Foundations of Economic Science

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FOUNDATIONS OF ECONOMIC SCIENCE

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SCHOLARS

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Moni gave me 22 years of vacation to do economics. Without her, I would be nowhere.

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I hope my children see why their father was unavailable.

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PREFACE

Economists are serious and responsible people. They try to find workable solutions of grave problems such as poverty and unemployment, stagnation and instability, indebtedness and inequity. The high social importance of economic issues has attracted some of the most talented humans over the centuries. Economics has certainly reached a point in rigor far ahead of other branches of social science. But economists recognize that their analytical tools have deficiencies. They are not satisfied with the level of accomplishment, especially in the face of the stubborn persistence of the real life problems.

While mainstream economists do recognize the deficiencies, they keep using the existing analytical tools for lack of superior alternatives. A large number of heterodox approaches certainly enriched the understanding, but they have not yet attained general or wide acceptance. The disagreements persist, and even seem to widen and deepen.

The problem is paradoxical. Bertrand Russell put it succinctly: *"The point of philosophy is to start with something so simple as to seem not worth stating, and to end with something so paradoxical that no one will believe it."* It so happens that economists overlooked some obvious but fundamental matters. Their implications are far-reaching and wide-ranging.

One neglected and obvious matter is the pursuit of gain. It is implicit throughout the literature that people engage in trade for gains. Carl Menger made it very explicit. However, nobody provided a formal treatment of gain. Though economics intended to be a study of exchange from the beginning (see Whately 1832), the neoclassical revolution turned it into a study of allocation (see Robbins 1932). The allocation model does not deal with the pursuit of gain, and indeed cannot deal with it. It can study the use of existing resources, whose optimal allocation cannot produce gain, but merely avoid inefficiency. The allocation model inescapably leads to the idea of an equilibrium in which profit is zero. When we study the process of creating new wealth in the pursuit of gain, we need a model of exchange, with implications contrary to those of the allocation model.

Another fundamental matter neglected by the profession is the fact that the buyer pays the seller. The payment has two obvious dimensions. It must be both of a definite quantity and of a definite kind. The two real goods pay for each other, and hence are necessarily of equal market value. Yet they must be of unequal utility to provide gains to both parties. In the synthetic measure of value (= price times quantity) they are equal, but the difference in their kinds hide the difference in their utilities. The kind of the object of exchange is also a fundamental element of choice.

The basic paradox is that over a given pair of real goods, the buyer and seller for any one good must have precisely opposite orders of preference.

Thus if 2 apples are exchanged against 3 bananas, it must be the case that the buyer of 2 apples gets more utility from 2 apples than from 3 bananas, while the seller of 2 apples gets less utility from 2 apples than from 3 bananas. The practical problem is that the seller wants a payment in a certain kind of real good, which gives him the highest utility from among all different kinds of goods of the same value of what he sells. It leads to indirect exchange. The solution involves the use of money. It serves as a tool to make it possible for people to sell one kind of real good and receive a payment in money. One then buys another kind of real good and pays with money. This changes economic analysis fundamentally. It turns out that the analysis of payment answers all questions that macroeconomics tried to answer unsuccessfully.

Another obvious fact is that the market is densely populated by merchants. They buy what they do not want to consume, and sell what they have not produced. The existing literature has no explicit formal treatment of this phenomenon. Economics does not know how to derive a demand function without an underlying utility function, or a supply function without an underlying production function. A formal treatment of the intermediary changes economic analysis fundamentally.

The real source of trouble is the lack of an analytical tool to make hitherto intractable issues easy to handle. Luckily, there is an extremely simple tool to deal with the matters of gain, payment, and intermediation. In this monograph, the formal treatment of choice is extended in two dimensions. First, it covers the choice over different kinds of goods of given market value (in addition to the existing treatment of choice over different quantities of goods of a given kind). Secondly, it makes a seamless transition to social choice from individual choice, over a given basket of traded goods. It decompose aggregate output into individual output according to means of payment. It makes a separate macroeocnomics entirely unnecessary.

The study of social choice opens up a whole new vista. It leads to a unified body of theory with no distinction between micro and macro. It treats money as a means of payment and not as a store of value. Entrepreneurship and transaction cost become integral part of the model.

This monograph proposes a new paradigm of economic science. Consistent economics hopes to overcome the fundamental weaknesses of classical and neoclassical economics. Its new analytical tool has far-reaching and wide-ranging practical implications. A properly functioning monetary system can tackle the problems of involuntary unemployment, unintended debt, and undue stability. All of these problems are found to arise out of perversions in the circulation of money.

The author and the publisher will greatly appreciate criticisms, comments, and suggestions.

Toronto July 2003   Mohammad Osman Gani

1. AN INVITATION

1.1 An Invitation

This is an invitation to take a tour of a new landscape of economics. Compared to older destinations, it offers
- **a clearer view**
- **a richer harvest**

The tour hopes to take a clearer view of economic reality under a sharper light of theory. It uses new analytical tools to easily grasp hitherto intractable issues for more reliable analysis of fruitful policy.

1.1.1 A Salutation

The tour begins with a salutation to Socrates who taught that power comes from scientific knowledge. People are interested in the power to acquire more wealth. This comes from the scientific knowledge of how to create wealth.

> Scientific knowledge is derived from observing how cause gives rise to effect. It is identified by testing the necessity and the sufficiency of the cause. Any statement that fails the test of necessity and sufficiency is not scientific knowledge. Such a statement has no power.

Science is not a matter of opinion. It is a report of careful observation on the causal process. Economic science can discover the source of power to acquire wealth if it adheres to the rules of science. Much of what is known as economics fails to be science. This tour is a

fresh search for scientific knowledge of economic matters. Almost everything here is new, and yet ought to have been known thousands of years ago.

Humans can turn what was useless into what is useful. They can turn what is less valuable into what is more valuable. Most often, the higher value is possible to get only if another human is willing and able to take it with a payment that the seller finds of higher utility. This is not usually possible without the use of money as a device to allow one to claim a more desired object in return for a less desired object.

This is a search for power. It wants to find how the world can become richer. It hopes to discover more effective policy tools to reap a richer harvest from a better real economy. It hopes to fight poverty, indebtedness, and instability in surer ways.

It discovers the hidden power of money as a means of payment, formerly confused as a store of value. It proposes to harness the power of money to promote growth, stability, and equitability.

