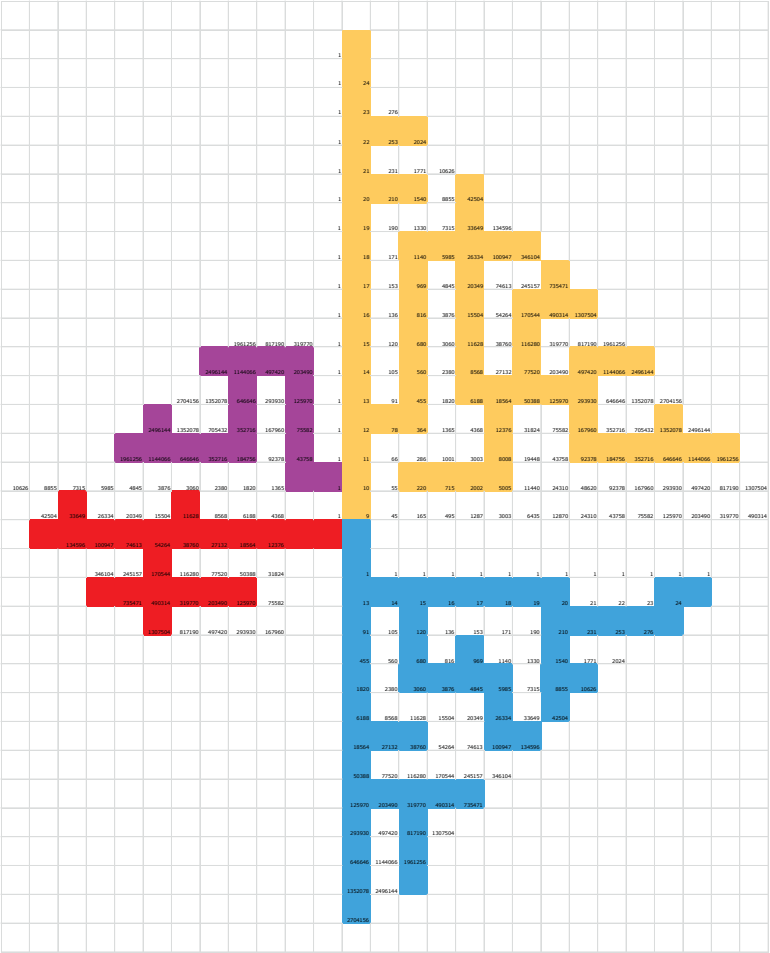
more females to prepare salad for. The next bifurcations on each branch might be race, there might then be more males of different races attending the university which affects sales.

The roots on the root as mentioned earlier are not connected at all, they represent new sales opportunities and would also be males and females of different races. Again the racial makeup of the males is more diverse, if these people are attracted into the market for fries and salad this would create a complex boom in sales. For example the ratio of females to males as clients would change as would the mix of races buying fries and salad. One race might prefer fries is a given ratio while another prefers salad, the overall ratio would suddenly change.

This is then like an Iv-B plant that is close to a new Gb resource, when it find it then its root system would grow to encompass this B root section and is equivalent to connecting to it. For example, this group might not eat fries or salad where they come from in a remote part of Abundia. When they try them then they connect to the Iv sellers

as a new market so Alice and Bob’s branches would grow chaotically, they would probably split into more branches to counter innovate into this new market.

For example Bob might make as a separate branch a salad like the Abundians eat at home, Alice might make a traditional meat dish they eat to have with fries. These are counter innovations because they respond to the new market opportunity, the Abundians are not an innovation but they appear as one to Iv Alice and Bob.



In the diagram above there are two Oy shops in the food hall selling traditional Scarcian cuisine. Many Abundian people don’t like it because it has cheap ingredients and Abundians can afford better food, however this is the traditional way to minimize costs for survival in Scarcia. They have a small R customer base, however most R people

buy Abundian food when they can as they distrust Oy sellers from their experiences in Scarcia. They assume for example the O police will accept bribes to allow substandard Oy food as at home. There is also a small market by Iv sellers who try to imitate these Scarcian dishes, however most B clients want to eat the traditional food.

The Oy lines bifurcate into two sellers, Charlie and Debbie. Debbie has the bigger store on the right with many more lines, however more of these grow and wilt because of sporadic demand from the R and B customers. Charlie has fewer varieties, however he also has fewer lines that collapse in sales like Debbie's. As before the R clients can be separated demographically, Charlie and Debbie can then plot with R and B what kinds of customers they get and whether to adopt a chaotic or random strategy in preparing food for sale. The Iv branch represents two sellers Edward and Fiona, Fiona is doing well on the left while Edward on the right is barely selling anything.

Over a year a movie of the growth and decline of these roots and branches would show some

chaotic and random changes, much like that of the whole food hall. Movies could be made for each shop with their customers and they could then be seen as rival plants growing and declining, the Roy colors could also be viewed as the number of animals growing and declining where the Oy shops feed on their R clients as predators.

In effect the Oy shops might be trying to rip off their clients in a predatory way, the R clients however when they get the better of Oy in a deal are like prey that escape while weakening their enemy. They must do this in a negative sum game because each survives better by minimizing their costs at the expense of each other. The Iv shops work on a positive sum game to maximize profit, generally their clients also profit from the deal because resources are more abundant. The division of the spoils of this abundance is done through the marketplace.

The diagram above can then be seen as a small ecosystem dominated by Iv-B plants with large roots systems and small branches, then there are large numbers of Oy predators trying to feed on

few R prey. This is not a stable situation even with the implied chaos, the Oy shops would try to rip off the B clients with substandard food while the Iv sellers would try to woo the B clients away from Oy with better ingredients. The O university police might be needed to punish Oy sellers when R clients complain of adulterated food, Oy expects to get away with this like back at home. The I police would punish Iv sellers with a fine if they kept a dirty kitchen to try to lower prices and take business away from the Oy sellers.

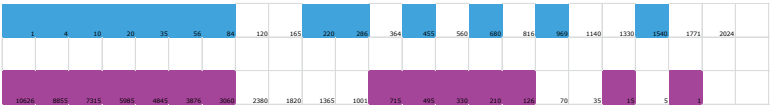
Business would then change in this ecosystem as the I-O police waxed and waned in strength, for example with budget cuts at the university there might be an upsurge in deceptive food for sale or with R and B people shoplifting.

These movies of different shops would also show some mutation as shops tried different new recipes or discontinued some items, they are then having counter revolutionary responses to the changing tastes of their customers. For example some shops might become vacant like a plant where its Iv branches died off while its B roots or

customer base waited for another shop to take over there. An Oy predatory shop might go bankrupt and so R clients get ripped off less for a while until another Oy shop opens up.

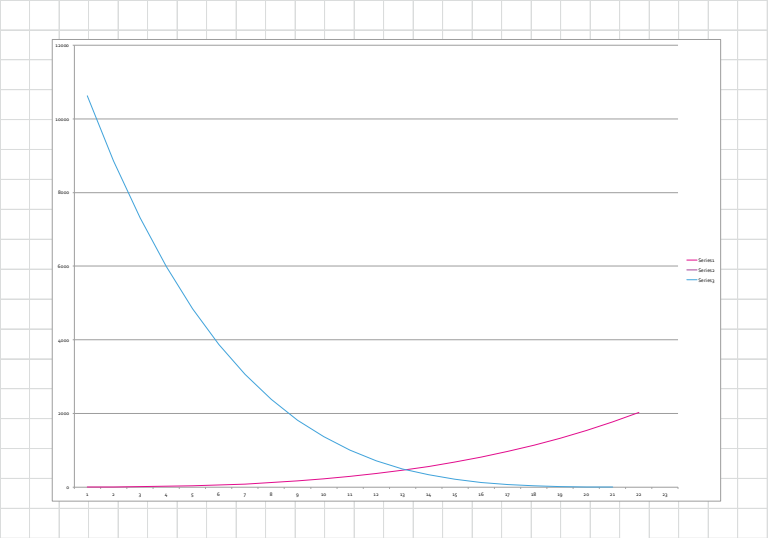
Comparing growth and decline in Iv-B and Oy-R

In these examples the Iv-B and Oy-R lines follow along the columns and rows of their Pascal Triangles, this makes their growth easier to calculate rather than having the lines change direction in an irregular way. For example an Iv line can be compared with a B line to show the relative growth of an Iv seller and B customer.



In the diagram above there are two growth lines from the diamond graph, both Iv and B grow along this line at some stage. Comparing this growth gives the diagram below. By drawing the roots and branches in this idealized way then they can be more easily be added up to see the overall

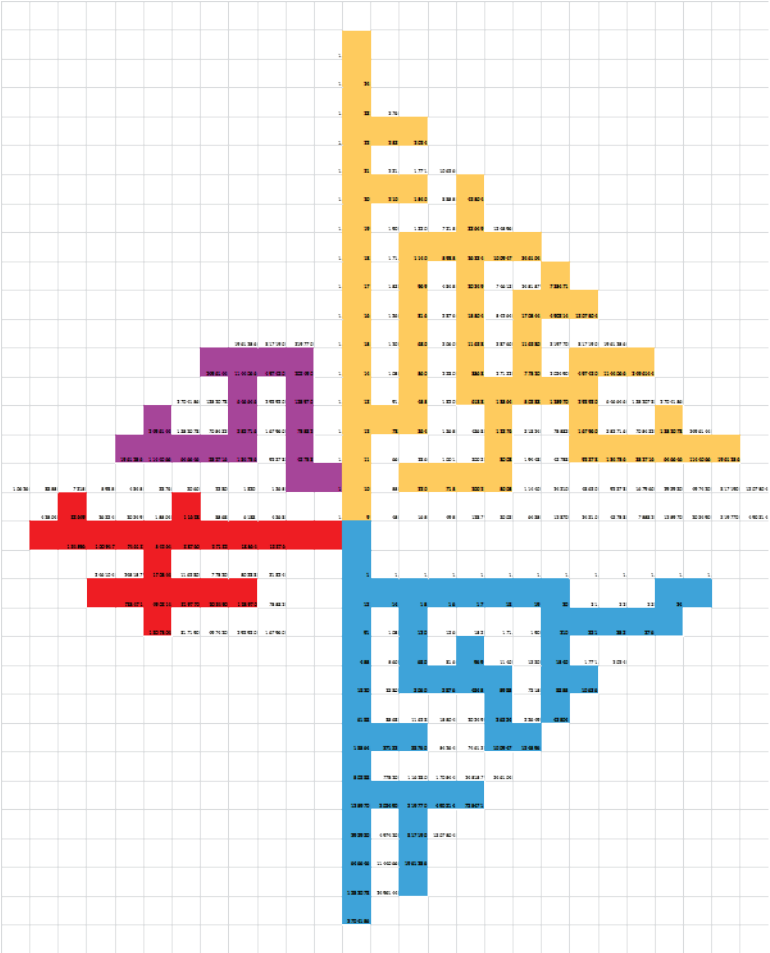
growth of the tree. Note that B is growing faster than Iv, if this was a market then Iv would not be keeping up with demand.