This is an investor's tour. People who want to acquire the knowledge that will give them the power to create new wealth may like to gain the knowledge of economic science. Specifically, it is about the power to make what was previously deemed impossible quite easy to do now.

It is about the power of perfect fiat, something which does not have to exist physically. It is about the power to manage claims on real resources so that one can deliver real resources to one person and receive real resources from someone else. The target is to deliver something of lower utility to acquire something of higher utility.

1.1.2 Welcome to New Readers

This is student-friendly economics. The students will like the new economics because it is
- easier to learn
- more accurate factually
- more coherent logically

The new economics has a very simple unified model, with no distinction between micro and macroeconomics. New students will see that the consumer's budget constraint contains prices and incomes, which can be studied by an expanded micro model, with no need for a separate macro economics at all. If one can find the demand under given budgets, one can find the budget under given demands.

They will find that the new economics does not employ any hypothesis other than rationality to explain all macro issues. They will see that the model is starkly empirical, and indeed does not allow twisted assumptions about reality. It is just a simple input-output model, with no room for strange behavior. Indeed, it is a study of quantities and kinds of traded goods. It is not a study of human behavior at all.

They will also find that it is logically more coherent. All events are derived from individual decisions, with no behavioral assumption other than rationality. They do not have to suffer through the immense deluge of opinions.

> New generations of students will have greater faith in it, because they expect that science does not consist of opinions, but statements of indisputable facts and irrefutable logic.

One might hope that the students will be rescued from the torture they now must endure because their professors must write one more article. The pressure to write one more article is so intense that the professors are always looking for something to disagree with others. The result is the production of so much disagreement that the students are unable to reconcile them.

The new students will not be asked to memorize a long list of opinions. They will be asked to begin and end with factual observations. They will learn how to analyze what they observe.

1.2 A Celebration

The tour begins with a celebration of human ingenuity.
- First, a two-legged animal invented trade as an alternative to natural plunder to acquire goods belonging to strangers.
- Secondly, humans instituted three laws to create the market as an institution to permit and facilitate peaceful and gainful trade.
- Thirdly, humans invented fiat money as the most powerful tool to help them conduct trades that were otherwise impossible to do.
- Fourthly, they found out how new knowledge can be turned into both power and wealth.

A journey to the new landscape of economics begins with a cheerful note, leaving behind the days of the old 'dismal science'. In the gloomy early vision of the natural economy, people were condemned to a profitless struggle under the miserable natural law of subsistence.

> The new view sees the economy as one populated by creative humans able to earn profits and to prosper, by ceaseless discoveries of new ways to add value to what was so far less valuable.

Malthus saw the economy as a natural ecology subject to nature's indemnity. Nature compelled people to eat, and propelled them to breed recklessly. It was seen as a wretched game between the sluggish supply of food and the explosive growth of mouths. This dismal view came from the belief in the natural law of subsistence that people must produce their own food. But the new economics sees that people may use creative technology to both produce more food and more of everything, and yet restrain the breeding. Prosperity is possible even without any change in nature's niggardly habits, because man's creative knowledge can add to valuable output without adding to natural input.

> Instead of self-reliant subsistence which necessarily minimizes output, creative people conduct gainful trades to produce far in excess of what they would produce only for their own use.

Even the more optimistic Smithian view of the economy is that of a natural mechanism. In it, human beings are just a peculiar sort of natural object carrying. natural 'propensity to truck, barter and exchange'. They are mere puppets that fulfill the natural laws of the market mechanism. This market has an equilibrium in which profit is zero. All the sound and fury of commerce and the relentless pursuit of self-interest ultimately signifies nothing in profit.

Man as an animal is naturally inclined to forage. It involves gathering and hunting. The hunting includes plunder of the weak by the strong. In nature, the strong suppresses the weak and eats it, but never pays.

> Humans have decided to control the natural urge to suppress the weak. They have decided to conduct trade. Instead of plundering, they have decided to pay. They see that the cost of paying is smaller than the cost of plundering, because the victim of plunder offers a resistance to make it costly for the plunderer. They have created institutions to prevent plunder and ensure payment.

In the new economics, the market is not a mechanism, but an institution. Humans have created it. They have made rules according to which they can make agreements on what and how much to buy and sell. They have figured out what and how much to pay. And they made room for intermediaries who neither produce nor consume and yet trade most actively.

In the old view of the market economy, fiat money is a mysterious veil that has no necessary reason to exist. There are extremely vague ideas of money as something to lubricate the market machine or to reduce some unspecified frictions or to offer some unspecified convenience.

> The new economics clearly sees money as a necessary instrument to permit indirect trade that cannot be done otherwise by barter. It finds the power of money to affect the volume of output and employment, the size of the debt, and the magnitude of the instability. And it proposes to use this power for prosperity, stability, and equitability.

The supply of natural resources has no connection to human needs or aspirations. The creative human gains the power of new knowledge to create new value. Knowledge allows people to make what was worthless into what is valuable. It allows humans to make what was less useful into what is more useful. Economic progress is driven by the power of knowledge. Nature cannot stop it. Indeed, the knowledge is about harnessing the powers of nature to man's purpose.

The new economics recognizes and celebrates human creativity. It refuses to see man as a mere forked animal doomed to a mindless ecology that is more apt to make species extinct than allow it to thrive. It refuses to see man as a puppet of necessity and insists on the human freedom of choice. Only the creative man can create new opportunities and rise above the compulsion of necessity and enjoy the luxurious freedom of choice.

The notion of free but rational choice informs the science, and inspires the art of economics.

The market as an institution co-exists with other social institutions, such as the state, and the culture. The new economics sees economic actions in the context of human society organized by institutions. It sees how peace and prosperity can coexist, how self-interest in the market is balanced by sacrifices through the protective state and culture. It sees

that humans are capable of agreement and not doomed to fight it out like the other beasts.

Man has learned to discover, to agree, to compromise, and to pay. He can forsake fighting over what he can get by trading. His genius is to turn an adversary into a partner. He knows that there is profit in peace and tolerance.

1.2.1 Disagreements Left Behind

This tour wants to escape from the endless disputes in prevailing macroeconomics. It is odd for science to have disagreements, because science is supposed to present indisputable facts and irrefutable logic. If something is still disputed, it is still unknown or unexplained, and hence should remain undeclared. In the new landscape, we do not hallucinate about what we cannot see and hence cannot show. We don't tell what we don't show.