The solution to this need not be for Iv to raise their prices, because B is growing chaotically this might reach a tipping point and cause a collapse. For example poor B students might only be able to afford the food because it is in their budget, go above this and they might starve if they continued to eat there. This is because the amount of calories they got from the food might no longer be sustainable shifting them into an R tactic of minimizing costs.

Each root and branch of these graphs can then be evaluated by its different growth, for example the growth curve of Bob's salad sales might be very complex, if this is compared to the different growth curves of each of the demographics as roots buying his salad then it is highly chaotic. At any given time there might be no equilibrium, instead different roots or types of B consumer might be either rising or falling.

For example there might be surges of growth when Bob discounts some older salad, some hang around to grab this giving a spike in sales. Also some Scarcian students might come from particular classes and rush to get the salad they like before it sells out, Bob might have a strategy of making more money by being left with little to discount or throw out.



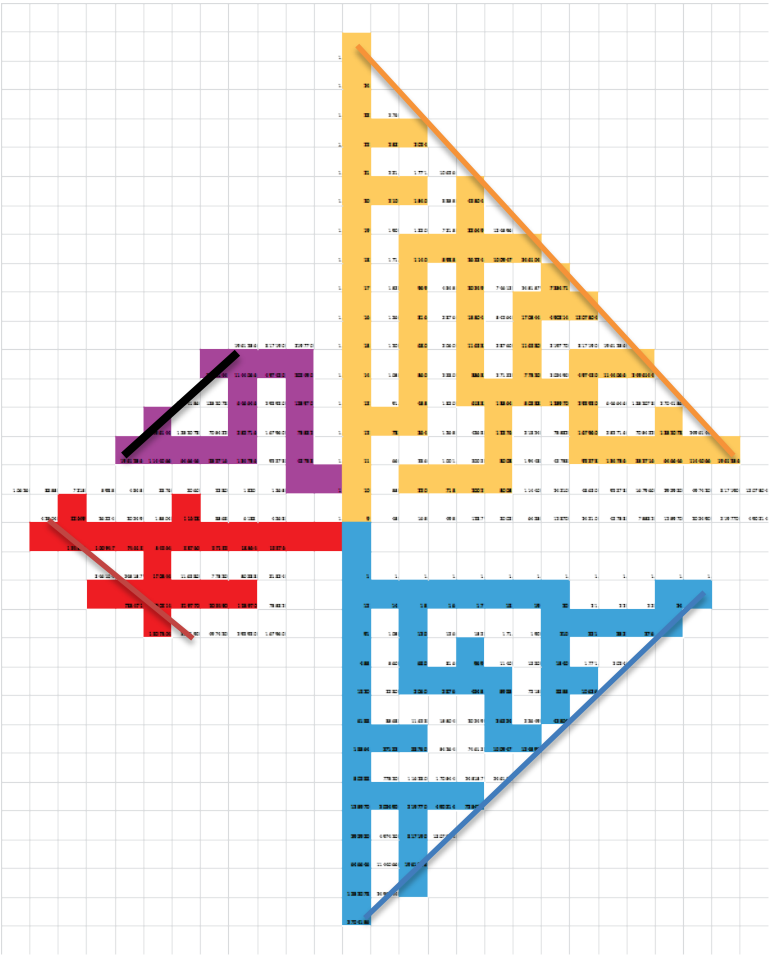
In the diagram above then each root and branch might be growing or collapsing at a separate rate, this also creates shearing and twisting forces on each root and branch. For example Alice might strain to keep up with orders when business is rising quickly, this might make her ill or cause some equipment to break down. If potato wedges

fluctuate too much in sales, leading to their being thrown out too often, then this flexing of the business can lead to the equivalent of metal fatigue where she might decide to let that branch wither or collapse by no longer selling them.

The business in the above diagram not only grows in its roots and branches but also parts can be broken or shed. For example the poor R students might shoplift often carrying away stock in an Iv branch, for example Bob might sell chocolates in one branch which are often stolen. This is like R animals in nature ripping off the branches of trees causing them to die off.

The stress from Oy shops selling adulterated stock might make some B students sick from this predatory business, some of their B root business then might wither away from this like dying roots in a plant not sharing food from its Iv branches. It is also like Biv plants in nature being uprooted as Oy predators search for B prey such as rodents, digging these plants up leads to their dying off in large areas.

V-Bi and Y-Ro

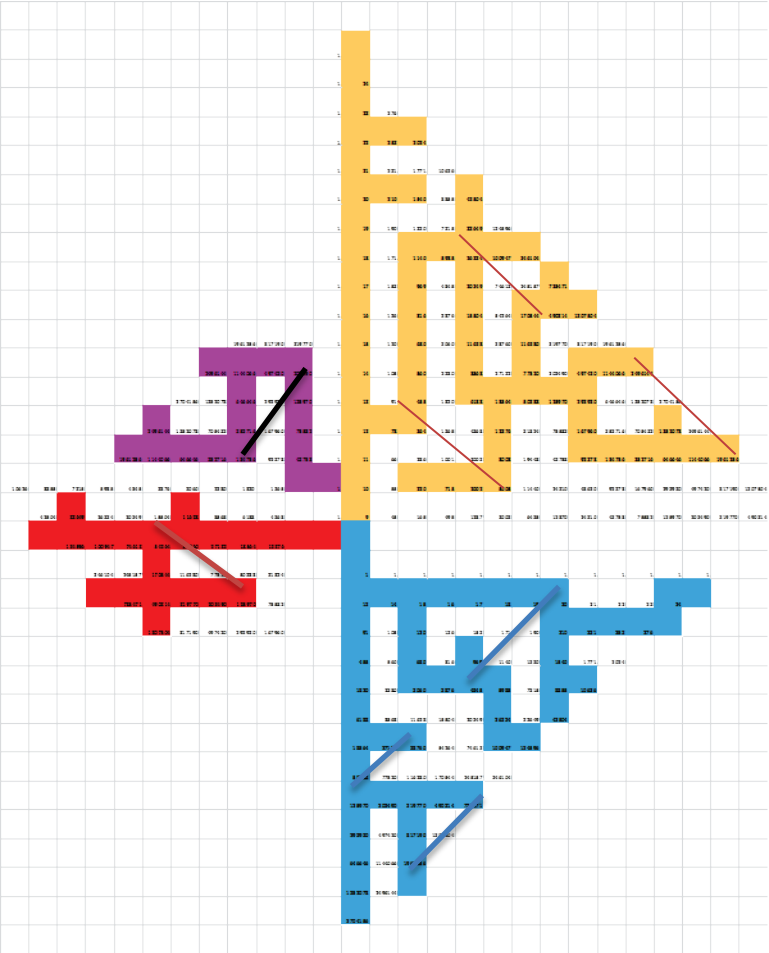


In the diagram above there are also random interactions happening, these will approximately follow a normal curve. In Oy there will be a tendency to work together as a team, they might fix the prices between them and punish R

shoplifters. If they are connected to a mafia in Scarcia they might start a protection racket from the other shops.

The B line is where B consumers start to group together as Bi, people might start to watch what the others buy and then eat a more normal diet. Some will still remain on the fringes of this curve, for example they might start to eat a normal salad and fries becoming more predictable customers to Alice and Bob. They then might cater more for their business rather than the booms and busts of trying to make money from the R students. R might also team up to some degree, being from the same country they might begin to sit together and order similar food so as not to appear the odd ones out.

Lines like this can be drawn anywhere through these roots and branches, for example there might be smaller groups as shown in the diagram below.



This is where small groups start to team up and become friends, they might still order chaotically in booms and busts but tend to order together. Over time the food market might stagnate with few innovations in dishes, people then might form more teams like this to pick out the best average meals.

It might also be affected by R-B revolutions and innovations at the university, for example new classes might bring in an influx of wealthier students causing a boom as some food branches grow to meet demand. This might also break up some of the teams as people compete to make new friends,

These groups could then be analyzed with statistical methods, they can determine how random they are and whether there are chaotic aspects to them. For example statisticians might survey people in the food hall for what they like to eat with an anonymous survey, this would give some groups of preferences which would result in a multimodal distribution with different roots having peaks around different food dishes.

A least squares analysis might show some trends, for example that groups of Scarcians over time prefer salad to fries perhaps because they begin to conform to a normal meal. This trend might continue, for example regular surveys might show newer Scarcians at the university eat more

diversely as they try more innovative and novel foods but then settle over time to a more conventional diet approved by Scarcians as a community. This might seem to have a causative factor behind it but it could be the desire to be seen as normal.

In effect then there can be a deterministic process which also happens to create normal curve distributions, if people tend to form normal groups from B roots and Iv branches then they are not completely random though they appear to be according to the assumptions in statistics. This is seen in Pascal's Triangle as a normal curve forms because the roots or branches towards the center grow faster than those on the edges to give the normal distribution. So people can still be highly deterministic or chaotic in their actions but are independent of other roots and branches enough to give randomness.