Conventional economics is divided into two incompatible parts known as microeconomics and macroeconomics. Microeconomics deals with the allocation decisions of the individual. It is free from controversy. Macroeconomics intends to deal with aggregates that emerge from interactions among many individuals. It is full of disagreement.

There are a large number of schools in macroeconomics, none able to convince the others. Why? They do not have an analytical tool to develop compelling arguments. They cannot show what they tell. The escape lies in using an analytical tool to articulate compelling arguments. This tour shows how such a tool works to put an end to controversy.

Science is not a forum to argue over different opinions, but is a test laboratory to observe and report facts. Hence it has no reason to have disagreements. The idea is that one does not report something that is not free from disputes. Why would one argue if not armed with indisputable facts and irrefutable logic?

In the new economics, there is no meaningful distinction between micro and macroeconomics: both are the same. The new economics is unified. Everything is derived from individual intentions. One may see it as an enhanced microeconomics that has taken over macroeconomics.

One way to see the unification is to consider the budget constraint in a micro problem. The budget constraint has unexplained prices and incomes. The explanations of the prices and incomes have been left to macroeconomics. The unification occurs when one sees how to

internalize the constraints. Expand the analysis so that the same model also determines prices and incomes endogenously, in addition to demands and supplies. This can be done very easily. It is so easy, it is hard to dislike it.

Readers familiar with prevailing literature will not see many references to it. The new economics diverges from the old at the roots. The very definition, subject matter, and method of inquiry are fundamentally different. It stands on a new paradigm, on new foundations.

The new economics may be called consistent economics to distinguish it from classical and neoclassical economics. A notion of consistency of individual and social choice is central to its worldview. Consistent economics insists on consistency of theory with facts.

Metaphorically, the reader familiar with prevailing economics will undergo a Gestalt Switch. What formerly seemed like two human faces now suddenly becomes a single flower vase, with very little continuity between the old and the new. Familiar things disappear altogether or reappear in very different guises, while many hitherto unseen pictures come to view.

- The idea of agreement gives a formal method to unify micro and macro in one body of theory.
- The market mechanism becomes an institution.
- Mechanical equilibrium becomes rational agreement.
- Things of equal market value become things of unequal utility.
- The optimizer is distinguished from the entrepreneur, who gets something for nothing.
- Money ceases to be a store of value, and becomes a means of payment.
- Price (in quantity) is sharply separated from payment (in kind).
- False debt is identified and sharply distinguished from real debt.
- Ability to buy is sharply distinguished from ability to pay.
- Visible intermediaries appear, and the invisible hand disappears.

1.2.2 Towards Clearer Views

Consistent economics uses a new analytical tool to study the events in the market. It is as if people who formerly used naked eyes suddenly get microscopes and telescopes to see the world more clearly. One can now see what one could not even see before.

Consistent economics is a study of economic actions. These actions are purposeful. These may be analyzed by a notion of rational choice.

The exercise of rational choice leads humans to create institutions. The market is an institution, not a natural mechanism. It is created and operated by humans. It is subject to evolution. A mechanism is installed by nature, and does not evolve. A mechanism does not permit human creativity to bring about any change.

The market cannot be a mechanism. It must be an institution. Otherwise, we cannot make sense of structural change, which is impossible under a mechanism. A mechanism does not change its own nature or structure. It cannot initiate changes from the inside, but must only react to stimulus from the outside.

In a study of mechanisms, one looks at events. In the study of an institution, one looks at actions. Events are generated by external forces, while actions are initiated by agents with the power to start something on their own volitions. Consistent economics is a study of purposeful actions, not of mechanical events.

There are two distinct kinds of economic actions. One is allocation, the other is exchange. There are two distinct characters of an economic agent. Allocation is done by an optimizer or economizer. Exchange is done by an entrepreneur.

> The optimizer tries to make the best use of what he already owns.
> The entrepreneur tries to acquire what he does not already own.

In an allocation, an individual makes a rational choice to allocate a given budget or endowment optimally. Neoclassical economics is defined as the study of allocation of scarce resources which have alternative uses. To the extent that microeconomics stays within the boundaries of allocation, it is retained intact.

The second economic action is exchange. In it, an individual tries to achieve a net gain in utility, by giving up something of lower utility to get something of higher utility. Since this requires the consent of at least one other individual, the problem is to study social choice as formally expressed in an agreement. The agreement specifies the quantity, the kind, the relation between the quantities (price) and the relation between the kinds (pensation) of the objects of exchange.

There is no trouble studying aggregates, as soon as one knows how to study agreements. Thus, what used to be macroeconomics of

aggregates now becomes a study of agreements in exchange.

A new concept of circular consistency of choice enables consistent economics to study agreements to conduct exchanges. In form, it looks like Leontief's input-output model. In substance, it carries the original messages from Menger. It formally unifies all economics.

The critical distinction between allocation and exchange lies in the analysis of rational choice. The following schematic presentation may help see this.

Agent	Optimizer	Entrepreneur
Action	Allocation	Exchange
Choice	Individual	Social
Consistency	Linear	Circular
Analytical Tool	Constrained Optimization	Consistency Analysis
Subject	Output	Price, Pensation, Intermediation

An individual agent as an optimizer (or economizer) makes a rational choice to determine what and how much to allocate. The analytical tool of constrained optimization has been developed by neoclassical economics to study this. It can deal with subsistence output under the full control of an individual. It can also study the individual response to given market opportunities and constraints.

However, optimization is not applicable to an entrepreneurial action which seeks to get net gains, somewhat akin to getting something for nothing. As an entrepreneur in a market economy, an individual must join a social decision. This decision arrives in the form of a social agreement.

A rational choice in an agreement has a different type of consistency. It cannot be analyzed by the tool of optimization. A new tool is needed. That tool may be called consistency analysis.

The basic notion of social choice is quite simple. New readers will find the notion of social choice self-evident. Readers familiar with prevailing economics will need to unlearn Pareto optimality, Arrow's impossibility theorem and conventional price theory. The unlearning is a hard struggle. This author needed many years to unlearn Pareto.

An individual as an optimizer may be said to adhere to a notion of linear choice. His choices can be represented by a line in which one point is higher than another point in a preference scale. Linear consistency means that the same individual cannot regard something to be both more and less preferred to another given thing. One point on a line cannot be both higher than and lower than another given point.

Circular consistency applies to two or more individuals engaged in an exchange. Two different individuals must prefer a given pair of goods in opposite orders so that they can both gain from the exchange. An exchange between 2 apples and 3 bananas is possible if one prefers the apples to bananas, while the other prefers the bananas to the apples. Compared to bananas, the apples can have more utility to one and yet less utility to another agent at the same time.

The isolated choices of each individual is linearly consistent, but the social choice is linearly inconsistent. Social choice is circularly consistent. In a circle, one point is both higher and lower than any other given point. On the clock, 1 o'clock comes both before and after 2 o'clock.

Thus Adam may prefer 3 bananas to 2 apples, while Eve may prefer 2 apples to 3 bananas. Provided that they begin with an anomaly so that Adam has apples but prefers bananas while Eve has bananas but prefers apples, they can increase their utility by the act of exchange. Thus Adam may get more preferred bananas in return for less preferred apples, while Eve also gains utility from giving up less preferred bananas to get more preferred apples.

There is a very simple way to formalize the agreements in an exchange. Three pretty simple "laws of the market" may help the formalization.

The law of value says that the two goods that are exchanged against each other must be of equal value. The formal notion of **equivalence** provides the tool to build a new theory of price, which has little in common with the past, beginning with the very definition of price. Classical Say's Law was a crude anticipation of equivalence.

The law of payment says that the seller must be given a payment such that it gives him the highest utility from among all kinds of goods of equal market value. This is expressed formally in the concept of double coincidence. It creates a completely new theory of payment, which covers money as a means of payment. It has nothing from the classical paradigm.

Some concepts of Keynesian monetary theory are retained, but in radically different guises. This is because the notions of demand, supply, price and payment are radically new.

The law of intermediation has no precedent in the previous literature. It says that in indirect exchange, arbiters who neither produce nor consume the objects of exchange nevertheless take a leading role in settling the prices through arbitrage. Seniors do not buy or sell and yet arrange payments through a process of seigniorage. In it, entrepreneurs cut down transaction costs within certain institutions, mostly created under their leadership.

Theory of exchange can be broken down into a theory of value, a theory of payment, and a theory of intermediation. Among these, only the theory of value keeps something from the past. Value is an arithmetic product of quantity and price. Consistent economics retains the theory of quantity (demand and supply at individual levels) from neoclassical microeconomics, but not the theory of price. It must have its own theory of price.

There are four distinct reasons for rejecting the prevailing theory of price, each enough to justify the rejection.

First, neoclassical economics must assume given prices in the budget constraints to arrive at optimal decisions of individual buyers. It also must assume fixed prices for inputs or given demand schedules for sellers, implying given product prices. But it then claims that demands and supplies determine the prices. This circular reasoning is invalid. Consistent economics claims that demands and supplies determine the quantities, but not the prices. Equivalence determines the prices. Neoclassical price theory is therefore rejected.

Secondly, a price must be seen as a ratio between the quantities of two goods that are exchanged against each other. Thus if 2 apples are exchanged against 3 bananas, then the price of 1 apple is 3/2 bananas, and the price of 1 banana is 2/3 apples. The demand and supply of one good cannot possibly determine the price ratio. To determine the price ratio, demands and supplies of both goods must be studied. The price of apple cannot be known from the demand and supply of apple, because the price is understood in terms of bananas with which the buyer must pay for it. Classical price theory is therefore rejected.

Thirdly, neoclassical economics has no room for entrepreneurship, while exchange is essentially entrepreneurial. The neoclassical idea that the optimal allocation leaves no room for further profit cannot be logically transplanted to an exchange decision. In an exchange, the buyer must achieve a net gain in utility (measurable as net benefit in common material units of account). The seller also must be able to get a net profit.

This means that in consistent economics, the market price is higher than marginal cost and lower than marginal benefit. This strikes off a very large part of neoclassical microeconomics.

Fourthly, consider the idea of nominal and real price. To say that the price of a shirt is 10 dollars does in no way mean that the demand and supply of the shirt alone determines why its price is 10 dollars. One must also have the demand and supply of the dollar as a means of payment. The dollar bill itself must be exchanged as a traded object. The buyer of the shirt must be seen as a seller of the dollar bill, just as the seller of the shirt must be seen as a buyer of the dollar bill.

The classical notion of nominal and real price overlooks this. It considers an arithmetic issue of no relevance to economics. It does not matter whether one quotes the price in dollars or dimes or cents. But it matters if the dollar has to actually pass hands. This is a very important interface between theory of payment and theory of value. This strikes off a very large part of classical macroeconomics. Both its theory of price and its theory of money are rejected.

Theory of intermediation says that arbiters settle the prices through an arbitrage or bargaining process. Even when there is a simple barter between two agents, one of them must act as the arbiter to finalize the agreement on the price.

The break with the classical tradition begins with the very notion of exchange. The Smithian idea of exchange as a natural act is untenable. There can be no doubt that more than 99% of the tenure of the human species on the planet went without any exchange. Exchange is a very recent phenomenon in human history. It was made possible by much struggle against plunderers and priests. The right to receive a payment was not natural: it was created by human struggle. Only a high level of human intelligence persuaded man to agree to pay instead of to plunder.

In substance, an exchange is a voluntary interchange of valuable objects between strangers. Transfers inside a family are not exchanges. To be formally regarded as exchange, the seller must be given an immediate and specified payment, even if the payment is an immediate promise for a future delivery of real goods. The seller must not be a member of the family who is supposed to give without taking and take without giving.

In nature, strangers do not trade. The strong kills or plunders the weak. Only humans have invented manners of exchange with strangers as a less costly alternative to war.

One must study the history of evolution of the market as an institution to see that it emerged despite resistance from kings and priests. Many people gave up their lives to establish the right to be paid. Even today, there are slaves without the right to be paid for their work. Even today, there are people who are not allowed to enter the market (say through illegal immigration or without license.)

To get a clearer view of the market economy, one must see the evolution of the economic institutions. One must study how creative humans make agreements. The notion of a naturally mandated equilibrium lacks the essence of human action.

Without human creativity, which Kirzner calls 'alertness to opportunity', an economy would degrade into a mindless ecology subject to natural equilibrium with nature's propensity for extinction. The creation of technology to grant freedom of choice would then be absent, condemning the ecology to permanent stagnation. Without human intelligence for rational choice in the presence of freedom of choice, there would be no tendency towards agreement. Then chaos would prevail and the economy would degenerate into an ecology.