This is very different to statistics because it assumes that these people would be randomly distributed in every way, including that their growth along these roots and branches would also

be random. So when statistics ignores this chaotic effect if Iv-B it can be giving consistently normal results until there is a boom and bust, this happens in the real world economy. For example statisticians might have been analyzing the real estate market before subprime mortgages created a boom in the US. As prices rose markets were often still random in many ways statistically, this is because the Iv-B roots and branches were growing in effect at right angles to the horizontal V-Bi layers of the economy.

When the economy collapsed in the GFC it came as a surprise because many statistical tools such as the Gaussian Copula and Value at Risk suddenly stopped working, this is like the Iv branches of a tree suddenly collapsing so these horizontal layers are no longer normally distributed any more. In effect then large parts of the normal distribution in real estate went into free fall like the tree branches, some parts of the market still had a normal distribution but cracks appeared throughout the market. This also happens in the food hall when the students are often normally distributed, then some roots of student types

might increase their purchases in a boom of salad or fries then it can suddenly collapse.

With enough surveys statistical methods could infer a lot about these roots and branches but they would find it difficult to estimate these accelerating of booms and busts in some menus. This is because they are chaotic by nature, starting from the assumption they are random on a normal curve then ignores this chaos until it becomes highly significant. Often statistics creates its own random samples by being used so much in planning an economy, people tend to act normally because the system is designed to work best for those that are more easily predicted in their behavior. For example freeways might be designed for the average motorist with a margin of error, drivers who like to speed or drive slowly are penalized for this.

The system then creates two classes of people, in Biv this is V-Bi people that try to be normal and avoid deviant behavior as dangerous. When they stray to the edges of the normal curve they can be more prone to chaotic collapses, if they regularly

enter the 5% on the edges then these are the people who are regularly ignored in surveys as being statistically insignificant.

There Iv-B people might experience chaos that multiplies together, for example if they have deviant food tastes then they might be subject to pesticides not as monitored as those in normal food. They might live in suburbs that police don't normally patrol, if they dress abnormally then they might be persecuted by police as suspicious.

They need not be the same as Iv-B people in general, for example some B roots of students might prefer fries and salad which are also usually in the center of the normal curve. So even though they are chaotic and often deceptive they still appear normal in statistical surveys. However people on the edges of the normal curve can be chaotic or random in their behavior creating a kind of fringe where problems in society can grow exponentially like an Iv-B contagion or stagnate as V-Bi.

They represent a problem in economics because 5% of people can still be a drag on the economy, for example 5% might be unemployed because economic theories don't know how to help them without affecting normal growth. 5% might end up on welfare or sick because of drugs that have side effects below this 5% level of significance. For example there might be people taking antidepressants that are being harmed by them in this fringe creating a drain on the medical system. 5% might also represent numbers in a prison system that are wrongfully convicted by being deviant types, they attract suspicion or police makes forensic mistakes that are not fixed because the errors are low enough to be deemed insignificant.

Many people might complain that the movies and music available don't appeal to them because they become normalized to attract the larger and better paying demographics. They can then attract fringe and alternative artists that cater for them, for example Indie movie makers. These groups can be very diverse in their interests and might then break up into more conformist V-Bi groups, for example Goths might end up on the

edge of V-Bi normal society feeling persecuted and then form their own team based V-Bi society.

Others might remain Iv-B loners in this fringe and survive by being relatively invisible to this normal majority. In the food hall people who like a kind of salad might find Bob and other shops won't make it because the market is too small, they might then try to patronize one shop to persuade them to cater for their preferred salad as a new normal in that shop. Statistics would then see this as clusters of normally distributed customers without showing how they evolved.

Illegal drugs might be tolerated in an economy if they are believed to be insignificant, when they rise above this there might be a crackdown by the police or an increase in funding in a drug war. Illegal immigration might also be tolerated to a level of insignificance, in all these cases the fringes of society grow as these problems are lumped together. In Aperiomics this can be how new species are formed, for example a herd of Ro buffalo might have deviant animals on its edges that eventually break away to form their own

herd or become R solitary animals like gazelles can. In the food hall some people would complain the kind of food they like

Chaos and statistics

These inaccuracies in chaos and statistics are labeled as uncertainty in Aperiomics because there is an uncertain relationship between whether variables are dependent or independent. For example falling dominoes might be set up to hit each other dependently or be far apart so they fall independently. In between this becomes uncertain as to whether they will hit each other. In the same way the food hall has some deterministic chaotic aspects where people might follow each other's purchases, other might order independently of each other and in between there is an uncertainty as to how to classify their behavior.

If these insignificant people can be modeled more accurately then this uncertainty can be reduced, this fringe often ignored in society can be better catered for making the economy more efficient as

a whole. As can be seen by tracing how people move along Iv-B roots and branches or in V-Bi teams all aspects of their behavior are analyzed minimizing uncertainty about them. Because statistics is highly developed as a V-Bi system Aperiomics is more about developing chaotic mathematics to fit into existing statistical theories, this is done by seeing how both fit together in the four Pascal's Triangles of the diamond graph.

Statistics as mentioned earlier starts from a null hypothesis that the data is random, if it deviates enough from this to two standard deviations or a 95% confidence level then this is considered to be significant. Chaos in Aperiomics starts from the alternate hypothesis being assumed to be true, that the data is chaotic in some way and if proven wrong then the null hypothesis becomes true. It may then be that the alternate hypothesis could also be proven chaotic to a 95% confidence level.

Statistics could uncover some of these roots and branches as trend lines in regression analysis or ANOVA interactions, for example the students being classified into different root structures

could each be compared in their purchases using ANOVA looking for significant interactions between them and what they buy. Then the shops might be analyzed with each branch as a separate sample for ANOVA, for example white coffee, black coffee, fruit juices of each kind, French fries, and salads might each be separate sample groups that are analyzed to look for trends.

The alternate hypothesis then might be that particular roots shop more at particular branches than random chance would indicate, also that some roots might shop differently because of the effects of other roots and branches. For example Roy engineering students might dislike Biv engineering students and avoid standing near them in queues. The samples taken of students would show this in an ANOVA table with interactions for example between the two student groups and the salad or French fries queues.

However the growth of these roots and branches would also be analyzed chaotically, for example in ANOVA each value is usually squared and added together to give a variance or standard deviation.

The nature of the growth of each sample however is ignored, for example the Roy engineering students might grow and decline in numbers at the salad queue throughout the day. These numbers are presumed random and might be compiled once per half an hour so each sample has fresh students as the previous ones have got their salad and left. These numbers might be compared by a similar process every half an hour to Biv engineering students buying French fries.

The null hypothesis would say their numbers should be random, starting with the alternate hypothesis however says their numbers will change chaotically affecting each other. A Poisson Distribution might expect that there is a proportion of each kind of student that would eat fries or salad, deviations from this should occur equally either side of this proportion like flipping a coin. This might show there are nonrandom changes in ordering but doesn't address how they change over time.

The differences between the two lines might be analyzed, for example the numbers of Roy and Biv

engineering students waiting in both the French fries and salad lines might change chaotically giving two sets of difference data changing over time. When a large number of Roy students join the French fries line the next Biv students then go to the salad line instead or vice versa.

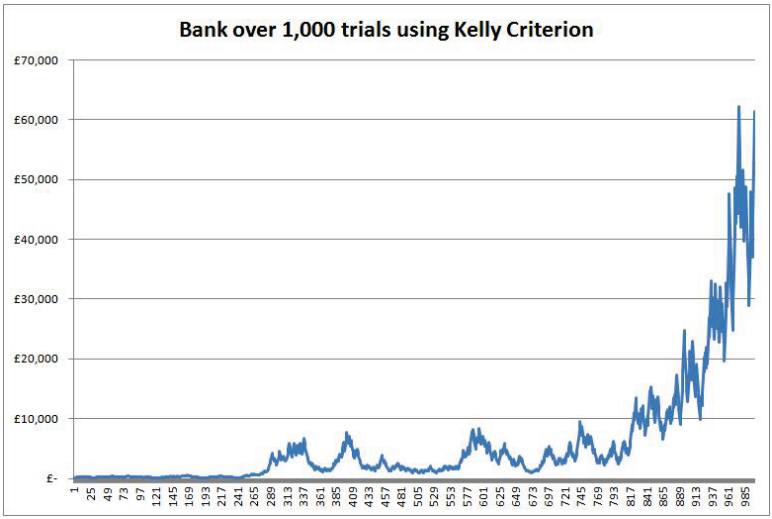
This might then be calculated like the Kelly System in gambling, the Poisson Distribution might assume the students would join either line randomly like heads being French fries and tails being salad with coin tosses. By looking up the distribution tables it might be determined to a 95% confidence level that the students are joining lines nonrandomly.

$$f^* = bp - q / b$$

where **f*** is the fraction of the current bankroll to wager;
b is the current bet odds(fractional);
p is the probability of winning;
q is the probability of losing, which is $1 - p$.

Using the Kelly System calculating this chaotic behavior might attempt to profit from this, the amount of profit from growing and decreasing bets would correspond to how chaotic the

students were. If they were randomly joining lines then the Kelly System would not make or lose any money except by chance, if for example when a Roy student joined a line a Biv student was expected to join the other line then a bet might be made on this.