Economic science must take note of the fact of technology and grasp its meaning. To repeat for emphasis, the entrepreneur tries to turn what was useless into something useful, and what was less useful into something more useful. Without this notion, there is no clarity in economic science.

1.2.3   More Effective Policies

The three gravest economic problems bedeviling humanity may be identified as
- involuntary unemployment leading to needless poverty,
- unintended excess debt leading to inequity,
- undue instability leading to unjust transfers and losses.

Consistent economics hopes to have found effective solutions for all three of them. The solutions are based on three theorems. These theorems are based on facts. But the world needs documentation of the facts. This monograph explains the facts.

The solutions do not require real resources. They require reforming the monetary system and the credit market. The solutions use the power of money to manage the transfer of claims over real resources. They call for strict policies to ensure a balance between savings and investment through a clear separation between fiat money and real capital.

Problems arise when the power to create and circulate money is used arbitrarily, giving some people too little access to money while giving some others too much. Consistency analysis provides a tool to measure the exact need for money. There is no further confusion between four alternative measures of money: there is only one correct measure.

All those who care about needless poverty, unintended excess debt, and undue instability will have much to study about the real market processes. In particular, the study of how money is created, issued, and circulated as means of payment must be learned afresh.

The new policy regimes will need to watch the institutional arrangements under which claims on resources are managed. A new era of financial management will be required.

The new generation of graduate students will hopefully find responsible jobs in a new system of monetary and financial management. The three key terms for them would be 'claims', 'payments' and 'agreements.'

No right is granted without a fight. There is a challenge before the new generation of economists. They will need to articulate the basic right of employment, a right to get access to fiat money, and a priority right over credit for self-employment. They will need to articulate the right to compete and to oppose undeserved monopoly.

In the end, policy is about power. Armed with the power of knowledge, the new economist will have to organize a professional class of people determined to promote the use of power for the benefit of the common people.

> In large measure, they will be the new architects of a new economy. The new economists would be the ones to possess the power of knowledge, and the skill to turn that knowledge into profit and power for peace and prosperity.

1.2.4   The Intellectual Heritage

This work owes its basic inspiration to great scholars of the past.

First is Socrates. He taught that
- knowledge comes from recollection of facts, and
- knowledge gives power.

Consistent economics insists that the knowledge of the economy

must securely rest on actual observations. It denounces statistical inference, which relies on distortion of observation. Economic science must avoid the fruitless search of unobserved regressions through the ascription of unobserved error on observed data.

Consistent economics also denounces a search for prediction. Science must produce statements that are timeless. It has no reason to engage in speculations about the unobservable future.

Aristotle remains the source of inspiration for purity of theory and the need for logical validity of arguments. The search for consistency is inspired by Aristotle.

Newton remains the source of inspiration for relentless scrutiny and skepticism. The author is presenting something that was first glimpsed no latter than 1977. All these years of scrutiny were not vain, hopefully.

Leontief was the author's teacher and mentor. Consistent economics is in form an extension of Leontief's input-output economics. He however is not responsible for the theory of price, or of payment or of intermediation

The notion of gainful and entrepreneurial exchange is basically from Menger, through the enrichment done by Mises and especially by the author's most beloved teacher Israel Kirzner. In substance, this book ought to have been written by Menger, who knew all the basics most profoundly. Sadly, this intellectual giant of economics exhausted himself by fighting a long battle against a gang of intellectual dwarfs. He laid the solid foundation, but did not build the structure, and indeed apparently forgot his own dictum.

It must be noted that the theory of money is radically different from that of Menger or his successors. Menger's theory of spontaneous origin is in essence incompatible with rational social choice, and his theory of money is untenable for the same departure from rational choice.

It is also worth noting that Kirzner's own theory of entrepreneurship does not extend to seigniorage for the deliberate creation of money. The author is compelled to make this extension, for which his teacher is not responsible.

To look into practical issues of unemployment and instability, Keynes was the most important source of inspiration, although one of the hardest to grasp and overcome.

Knut Wicksell was the source of spiritual inspiration through the decades of frustration. Hopefully, the name Wicksell Matrix will commemorate this great man.

1.3   A Dedication

This is dedicated to the new generation of students who want to make the impossible easy to do. It is for those who believe in profit and power. It is for those who trust in the power of scientific knowledge. It is for those who can bravely disregard opinions of famous people who taught false theories.

It is dedicated to those who will seek to put an end to needless poverty, unjust debt, and unjust transfer of wealth through instability. It is for those will build a better world through more intelligent study of facts.

2. A ROADMAP

2.1 As We Failed

In 1974, the amount of food available per person in Bangladesh was higher than in the previous year 1973 or the following year 1975. And yet about half a million people died in 1974, and not in the years with lower actual food supply.

The explanation of the tragic event is simple. The leaders of this newly independent nation had no experience in governance. They fancied a socialist society they did not know. They scared the food merchants, branding them as smugglers, profiteers, black marketers and so on. They hoped that this would keep the food price lower by eliminating the middleman's profit.

With the merchants put out of operation, the food market collapsed. Unsold food stayed with farmers. They had no experience or ability to deliver the food to customers directly: the transaction cost was too high. The customers had no experience or ability to get the food from producers directly: the transaction cost was too high on their side also. Enforcers beat up, harassed, and arrested the small traders and confiscated the small bags of food they desperately tried to bring to the cities. And so people died.

The economists who thought that eliminating the middleman was a great idea made honest mistakes. They believed in their ideas with all sincerity. But the deaths were not spared by the honesty of their mistake or the sincerity of their belief.

Prevailing economics is full of such mistakes, with horrible consequences for humanity.

As we embark on the journey to economic science, this bitter lesson is worth remembering. Humanity has been hurt very badly by poor science in previous economics. Needless suffering has occurred to billions of real humans, because economists made mistakes. Let this journey begin with a moment of pause for the souls that suffered because economists made honest mistakes.

> The bitter point is that scientists have no right to make mistakes. General masses believe scientists blindly. Nobody has a right to misguide them through negligence and incompetence.

And the sweet thing is: there is a proven way to avoid making mistakes. It requires a study of the philosophy of science: to understand why to study and how to study.

2.2 The Economy As It Is

How can humanity avoid making mistakes, by seeing things as they are? This is a question whose answer requires the concept of paradigm in science. A paradigm is a set of dogmatic beliefs which scientists adopt when they build their science. These beliefs are not open to question.

A paradigm defines what to study, why to study, how to study, and how to report the findings. The four terms (worldview, epistemology, methodology and rhetoric) may be useful in this regard.

Worldview : Before one starts studying something, one forms a preconception of what it is like. This is unavoidable. One could hardly become a herpetologist if one had no previous idea of what a snake is, and randomly started with a study of tar and silica sand in the hope of becoming a snake-expert. The problem is that the preconception affects how the subject is studied. Economists disagree largely because they think of the economy in contradictory ways.

Epistemology : Different people may want to achieve different goals from studying something. A large number of people think of science as an exercise in prediction while others banish the notion of prediction as superstition. Some people insist that science must provide explanation while some others believe that science does not have to bother with explanation. In our case, we believe that science must explain the causal connections to empower us to manipulate the cause to generate the event of our desire. If done right, science is a source of power.

Methodology : How to study depends on the goal of study as well as the preconception of how to conduct analysis. Different worldviews dictate different and incompatible methods of study, leading to incompatible conclusions.

Rhetoric : Scientists need to present their findings to others. The style of discourse and presentation can vary greatly. Some people make sharp presentations with much clarity, while some others dump huge heaps of rich but undifferentiated information.

In our journey, we will leave behind a huge literature based on the classical paradigm. We will keep nothing from the classical tradition. We will also abandon a very large part of the neoclassical paradigm. Our destination is the consistent paradigm. It differs from the classical paradigm in all four respects. It also differs from the neoclassical paradigm in many ways.

2.2.1 What is in the Economy?

What is there in the economy? The worldview dictates the questions we ask, and the methods we employ to get answers. At first, the worldview remains somewhat hazy, but it becomes clear as we go on.

There are two completely opposite worldviews about the market economy. The classical paradigm sees the market as a mechanism, while the consistent paradigm sees it as an institution.

A mechanism is installed by nature. It is governed by immutable laws of nature. The human beings in a market mechanism are biological organisms that have natural propensities to behave in certain ways. Nature compels them to produce and consume for sustenance. They also have natural propensity to engage in 'truck, barter and exchange'. Their intentions do not matter:

Indeed, mechanism denies the existence of intention. Regardless of what people may intend, the market mechanism works according to the natural laws of the market. Forces of demand and supply reach equilibrium to determine quantities of output and their prices. Prices change to bring about the equilibrium using the forces of demand and supply. The market automatically generates the benefits that the people want. People may attempt to regulate it, but all human intervention is futile. The market is self-regulated.

The completely opposite worldview adopted by consistent economics is that the market is not a natural mechanism, and it was never installed by nature. It was created by humans who repudiated nature's restraints on sustenance. The humans are able to use knowledge to create new options or opportunities for gain. They create choices. They are not compelled by forces of nature to behave mechanically, but they have human creativity and freedom to act rationally. In this view, the market is not at all self-regulated.

What happens in the market depends on how people make agreements. In these trading agreements, intermediaries may play leading roles, even when they neither produce nor consume. Seigneurs neither buy nor sell, but help others make pensations. If the intermediaries fail to use the power of money to permit all indirect exchanges (if demands and supplies exist), there is involuntary unemployment, unintended excess debt, and undue instability.

The neoclassical paradigm is mainly concerned with individuals. The individuals are seen to have intentions, which they try to fulfill within the constraints. The paradigm really does not grasp the process of how different individuals with incompatible preferences may come to agreements. It can also make no sense of how intermediaries may buy without an intention to consume, and sell something without having produced it. It cannot grasp the case of the intermediary who does not produce, consume, buy or sell, and yet arranges pensations by creating and lending fiat money. It cannot grasp how fiat money pays for real goods.

The real issue in the choice of worldview is proof. The worldview as such is not open to empirical test, because it is a way of seeing, not the object seen. The mechanistic worldview leads to theoretical statements about reality, and those statements fail, because they contradict facts. That is the ground to dismiss mechanism from economics. However, in natural sciences, mechanism is the only possible worldview. For mechanical reality, mechanism provides correct explanation and indisputable proof.

The idea that human actions are guided by conscious intentions is called teleology. It is the opposite of mechanism. Primitive teleology was the mother of all superstitions, because it allowed people to postulate the existence of unobserved agents allegedly responsible for certain events. But institutionalism is free from this long history of scandal, by insisting on proof of action. In institutionalism, one must provide evidence that an observed agent is in fact identified to carry out an action.

Although consistent economics postulates the existence of intentions, it does not study intentions. It studies the outcome of actions. These outcomes must be observable. All statements about economic reality must be statements about outcomes of observed actions, and not about unseen intentions. Economics is a study of the quantities and kinds of traded output or allocated resources, and not of human intentions, perceptions, or expectations.

There is a very high risk that the believer in unobservable intentions may descend into the abyss of superstition. The line between science and superstition is indeed a thin one. Unless restrained by observations on both the cause and the effect, and a description of the observed causal process, the intention alone will inevitably lead to imaginary events. In short, the variations in one observed variable must be linked to the variations in another observed variable. No observable variation can be validly linked to changes in unobservable preferences, perceptions, or expectations

2.2.2 Epistemology: Why Study?

The general reader studies economics just like watching TV. He is interested in getting the end result: a vivid picture, and a crisp sound. He does not worry about the technical issues of how the TV works or why it works the way it does. The innards are not for him to know. That is for the professional technician and designers to know.

In economic matters, he wants to get results such as secure and well paid jobs, stable businesses, and equitable growth. He has no reason to learn why and how the result will come about. If he likes the promised result, he will pay the price.

The general reader has a right to rely on professional economists in blind faith. He is like the ordinary patient who surrenders himself to the physician and surgeon for his life. He takes it for granted that the doctors know what they are doing.

Professional economists are practitioners and scientists. They need to know exactly how the economy works and why it works the way it does. The professionals cannot work negligently. What they say is what the general public will believe without question. The professionals have no option to do sloppy work that will misguide and harm the innocent public. They have no right to offer opinions instead of the required irrefutable logic and indisputable evidence.

Professional economists study economics for two main reasons.

Economic engineering: The practitioners want to learn the art of designing and managing economic policy to bring about desired economic change.

Economic science: The scientists want to discover how and why the economy works the way it does.