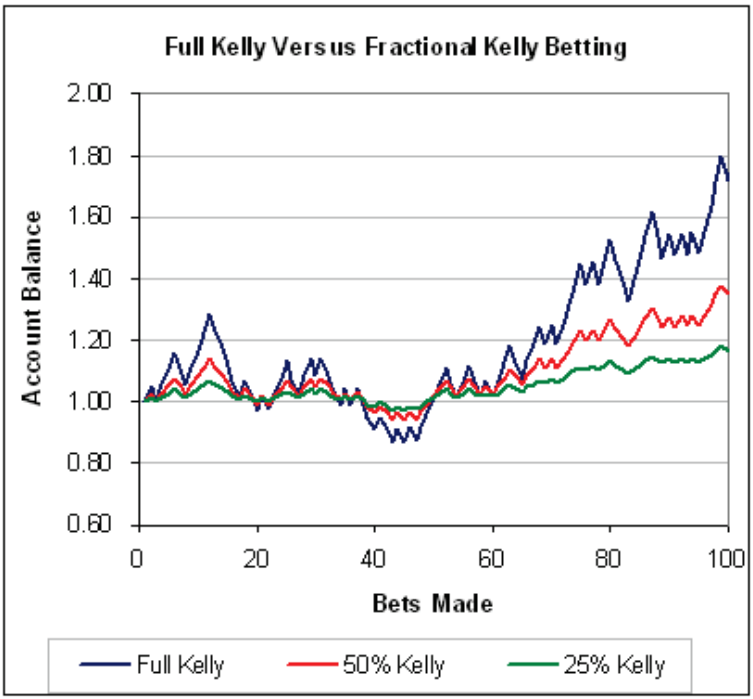


In the diagram above trials using the Kelly System increase the stake, if this was monitoring the Roy and Biv engineering students then betting on their avoiding each other would be proving the alternate hypothesis, the random null hypothesis would have lost money here indicating it was false. For example there might have been a

variable proportion of avoidance of 2/3 to 5/6 occurring but the null hypothesis predicted it would occur only half the time. Even if the null hypothesis had been 2/3 of the time it still would have performed less well as this avoidance changed between floors and ceilings. For example the parts of the line where the Kelly System lost would be where the avoidance behavior rebounded off a floor or ceiling, it might also have been random events moderating the chaos and causing losses.

As these bets paid off in the graph then they might be increased in value according to the Kelly System equation mentioned earlier, the larger the bets became this would correspond to confidence values in a table that the student movements were chaotic. The same system works in effect on the stock market, a stock might be assumed to have a random walk like students randomly walking to either line. It might also be assumed to have a chaotic walk where for example a price rise might be followed by arbitrage traders assuming it is a random walk are shorting the stock or vice versa.

After the students were monitored like this over a few weeks then enough data might be gathered to look for chaotic trends, the Kelly System would have made or lost money. For example it might have misread the situation and Roy students like Biv students so much that they joined their queues to talk to them rather than avoiding them.



The diagram above shows a proportional Kelly System where the stake might be raised or

lowered less than the full amount to compensate for miscalculating the odds. This might also be used in analyzing the food hall or an economy, this might reduce some of the errors against the randomness encountered or unknown chaotic influences.

The Kelly System might use a percentage of the available stake on each bet, for example it might start with a nominal stake of 1000 points and if the estimate edge is an 80% chance of a Roy engineering student avoiding the Biv one or vice versa then it might indicate betting 80% of the stake. The overall profits and losses can then be calculated to give an expected profit or loss per bet, for example if the student situation happens 1000 times over a few weeks and each results in avoidance around 80% of the time then with some random results there will be an expected profit per bet.

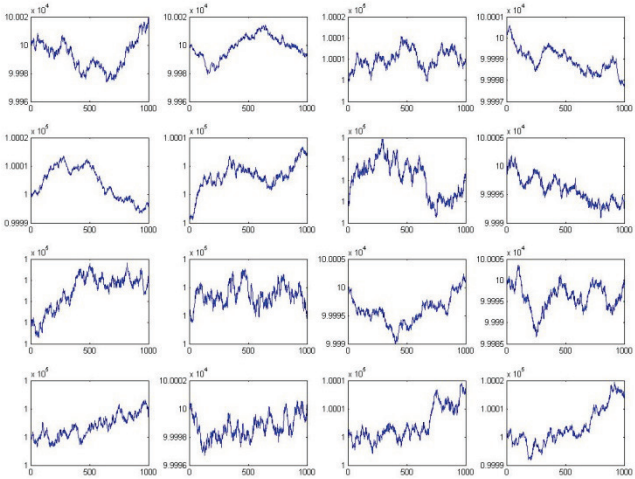
The real odds can be worked out from the history of the student interactions with some chaotic and random influences, for example some Roy and Biv students might be friends or not notice the other

in the queue. They might also be separated enough in the queue to not care. This randomness might reduce the expected odds and increase in the stake wagered, this would lower the growth of the stake over the 1000 student interactions.

This growth of the stake would be like a trend line in regression analysis or ANOVA except it begins with the alternate hypothesis and can go back to the null hypothesis at times if the students sometimes act randomly. The growth of this stake can then be estimated mathematically on a log graph to see if it becomes a straight line at various times, if it does then there is a direct causal link.

This process could be followed with every root and branch in the food hall to look for growth, by using the Kelly System an initial alternate hypothesis if formed and the odds might be adjusted over time according to how the history of purchases occurs. This is similar to Bob working out how much salad to make except now chaoticians like statisticians would be monitoring all the data in the food hall looking for growth and decline in each root and branch. The more profits

this system generates then this makes the data easier to plot on a log graph, if it is highly successful through the food hall then the chaoticians might recommend to all the shopkeepers changes to increase their profits.



The diagram above might represent different roots of students with their food and drink purchases. The Kelly System then might examine each one over time to calculate algorithms that predict their purchase changes better than the null hypothesis of randomly visiting each shop in the food hall. Statistical analysis would also

analyze this data with the most likely outcome being a mix of chaos and randomness in their purchases.

The same process could be used in an economy to identify the roots and branches and how they interact with each other. The graphs might also represent Alice's and Bob's sales, the 8 on the left being Alice and the 8 on the right as Bob through the day. Each sells 8 different goods of foods and drinks. They try and calculate from this data chaotic patterns which enable them to make less food and still satisfy demand reducing the amount they must discount or throw out. By connecting graphs like this of roots and branches then these random and chaotic connections can be found more easily, for example a surge in sales to new Royville students would correlate with a surge in sales of fries implying a bet using the Kelly System that they will buy more fries would increase the stake compared to the null hypothesis.

This then is similar to the process already followed by many investors in the stock market, they might examine the historical movements of stocks to

estimate the odds of their rising or falling and placing that fraction of their stake on buying long or short. The graphs above then might represent 16 stocks and their price changes over a year. This system can also be used in an economy to measure economic problems, for example the effects of different taxes might be monitored on a state's economy to see if they spur growth when reduced as an alternate hypothesis or make no difference as a null hypothesis. Theoretical bets are made over time on different goods and services that they will increase in turnover as taxes are reduced, by looking at this history the Kelly System could determine the odds in each part of the economy for the alternate hypothesis making money.

Often the Kelly System will not generate profits, for example the history might really be of random rises and falls in turnover of goods and services and the Kelly System would work out a complex betting strategy that is just mimicking random behavior. If so then then if this was tested on a similar tax decrease in a neighboring state then it might fail to model their economy because no pattern of odds giving an edge actually existed. It

might then actually lose money when applying the wrong odds and proportions to the neighboring state compared to the statistical results.

If so then the null hypothesis might be proven, that the tax decrease had no effect or that the effects it did have did not conform to a chaotic pattern but where just a random increase in business everywhere. This system has the advantage of working well with current statistical techniques because it is already used on the stock market, historical data is examined to look for ways to make money in bets by finding odds better than chance.

These odds represent roots and branches by classifying them in Iv-B, then if these odds persist over time then the economy is growing in ways that are more predictable and chaotic. In Aperiomics however this growth would usually alternate between floors and ceilings, in the food hall for example the Kelly System might pick up on trends that reach a ceiling then collapse to a floor. For example the Roy and Biv students might grow in their avoidance of each other until it becomes

so inconvenient that they have a truce and then mix in the lines much more. This continues until it reaches a floor where the clumping together of Roy and Biv students reawakens old animosities and they start to avoid each other increasingly to another ceiling. Some of this would be moderated by randomness so the result in an uncertain mix of chaos and randomness where the Kelly System would predict these booms and busts of avoidance to a large degree.

The avoidance of the Roy and Biv students of each other can then have a random aspect, this can correspond to a coefficient of dispersion in the Poisson Distribution where random objects might clump together or be more widely separated. The null hypothesis would be that Roy and Biv students join either line randomly like coin tosses, if they are moving to a ceiling of avoidance then it would be very rare to see a Roy and Biv student in the same queue even when widely separated. If moving to a floor then they might clump together more than usual, they might then be seeking each other out to maintain the truce for longer before it breaks on the floor.

The Kelly System can be seen as using odds that are innately random, we get used to this concept from odds being used in gambling. However odds are also a fraction and these odds can also be seen as deterministic fractions. For example a Roy engineering student might have a deterministic plan of avoiding Biv students if he has to stand within 3 people of them in a line to buy salad or fries. There is no chance in this for him, he follows an algorithm that determines what he will do. In the same way all the Roy and Biv engineering students might follow a similar algorithm they have calculated, they might even have decided variations of these at meetings. So the Kelly System is in effect trying to work out this deterministic group of algorithms to give a deterministic increase in its stake.

This is like in Pascal's Triangle where the individual cells might be regarded as random odds when viewed in horizontal layers forming normal curves. This is because horizontally each cell has no real relation to those adjacent to it, they are in effect random like people in a statistical normal distribution would be. However looking at the triangle vertically it can be regarded as random

odds as well like conditional probabilities, it can also be fixed events that happen a definite proportion of the time.

The Kelly System then might increase its stake by finding conditional probabilities where one probable event depends on another one occurring first, it can also find events that are as sure to happen as if actual levers and mechanisms were producing them. If it determines these algorithms accurately it might increase its stake with every bet, if inaccurately it might lose each time there is a mistake because the algorithms always go against the system.

If these are acting as conditional probabilities, for example if a Roy engineering student has a particular probability of joining the salad line then a Biv student has a probability of avoiding that line, then the system will still work except the mistakes are more related to horizontal odds rather than vertical proportions.

Iv-B and Oy-R interactions then act as definite proportions, for example if an Oy hyena is hungry and sees a nearby R gazelle then it will chase it a definite proportion of the time depending on distance, its hunger, etc. There need not be any odds in this calculation, it might know it will succeed in catching the gazelle 2/3 of the time but this need not imply the 1/3 of failures happen because of random reasons. The R gazelle might change direction when running seemingly randomly but it might also be working out a dodging system according to what it sees in front of it that the Oy hyena cannot predict even though it is not random.

In the same way then the Kelly System in investing need not be looking for an edge in odds to make money, it might be seeing actual chaotic interactions. For example investors might be watching each other ready to jump into stocks that announce improved earnings, each might have computer algorithms that force them in effect into specific investments. The Kelly System determines from historical analysis an approximation of all these investor algorithms and

with some mistakes increases its stake by also buying into these situations.

Another group of investors might have a random strategy of investing after announcements like these more often than not, the Kelly System also makes money on their actions even though it is nor evaluating random odds rather than chaotic proportions. The difference is important because the object of Iv-B and Oy-R chaotic analysis is to look for deterministic strategies and proportions first, even though many of these will have random aspects that either moderate this chaos or even sometimes go along with it to make the analysis more uncertain.

Color interactions

The statistical and Kelly approaches can then be used in tandem to describe the movement of students more accurately as well as for the economy as a whole. However colors also have characteristics that affect these results, this is also seen in stock market analysis where chaotic Kelly System analysis or random arbitrage systems

following Eugene Fama also have to consider how people behave. Stocks might become fashionable, innovate in ways that change stock values, disasters might also occur that are hard to predict as randomness or chaos introducing additional uncertainty.

For example in the food hall the movements of the Roy and Biv engineering students might be affected by innovations by Alice and Bob in their French fries and salad, new recipes and ingredients might cause the students to crowd onto one line to try curly fries and ignore their animosities causing losses in the Kelly System bets. This is like the problem in Kelly System investing where the stock market might reach a ceiling and then collapse, often it goes into a reverse momentum accelerating towards the floor.

The food hall might be chaotically modeled to look for changes after innovations in foods and drinks, this happens in the stock market where investors look for new products being announced by companies and then watch each other for signs

of jumping in or out of a stock. Some new products might have little effect, for example the Kelly System might predict a chaotic growth in curly French fries sales as the animosities are overcome but the new fries might have a random effect and so maintain the previous mainly random level of avoidance.

Time and energy are important factors in V-Bi and Iv-B interactions for Biv students, and Y-Ro and Oy-R interactions for Roy students. Generally then the Kelly System would be monitoring chaotic changes that are higher in energy or momentum and accelerating. For example if there is a stable level of avoidance between the Roy and Biv engineering students then that indicates V-Bi random associations, also that statistics would better model the situation.

Another way to separate chaotic and random data is whether it changes between floors and ceilings or tends to go to an average equilibrium. For example if the Roy and Biv engineering students tend to avoid each other an average percentage of the time with an error around this then it is

likely to be accurately statistically modeled. If it oscillates between a floor and ceiling then it is likely to be better modeled with chaos. More often this error around the average might contain a chaotic or dampened oscillation, for example it might still have an average level of avoidance but 95% of the time it moves between 10% more and less than this in an irregular chaotic pattern.

This is a common pattern in the I-O market, for example a Kelly System in a regulated I-O stock market might look for smaller chaotic patterns like this to make money on, other investors might use arbitrage to bet against these same kinds of oscillations. Arbitrage often works on the law of the one price, that there is a normal price for a stock either by itself or compared to other similar stocks. When it deviates from this arbitrage might indicate the price will return to normal, they then short the stock if it goes up or buy it if it drops in price.

The two kinds of investors can then be working against each other, the Kelly System investor can be buying long expecting the stock to keep rising

while the arbitrage investor is shorting it expecting it to return to normal. Because the fundamental uncertainty or h between chaos and uncertainty neither knows for sure who is going to profit from this, more usually the two tend to moderate each other so the stock moves in a mix of chaos and randomness. It also tends to do this if investors are each using a mix of chaotic and random strategies rather than one group using chaos against another using randomness.

The same situation occurs in analyzing the food hall though no money is being bet, the results however are that in some situations the Kelly System would increase its stake more while elsewhere statistics would be right more often. The food hall is a market for food, the results of the competing analysis then give a similar mix of success according to how investors do using the same mathematical tools with stocks.

Using statistics in this way can make more money theoretically than the Kelly System if the Kelly Systems algorithms are wrong enough, however to fully balance the two together statistics would

be used in an arbitrage system. For example with the French fries and salad lines the null hypothesis is that Roy and Biv engineering students avoid each other a fraction of the time, it might also follow a more complex curve determined by regression or ANOVA. This relationship then has random movement on either side of it, the regression line then might have random movement where there is more or less avoidance but it follows the regression equation with a confidence level or margin of error.

Betting then that each Roy or Biv engineering student will follow this equation can increase or decrease theoretical money staked compared to the Kelly System attempts to improve its algorithms. However the statistical approach can also use arbitrage by assuming a variation of the law of the one price, that if there is a deviation from this regression line or equation that it should return to it. Bets then made in an improbable situation will pay off by assuming the values will return to the equation line.

For example there might be a complex equation which models the avoidance behavior of the students, if they start avoiding each other more than usual then bets could be made that this avoidance will return to the mean. This is not the same as statistics generally where each student is assumed to be independent of the others, here deviant students avoiding each other more often are bet again that they will change their behavior or even start avoiding each other less more often to return to the mean values around the equation line.

The reason for this is in V-Bi and Y-Ro values can follow the normal curve but there are other reasons for this such as the desire to cooperate and conform in a team, this deviant behavior of students then would go against the team's strategy and the desire to conform would then pull them back into line. The same occurs in arbitrage, V-Bi and Y-Ro investors tend to move in teams with a normal strategy, when they start acting abnormally like members of a Ro herd of buffalo there is a strong tendency to become conformist again. So when a stock price rises to an abnormal level investors who prefer the normal

price will tend to bring it back into line and the arbitrage investor take advantage of this.

Eugene Fama saw the markets as random but they are often more conformist with the same distribution as randomness, this is not the same as with games of chance because cards or Roulette might follow a normal curve without each trying to conform to the others. The V-Bi and Iv-B mathematical systems then can bet against each other on predicting parts of an economy much as they do in the I-O stock market already, here they do this on parts of the economy that need not be tradable information to improve economics predictions.

For example the V-Bi and Y-Ro statisticians make theoretical bets using points not actual money against the Kelly System Iv-B and Oy-R chaoticians on how the Roy and Biv engineering students will behave, their bets change as the underlying equations and algorithms change modeling the student behavior more closely to a minimum level of uncertainty called h. This value of h then would assume real values over time where the

fluctuations between the time and energy based calculations would still fail to model the student avoidance behavior to some degree.

This is still different from an I-O market because the students need not change their behavior because of this modeling, in the stock market the prices also change as this V-Bi and Iv-B investing is done making it more complicated. However over time this modeling might change behavior in the food hall as the shops arrange their food products and stock reserves according to student behavior. For example Alice and Bob might have automatic software that counts the Roy and Biv engineering students so their avoidance behavior automatically tells them how much French fries and salad to make.

This would in turn affect the student behavior because they would sometimes find that avoiding each other makes them wait more or less time for their food. Like with the stock market this would affect to some degree their avoidance behavior, some might decide to avoid each other less to get their food more quickly while others might avoid

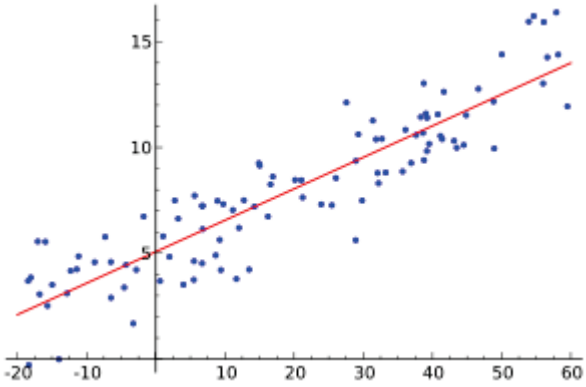
each other more because they find that gets their food more quickly. The system then could moderate or exacerbate this avoidance behavior from changing the food availability much like supply and demand of shares is affected by the prices changing from investment strategies.

The mathematics is much more complicated than just using the normal curve versus the Kelly System but this illustrates chaotic versus random predictions already being made in investing, the idea of Aperiomics here is establish the basic principles and then to extend this into more complex modeling of economies to prevent problems occurring. For example companies vulnerable to collapse form fraud or misallocation of resources are often detected by the interaction of chaotic versus random investing, in the same way detecting these problems in an economy could prevent major areas of fraud developing as happened with subprime and derivatives leading to the GFC.

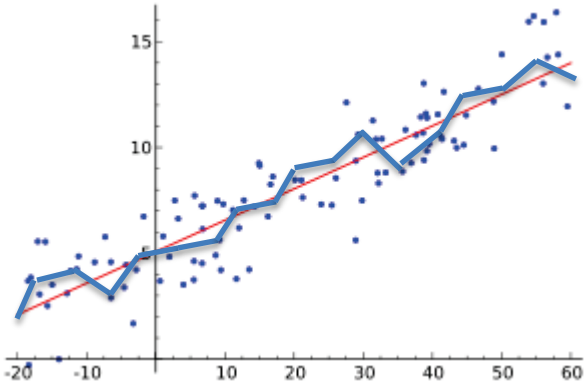
One reason much of this analysis is not happening so far is that Iv-B investing is secretive and

deceptive by nature, the algorithms they use might work well in economic analysis but are often trade secrets. If a Kelly System investor has his algorithms anticipated by another then he could be ruined by them. This is like Oy-R predators and prey losing if their tactics are worked out too closely by others. So in effect the dominance of statistics in economic analysis happens because of the color interactions in Aperiomics, transparent data is more random and so statistics has evolved to model it within margins of error.