The overwhelming majority of professional economists pursue the art of designing and managing economic policy. They require the guidance of economic science to design policies that will actually work. The practitioners master the science already doctored by others. They are not interested in discovery, but in the application of what have already been discovered by economic science.

This monograph is concerned with economic science. Its goal is to learn how the economy works. It is for the scientists who want to discover how the economy works. It is also for the practitioners who want to apply the science.

The journey begins with the philosophy of science; because that sets the rules that a responsible scientist must follow. It is a tough job, but the reward is also great.

The goal of science is to inform what is known with reasonable certainty within the reach of human observation. Its goal is not to entertain. The public accepts whatever is uttered in the name of science. Therefore science has no option to speculate or imagine, because the public will then be misguided to ruination. Science has no room for opinions. That is the business of the comedians, and the confused.

2.3 What is Economics?

To the general readers, economics is simply a study of the economy. It covers economic history, economic art, and economic science. The old distinction between history, art, and science must be kept clear.

Economic art (called economic engineering) applies economic knowledge to plan and manage economic projects and programs of action. Business schools teach economic art. People learn how to use economic analysis to understand the market and apply the techniques to make business decisions. These are at the level of the individual firms.

Other professionals use economic art to devise policies for whole economies. They work for the governments and other agencies with influence on policy matters nationally and internationally.

Economic science is that part of economics which deals with the issue of why and how the economy works the way it actually does. To discover how and why the economy works the way it does, economic science studies economic actions. This is not a study of economic history or economic art.

History is a record of episodes of actions, limited by time and place. The reader of history is interested in the particular, the special, and the unique. Its aura lies in the concrete details that set one episode apart from another. Nobody wants to study the history of the number of human legs, because it is always the same. If somebody had one leg or three, that would be of interest to a history reader.

In contrast, science throws away the particulars of times and places, and looks only at the universal. It throws away the concrete details and keeps only the abstract essence. A scientific statement, called theory, is true for all times and places. It cannot therefore be made about historical events. History cannot be science, and science cannot be history.

The task of art is to do, while that of science is to know. As their goals differ, so do the way they are made. Art cannot know, it can only do; and science cannot do, it can only know.

An artist has no concern with correctness, completeness, and precision. He is creating something. His concern is with usefulness. He cares about beauty, efficiency, cost, durability, desirability and so on. But science gathers knowledge. It must be accurate, complete, and precise. It cannot worry about beauty, acceptability, and so on.

Art cares only about usefulness, but science does not care at all about usefulness.

Economic science must uncover the causal character of economic reality as it is, regardless of whether readers like it or not. It cannot consider acceptability or usefulness. It must consider nothing but truthfulness. Its usefulness is incidental.

In contrast, art is by design a destroyer of truth: it falsifies what it destroys, and it brings into being that which did not exist, namely turns what was false into what is true. It imagines and desires what does not exist.

Art is preoccupied with what ought to be, but is not. Science forbids any mention of what ought to be. It insists on learning precisely what is.

People who want to change this world are not the ones who can undertake the work of science. It is only for those who want to understand the world, but do nothing about changing it. This is because one who wants to change cannot wait enough to understand. It is also because one who wants to understand never has time to get up and do anything to change what he is studying.

Art is eager to leap, and too impatient to look. Science is so engrossed in looking, it just does not leap. Science watches the game, but does not play it. Art plays the game, and does not watch it.

2.3.1 A New Definition

Consistent economics differs from classical and neoclassical economics in its basic definition.

Classical economics is a study of wealth and welfare. It is a very vague definition.

First, wealth has no unique economic character. Biology can very well describe how animals produce and consume in a natural subsistence economy. Political science can very well describe how a large empire may decide how to divide the work and distribute the output according to political considerations of ability and need, with no concern for economic considerations of profit and cost.

That is, wealth as such is not necessarily an economic subject. Classical economics was indeed political economy, and it was dominated by political concerns. It rarely grasped the economic issues.

Secondly, the study of welfare is not a legitimate part of any science, though it is a necessary part of all arts. The trouble with classical political economy is that it hides political ideology under the name of economic science. Its call for non-intervention in the market is based on a moral judgment with no basis in science. In fact, it is simply a superstition to believe that the market is coordinated by invisible hands. Visible intermediaries actually coordinate the market actions..

Science must be based on factual proof. It must not appeal to blind faith in unobservable entities. In its rhetoric, the proof must be presented without ambiguity. Literary ploys like metaphor, metonymy, allegory, and so on must not be used to say one thing and mean another. Science must mean exactly what it says, and say exactly what it means.

What constitutes the unique subject matter of economics that no other science can handle? It is the event of voluntary exchange for profit. The operation of the profit motive is something that biology or political science cannot handle. This phenomenon has its own special structure of causation. Economics can be justified as a separate science if it studies exchange as a unique kind of event not studied by any other science.

Classical economics did attempt to study exchange. But it failed in its method of study. It saw the market as a naturally installed mechanism rather than as a manmade institution. It saw the market without seeing the creators of the market, namely, the merchants who neither produced nor consumed, and yet traded most actively. It missed the essence of exchange by failing to see the creation of pure profit or net value-added.

Neoclassical economics is defined as the study of allocation of scarce resources which have alternative uses. This is too narrow a definition. It excludes exchange. This exclusion occurs because the process of exchange is not within the grasp of the tool of optimization analysis. Exchange is not allocation, because exchange requires an agreement between different people and requires payments, none of which are present in allocation.

Consistent economics is a study of economic actions that include both allocation and exchange.

It broadens the scope of economics. It also sharply defines its limits. It keeps away political and sociological issues from being lumped with economic issues.

Since neoclassical economics has already explored allocation, the new element in consistent economics is the study of exchange. This is fundamentally different from earlier attempts to grapple with matters of exchange as if they were matters of allocation.

Exchange requires the use of payments. Indirect exchange requires the presence of intermediaries. Previous economics could not find a tool to handle either payments or intermediation.

Consistent economics uses a new tool to study market agreements to understand exchange. This tool allows us to grasp the matters of payment and intermediation.

2.3.2   *Economics & Social Science*

Economic science may be sharply defined so that it does not get mixed-up with other branches of social science.

In the past, political philosophy and anthropology tended to get mixed up with economics. Some authors even imported psychology, geography, and history into it. This is not a helpful situation. Economics needs to know its own field of study so that it does not stray and trespass.