Chaotic data is hidden and often uses misdirection, the mathematics involved in understanding it in markets has then grown by revolutions where often the discoverers profit more by keeping it secret. This happens for example in hedge funds where traders work out where chaotic edges are found in the market but don’t share this in journals or with other traders. Statistics then tends to give a false impression that because its mathematics is widely available that it covers chaotic situations as well.



In the diagram above a regression analysis gives a trend lines, this could also be viewed as a Kelly System investment strategy that bought and sold stocks to give this rate of growth of its stake. In practice chaos is more likely to have a complex line that changes quickly, like the diagram below.



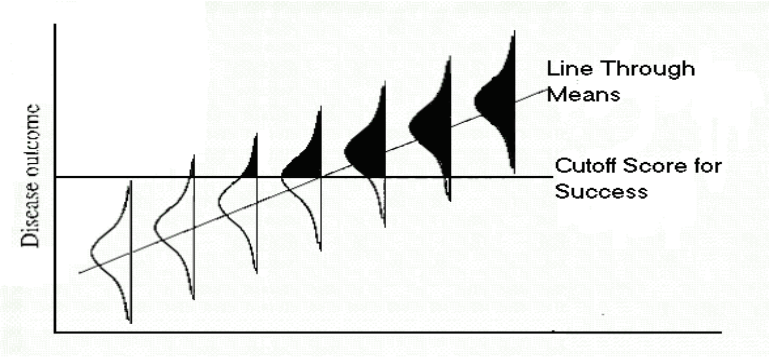
In these bets the Kelly System looks for chaotic and predictable patterns in the data that is more accurate than the trend line, ideally some of these algorithms would then be used to predict where these dots of data will fall later as the red trend line does with a random margin of error. These dots might be changes in stock prices and the blue line where the Kelly System bought and sold stocks, it would have anticipated much of this red line trend as if the stock market was generally rising in value.

The Kelly System was based on work done by Claude Shannon of Bell Laboratories on entropy, which in turn is related to surprisal in statistics. It involved the problem of sending a signal with various amounts of random noise, this problem is in effect the same as trying to find Iv-B and Oy-R algorithms to describe the roots and branches in the food hall with random noise being V-Bi and Y-Ro interactions. The Iv-B and Oy-R chaos is in effect the signal in the random V-Bi and Y-Ro noise of the economy.

If the blue dots represent Roy and Biv engineering students avoiding each other then each dot might score on the Y axis as a level of avoidance behavior. Low scores might be standing next to each other in the queue and high scores can be leaving a queue when the other joins it. The red line would indicate a trend of rising avoidance calculated by assuming the null hypothesis that their avoidance is random, it is likely to be rising to a ceiling and then will crash down to a floor of low avoidance.

Instead of a regression analysis then the Kelly System creates smaller lines that represent the best bets for increasing the stake over time, each smaller line might have a normal curve distribution above and below it because the horizontal layers of Pascal's Triangle are random while the vertical columns are chaotic. In this case then at right angles to the smaller lines when the dots are in a normal distribution with the line at its mean then this might be the optimum bet historically at that position on the graph. Alternatively the normal distribution of points might remain vertical as it does in regression analysis. For example with any small blue line

where it changes direction the dots directly above and below it might have an average at that line. This is seen in the diagram below.



While this system would over time model supply and demand in the food hall it would still have the problem of I-O interaction waxing and waning causing V-Bi and Iv-B disconnects. For example if the food hall is poorly policed then the Roy and Biv engineering students might start fighting with each other causing the modeling to be less accurate. Iv-B and Oy-R interactions might

increase as deceptive tactics are used between them, the modeling system could not discover the hidden conflicts growing like a contagion and causing more booms and busts of avoidance.

Some might be fighting and avoiding each other more in the food hall because of injuries sustained there, others might disguise themselves as other kinds of students to get the food they want which fools the monitoring system into miscounting them. They might also pretend to be friends with the opposing students more like undercover spies to tell the others where their movements are likely to be so they can be countered.

V-Bi and Y-Ro interactions might also increase as the students form more team conflicts like rival gangs fighting in wars of attrition, a team of Roy engineering students might assemble first and then take over the French fries line while the Biv students either join this line in a fight or take over the salad line as a rival territory. This would change the modeling again because instead of these students picking the food they want they

would be picking the one where their team or gang is strongest in protecting them.

Situations like this often happen in the real world, for example Ro and Bi gangs might fight for territory in Scarcia and Abundia, just like they do today in many US cities and ghettoes for selling drugs. For a gang member to stray into the wrong area when shopping can be dangerous or deadly for him, they might then go there as undercover spies or dress as neutral shoppers to avoid trouble. Modeling the behavior of shoppers in these circumstances becomes more difficult because the I-O police are weak there, in the same way modeling the food hall and the real world economy becomes more uncertain when strong and neutral policing is unavailable.

This then is one of the causes of the GFC, modeling in the stock market using Kelly System variations against arbitrage became unreliable under I-O deregulation. In effect the two systems worked against each other until the market became fragmented, arbitrage stopped working properly in the GFC when there was no average

price for stocks, they went into free fall after hitting the Iv-B ceiling.

In the same way weak I-O policing in the food hall could make analyzing its data more uncertain, fights between the Roy and Biv students could become chaotic between ceiling and floors so statistics has a much larger margin of error. It could also become more random as people join gangs engaging in boycotts of some stores, this would hurt the Kelly System as algorithms describing small groups of students would be obscured by these larger gangs.

Disconnects and data analysis

Problems with analyzing the food hall data could lead to changes in surveying methods, for example the dishes people are ordering might boom and bust as each shop tries to counter innovate against each other so there might be no statistically normal diet. Any snapshot the statistician gets of their eating habits might be meaningless because it cannot form a normal curve except in minor ways. To counter this they

might try surveying on different days getting different results each time, this is like in the GFC where the statistical methods such as the Gaussian Copula pricing Credit Default Swaps and Value at Risk models stopped working with any accuracy in the chaotic situation.

To avoid this problem the statistician might try to randomize the data by leaving out some students that are harder to plot on a normal curve, for example Abundian students might be more normal in their eating habits while Scarcians change drastically according to how much money they get from home. This is the same problem as with opinion surveys, by removing people that aren't randomly distributed it may give a more accurate prediction but it can also remove people with chaotic opinions. This can indicate an Iv-B and V-Bi disconnect where the two sets of data become so different that they must be separated.

For example before an election people might be panicking in both parties, their followers are not acting normally and so don't fall on a normal curve for their opinions. To fix this the statistician

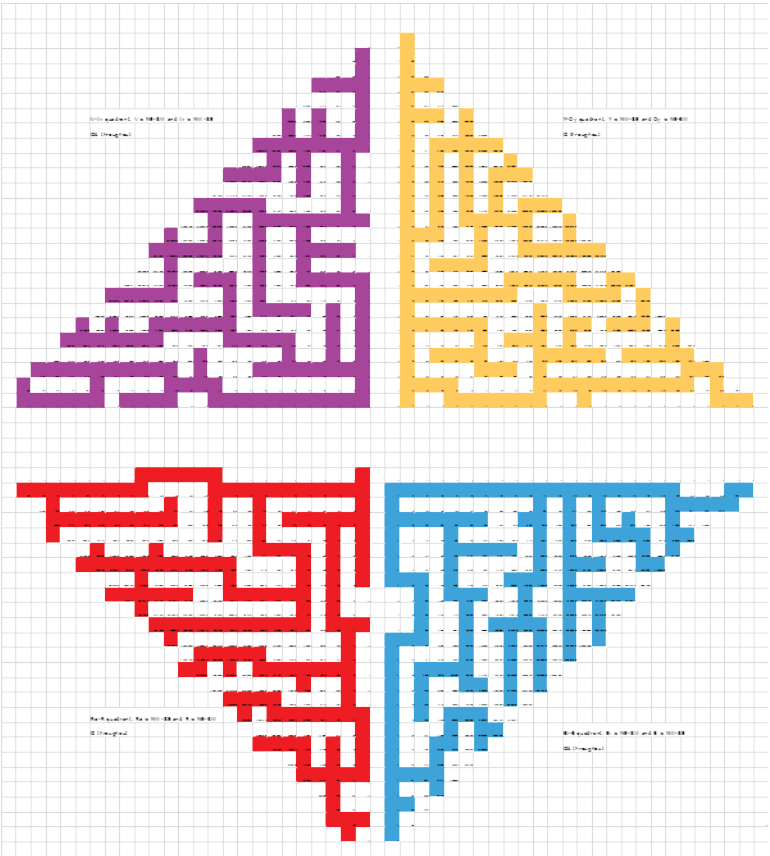
might exclude some people on both sides to get a balanced normal curve which predicts the election well, however this can be because the connections between these chaotic voters have been randomized on both sides.

The result is a survey method that can be very accurate for a short amount of time because it is a V-Bi methods that doesn't try to measure Iv-B trends. Instead it might be used to take surveys each day in the few months before the election on an Iv-B tree of questions, for example it might ask different age groups, different religious types, different locations, races, etc the survey questions.

This can come up with a tree like shape where some branches might surge before the election, for example a candidate makes a gaffe and so older voters swing to the other candidate until the momentum from this is countered by an innovative defense. Often the situation before an election has many tipping points, if a candidate says the wrong thing or his opponent makes a B innovation or Iv counter innovation in the

campaign then it might tip to a landslide for one or the other.

This is then a disconnect where the surveys ignore momentum completely to get a smaller margin of error on that day, it might be possible to see this momentum by looking at each survey which is in effect like looking at horizontal levels of Pascal's Triangle as it grows. However there is no real way to measure these changes except from beginning with the concept of V-Bi randomness, in the same way many stock prediction programs also rely on an assumption of randomness to find stocks behaving unusually.



This situation is illustrated in the diagram above where the various growth and decline patterns of different students interact with the many food items for sale. Statistics might get some idea of these changes by taking a survey each day, however by presuming chaos is dominant then this chart might be better approximated.

For example each line in the four Pascal Triangles above represents a growth rate, it might be growing moving away from the center or declining moving towards it. Daily surveys then might ask people what they buy to establish where they are in this graph, for example if people buy salad from Bob but then Sushi from Evelyn then they might fall on a branch that leads to both of these. Depending on the growth rates they might be represented on this common root or put onto separate roots for Bon and Evelyn.

With thousands of students surveyed like this they would be plotted on the branch that leads to what they buy, also they would be plotted on the roots that breaks them up into their differences from each other. For example there might be sixteen different dialects of Scarcian spoken and this would make sixteen roots plotted, there might be sixteen dialects of Abundian plotted as well.

So people would be plotted on the graph according to their dialects and what food they buy, then this might have more roots with different ages having different roots splitting off

each dialect. Then male and female, health, weight, and so on. Their food orders would be equally granular, different kinds of sushi and drinks, how they want their steak cooked, and so on.

From this data booms and busts in food ordering would be easier to see, also that people switch from one branch to another to try new dishes. If this survey is done for a month then over this time there will be common curve growth in some cases, for example in front of the salad bar it might follow a similar growth pattern each day.

So this growth curve would conform to some numbers growing in the Iv-B roots and branches of the Pascal's Triangle graph, these branches would then be seen as occurring in around the same part of the triangle each day. The branches might also move as the growth rate increases or declines each day, it would look like branches swaying in the wind or growing and withering.

This is then like a microcosm of an economy, different businesses would be growing like this as their business changed each day. In the same way the roots would also change, after a class the roots might quickly swell in numbers with orders as they rush to get in first and avoid waiting.

Sometimes a particular root of Scarcian female students aged 19-20 might surge in numbers and orders with a new dish becoming fashionable then it suddenly crashes as they get tired of it, there is no normal ordering pattern with them. Analyzing the buying habits of that root would find the branches they order food from might subsequently change in booms and busts. Sometimes they eat much more and at other times they might be crash dieting or short of money, the numbers also change chaotically.

A business looking at this data might get much more benefit than from a typical statistical analysis as might a political campaign. It shows for example how quickly different roots and branches might change in response to a situation and what makes them change. There can be other chaotic

factors hard to pick up statistically, for example Alice might sell more fries to the Scarcian girls mentioned, then sometime chaotically they stop.

By seeing what other roots order at the same time it might be a group of males bother them and drive them away sometimes, it might also be they join another root of female Abundians from their class and order something else. It might even be at some times the lines in front of Alice's shop get so long people don't have time to eat a full meal before the next class.

So by laying out these roots and branches, then arranging them according to their growth the whole can be seen to move in deterministic ways. To this can be added standard statistical methods to determine what random interactions are also happening, for example some people might vary their diet randomly or just buy from whatever shop has the shortest queue. Sometimes normal V-Bi groups might form as shops make alliances to fix prices and then lose some market share over time. People might make friends and join clubs, sit

together and eat the same thing until competition from other shops breaks them up.

To illustrate how these opposing methods work a survey might attempt to find out dishes Abundian women prefer at the food hall. The V-Bi statisticians expect this will fall on a normal curve while the Iv-B chaoticians assume there will be no normal diet but changes in booms and busts according to fashion. Each can survey a number equivalent to half the people attending the food hall on a given day, however they don't have to survey all of them in the same day.

The V-Bi statisticians take half the people and construct a curve with some skew and kurtosis to estimate the most probable diet, however this suffers from the problem of opinion polls around elections where people change their minds over time. The Iv-B chaoticians decide to survey 5% of the allowed number once a week for ten weeks to give 50%, they then group these in different roots and try to match these roots according to similar growth rates each day.

If these growth rates are consistent then it’s likely there is a normal diet because people are growing in numbers to eat it in a normal way. For example after classes they might line up at various shops according to their preferences, because they have a normal diet these lines grow and decline at about the same rate each day. The chaoticians might then concede statistics will give a more accurate answer but there is always an uncertainty between chaos and randomness.

For example the statisticians might use up their 50% of people in one day and be highly uncertain as to whether people were eating normally or booming and busting in fashions. The chaoticians might use up their 50% over ten weeks but be highly uncertain as to whether the booms and busts of growth they found were just in the margin of error of normal fluctuations instead of changing preferences for food. For example there will be some natural variation in a normal diet, this can still be explained on a normal curve. However the chaoticians may see these fluctuations as chaos and think there is no normal distribution, or that the chaos is more important.

They might also arrive at a statistical result with a chaotic method, for example to test that female Scarcians prefer sushi as a normal diet they might pick in the first week half males and half females, this gives a total sushi number of orders of 70%. Then the next week they might pick 30% females and 70% males and the number of sushi orders drops to 50%. Then with 70% females and 30% males the number of sushi orders goes to 85%.

With trial and error this way they can come to the same answer without using normal curves, this is because the changes in growth rates can match different roots of a tree. Each time the growth changes with different ratio it implies a deterministic relationship between sushi and gender. However a statistician takes the opposite approach, they assume a null hypothesis of no relationship and then this is slowly disproved as the results are increasingly improbable.

In effect the chaoticians as mentioned earlier start with the alternate hypothesis, that there are dependent variables which might be disproven to end up at a null hypothesis instead. This might

also be see when statisticians are adding more people to their survey, for example as the proportion of females to males changes in adding people the proportion of sushi compared to other food eaten also changes. This can be analyzed from the point of view of the null hypothesis, like an improbable sequence of coin tosses. However the chaotic changes in sushi eaten can also be viewed not only as a coin not acting randomly but describing a complex chaotic pattern.

For example the accumulation of people in a statistical sample can be viewed as a single large horizontal row of Pascal's Triangle which is filled and approaches a normal curve. It can also be viewed as a Pascal's Triangle filling up from the apex going down so at any time there are horizontal levels of the triangle growing larger as they go downwards. Both might be mathematically equivalent but the second way can include chaotic patterns that are not seen in the first way.

When an association between two sets of data is increasingly unlikely and confined to a small area

on the edge of the normal curve it may be chaotic, as these samples are taken the number of females eating salad might be lower than 5% on the edge of this curve. When viewed in the first way of just filling up on horizontal row of the triangle eating salad just seems randomly improbable, the second way of filling up the triangle indicates that some might have a habit of eating salad but the market for eating sushi is growing much faster.

There could also be a survey on lung cancer and smoking, the association between lung cancer and smoking is known. B roots might be drawn of all students in the food hall that smoke, over time these will branch into what diseases they get and what they die of. A second set of roots would be of nonsmokers and what diseases they get. By looking at how the diseases grow in these roots over time it not only implies not just a link between smoking and cancer, but how quickly these links grow.

This would then look like the roots of a tree growing, either both the smoking and nonsmoking would look about the same over time or there

would be differences shown in the root structure. A statistical method takes the reverse approach, it looks at horizontal levels of this root structure as Bi normal curves. Then it infers from the unlikely shape of the resulting normal curve that the data is not random, this leads to trend lines of the growth of various diseases which are the B roots.

A chaotician then would plot these different diseases onto different roots and then try to calculate their growth rate matching it to number sequences in Pascal's Triangle, the closer they get to a known growth rate the more likely it is to be deterministic. If there is a random component to this growth then the root might point more to the side, if highly chaotic then more at right angles to the Bi curve.

The two approaches look very different when looking at an economy, different business and consumer purchases as well as other economic data can be plotted as roots and branches in Roy and Biv. By measuring their growth or decline over time this gives the data a particular shape in

Pascal's Triangle which can then be viewed as an overall graph of the economy.

Some areas would be clearer lines which would indicate the growth rate is similar there, it also implies a deterministic connection between roots with similar shapes and positions in the triangle. For example prior to the GFC Credit default swaps, subprime bonds, and other securities would have been growing in price and volume giving them shapes and positions in the triangle.

Then after the GFC these curves often went into reverse pointing back to the center as prices declined. The boom and bust cycles are clearer than with normal statistics, however at the various V and Bi lines cutting across the Iv and B roots and branches the statistical curves should match up. So for example statisticians might be analyzing some economic data which gives skewed normal curves, these would also have a shape and position in the triangles where they intersect the same data giving roots and branches.

After the GFC as some areas of the economy became Roy then these curves would shift to the Roy triangles instead of Biv. It could then be determined how long it takes to recover back to Biv, for example whether there has been G nationalization of some businesses or governments are still minimizing costs. It is beyond the resources of this book to plot the data for an economy but there is no reason in principle why this could not be done as described. More will be explained on this in a future book.

Selecting data for these roots and branches could be done statistically with random samples, however this would tend to obscure the chaotic nature of the growth. Instead an idea outlined in Crisis Aperiomics is that connections between companies are followed in long roots and branches with some bifurcation points.

For example a company First Iron Mining of Abundia might have connections with sales to First Lumber and First Wheat Farming, those transactions which can be followed for the greatest length would be the chaotic samples

used. This is the opposite to that used in statistics where independent data is preferred.

When some of this chaotic data is mapped out then those sections which are short and taper off into random sales and purchases might be excluded. These are more random and should be covered already in statistics, these longer roots and branches would then be added to the Pascal's Triangles in the diamond graph.

For example if this was being done in subprime banking prior to the GFC then data with the longest length would be used, it might go from advertisements for loans to B workers applying for them with their associated root structure of costs. Then the path of these loans being processed into bonds would be followed in dollar and volume to their end user purchasers such as banks and pension funds.

With defaults on loans these might be traced to use those with the longest lengths of roots and branches, for example a B worker defaulting

might lose his job and this is traced to the business he worked for. Then they are in turn mapped out with links to other businesses in sales and purchases, other workers hired and fired, and so on. The longest chains of data would again be kept on the assumption that shorter ones would be more random and better covered by statistical methods.

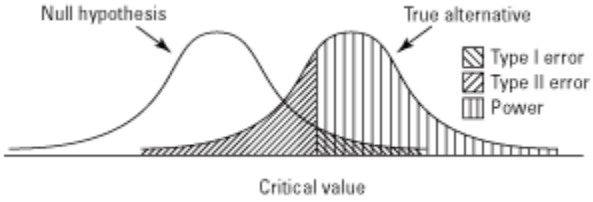
These then give highly chaotic Iv-B and Oy-R roots and branches through the economy, they can then be supplemented with V-Bi and Y-Ro statistical results to fill the triangles in with more data. There would have to be a confidence level calculated with this chaotic data, for example how well it agrees with other similar roots and branches. Some of this could be worked out statistically by working out the chances of similar trend lines happening by chance.

Errors in statistics

	Null hypothesis (H_0) is true	**Null hypothesis (H_0) is false**
Reject null hypothesis	Type I error False positive	Correct outcome True positive
Fail to reject null hypothesis	Correct outcome True negative	Type II error False negative

In the diagram above a null hypothesis is correct in the upper right and false in the lower left, it could also be said that the alternate hypothesis is correct when the null hypothesis is false. That is, the null or independent hypothesis says there is no connection and the data is random, the alternate hypothesis says there is a dependent or chaotic connection between the data.

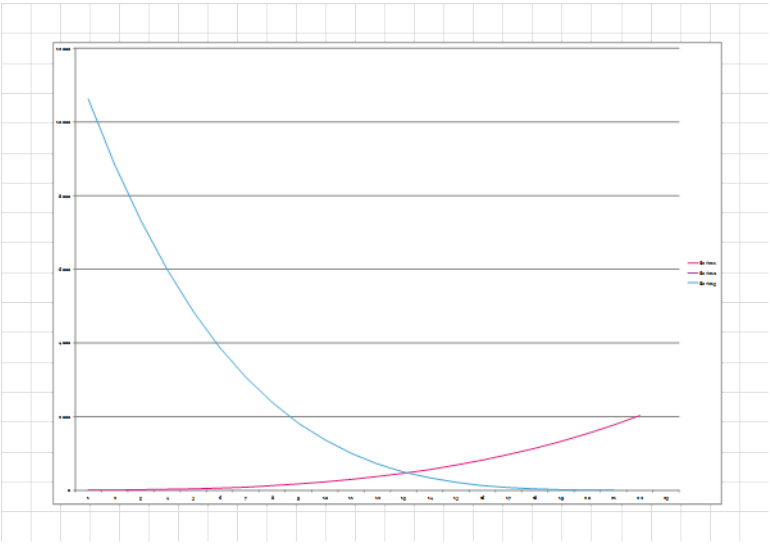
In between these there is uncertainty as a mix of chaos and randomness, it is not known whether this dependence is strong enough to be called a real connection or just random coincidence.



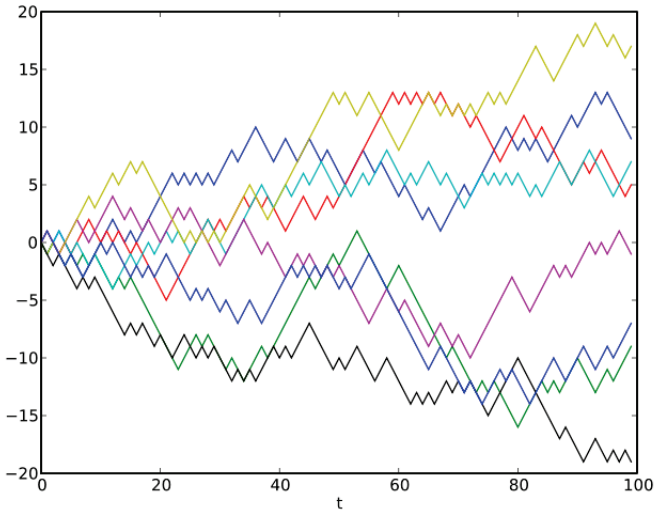
In the diagram above this alternative hypothesis is shown as another normal curve, however it has the problem of using a curve based on

randomness to show that something is not random. It implies then another curve or equation which would describe what this connection looks like rather than what it does not look like.

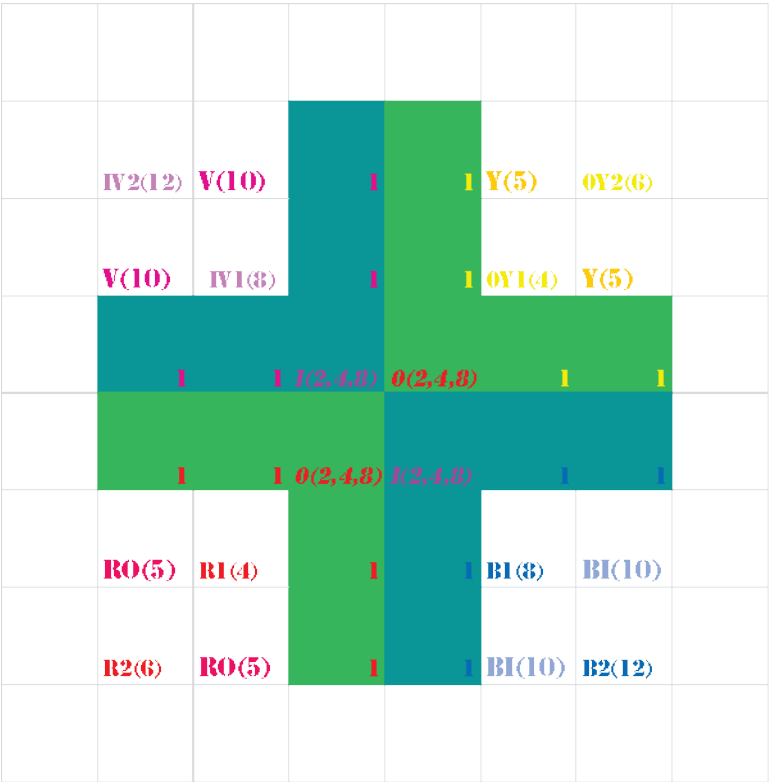
This can be a growth curve from an Iv branch or B root shown below. A different growth rate gives a different curve but one where the data is not changing randomly.



Compare this to a random walk below. The difference between the two can lead to Type One or Type Two errors.



The concept can also be extended to game theory, in the Aperiomics game matrix below a statistical survey could attempt to map out some of the jobs done by Bi-B and Ro-R workers.

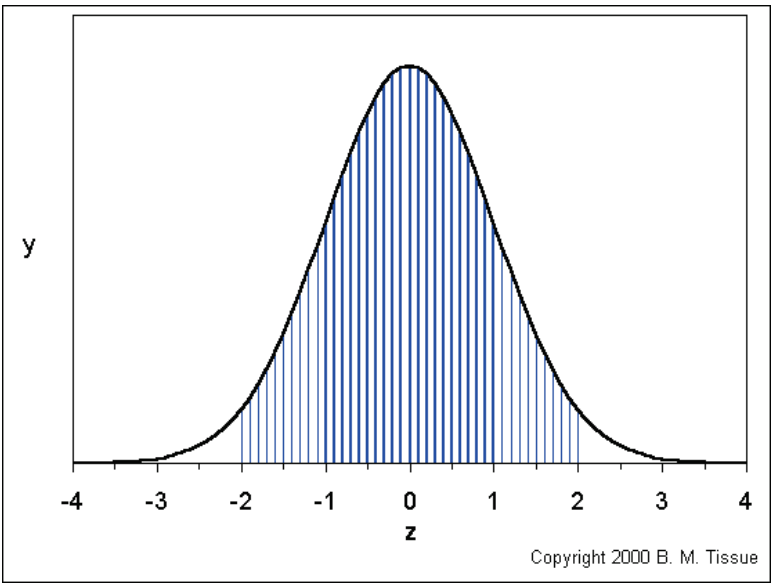


Statisticians might try to analyze this game matrix by assuming all the deals done are random as a null hypothesis, then they plot them on a normal curve. This is true in some areas, for example Bi unionists might randomly accept lower prices for work on the assumption that they will average it out by getting more money later. This then is a null hypothesis as true but still being useful. Iv agents however fight against this null hypothesis because they want to do better than chance in

making money, this happens in poker for example where a game based on random cards can become chaotic with bluffing.

This creates a problem for statisticians in analyzing this job market because some people are actively for or against their null hypothesis but the statisticians assume this is an objective measure that the participants are not interested in. The Iv agents and Bi unionists compromise in the I-O market, here there are Type One and Type Two errors from the point of view of a statistician.

However the term error itself implies a normal curve as the error curve is a normal curve as shown in the diagram below. For example people playing darts might aim for the bulls eye, however the misses around it tend to form an error curve that is the same as a normal curve.



So the concept of Type One and Type Two errors just means the data is not sufficiently random enough or contains enough samples for the null random hypothesis to be confirmed or rejected. The concept can be turned around in chaos so that a Type One error as a false positive means that the chaotic alternative hypothesis was false. A chaotician then looking at patterns of food orders in the food hall might make a Type One error when the Kelly System by chance increases its stake, this would be like a gambler believing they had discovered a winning formula in Roulette.

This can happen in the game matrix above where V-Bi unionists and management are also competitive to some degree, a chaotician might have an alternate hypothesis that Iv agents and B workers are affecting V-Bi wages. After analyzing the data they might make a Type One error where the null hypothesis of little Iv-B effect is true. Bi unionists might sometimes moonlight to get higher wages while Iv agents might sometimes take a bribe to hire a Bi unionist for higher money. However this amount of chaos might be small, it can though make the random changes in wages appear chaotic sometimes.

Type Two errors in would be where the data seems random but is chaotic, for example Iv roots an B branches might appear to be like random walks because they can grow and then collapse between floors and ceilings. This can happen in the game matrix with Iv-B and Oy-R, workers and agents try to bluff and deceive each other causing wages to boom and bust in ways that can seem to be a random walk. For example Iv-B agents and workers might also collude as V-Bi, Iv agents sometimes cooperate with each other so their

chaotic changes in what they get B workers for get averaged out sometimes. This would appear to be a Type Two error.