Arrogance begets error. He who thinks that economics is what economists do, does not know what to do, and ends up errantly misdoing what is none of his business.

An economist must humbly plead: I know that I don't know anything besides the kinds and quantities of what people buy and sell and use. I know that I can't know anything besides what I am trying to observe and understand. To draw a clear line of demarcation, one may use the following scheme.

Need	Self-sustenance	Self-defense	Self-reproduction
Right	Self-employment	Collective Security	Self-expression
Institution	Market	State	Culture
Motive	Profit	Power	Acceptance
Analytical Concept	Economic Rationality	Political Rationality	Cultural Rationality
Science	Economics	Political Science	Anthropology

The above scheme is based on a rudimentary theory of social institutions. The idea is that an individual has a basic **need**, which the others may recognize by a **right**, to be enforced by a social **institution.** The exercise of the right is seen by a *science* to come from a *motive*, which is linked to choice of actions according to some analytical notion of *rationality*.

The economic need of an individual is to procure the means of self-sustenance. One however cannot procure the means of sustenance in any arbitrary manner, for example, by stealing, plundering or cheating, and sometimes by begging.

A right is created by a social contract or agreement. This agreement recognizes certain manners of meeting the need as legitimate. An institution is created to grant and protect this right. It may even facilitate the exercise of the right. Thus others may agree that an individual has a right to employ himself to earn a livelihood. In a market economy, this is linked to a right to enter the market to buy and sell for profit.

Economic science understands the actions of economic agents in terms of a profit motive. It is formally analyzed by a notion of economic rationality.

In a similar manner, political science might recognize the basic political need of self-defense against all forms of harm done by enemies from outside and inside. Isolated individuals may be too weak to effectively defend themselves from the stronger enemies. So, they may unite to create a system of collective defense. The member gains the right of security from every kind of harm, and is obliged to take part in the defense. The institution of collective defense is the state.

The student of political science may study political action according to a notion of power motive. Power is something that enables one to defend himself and his charge or constituency. A defender may be required to sacrifice life and other things. The choice of political action must be based on political considerations. The considerations may be formally articulated as political rationality. The decision may be linked to some observable aspect of power.

Anthropology may recognize the basic urge for self-reproduction. An individual needs to attract a mate for biological reproduction, and other assorted friends and admirers for spiritual reproduction of the image of the self in the minds of others. A deliberate attempt to cultivate attractive virtues may be called culture. In that sense, anthropology may be the study of culture. Cultural science would be a better name.

People express themselves in many ways. They may create virtue by creative manners of walking, dancing, jumping, speaking, singing, mocking, cooking, dressing, and so on. Some may want to attract others by telling stories and by other literary devices. Others may try to dazzle the audience by truths of science or the mysteries of religion and so an. Various forms of art may create beauty of various characters. Beautiful prose, beautiful pronunciation, beautiful painting or sculpting or building and so on may make the creator attractive.

The problem for anthropological science may be to discover how a motive of acceptance may help individuals choose cultural actions. A notion of cultural rationality may be formalized in terms of some observable aspect of acceptance by others.

Once these distinctions are made, it should be clear that economics has no reason to worry about political or cultural matters. Confusing one thing with another does not help. Economics may seek to know about profit, and must plead ignorance about power or acceptance.

If action can be categorized as economic or non-economic, one can also study the issue of institutional equilibrium. A change in profit may entail a change in power and acceptance. The changes in power and acceptance may also change the profits. One may be able to analyze the complex manners in which economic change reinforces or impedes political and cultural change and vice-versa.

A clear distinction between the economic, political, and cultural motives may help the economic practitioner gain a sharper understanding of the various dimensions of economic policy.

Economic policy is never undertaken solely for economic reasons, and at times, may be undertaken without any economic reason. People have reason to act politically and culturally, and they need to bring a balance between the three basic motives, which sometimes seem contradictory.

A clearer sense of economics would help economists identify political concerns as they are, and hence make a much better decision. They may grasp the cultural concern of environmentalists and other crusaders much more clearly if they understand the other concerns as they are. Profit is not all of life.

Economic science, being the most advanced branch of all social sciences, may inspire other social sciences to search for greater sharpness and clarity. One such element to keep sharply in mind is that economic action must be specified in terms of the outcome of actions on the quantities and kinds of economic objects. Economics studies how the kinds and quantities economic objects are determined. It does not study human behavior.

2.4 Worldview: What to Know?

How would a wise person decide what to know in economic science? Socrates remains the wisest source of guidance on this issue.
- First, knowledge is (from) recollection.
- Second, knowledge is (to) power.

2.4.1 Empiricism

The first Socratic dictum means that one cannot know what one has not observed or what one cannot remember. One cannot know the future, because one cannot see or remember it.

Knowledge in science means knowledge of causation. When one identifies the cause, one automatically learns about the past, the present, and the future. There is no special reason to worry about prediction if one has a correct explanation of the cause, as the knowledge of causation is timeless. It is no prediction to say that tomorrow, pure water will turn into ice at temperatures below 0 degree centigrade, because it is the very nature of water to do so. A scientific statement is timeless, such as 'pure water freezes at temperatures below 0 degree centigrade'. It applies to all times and places.

The Socratic guidance is that one must remember the observations to gain knowledge. The causation is a logical linkage between observed events. It means that science must ban all reference to unobserved entities.

<div style="border:1px solid black; text-align:center;">

First observe, then explain, never predict.

</div>

This does mean that consistent economics cannot engage in manufacturing unobserved regressions, and other statistical or astrological 'sun-spot' coefficients as subjects of explanation.

Descriptive statistics is fine, but no statistical inference is permissible, simply because these refer to unobserved imaginary entities. Nothing but actual observations may be explained.

Statistical inference is not valid, because they rely on randomness. Science insists that every event has cause, while randomness means that nothing has a cause. Any inference based on the occurrence of randomness must be invalid.

There must be some puzzle to explain. The puzzle is an observed variation whose cause is not self-evident. Before there is any science, one specifies the puzzle to be resolved. Science comes after the puzzle has a solution.

Constants need no explanation because they contain no puzzle. Variables carry puzzles and hence need explanation. Thus one explains why income varies. There is nothing to be gained by looking for an imaginary permanent income. The object of economics cannot be that of explaining a natural rate of unemployment, because it is not observed. The job is to explain the actual observed rate and more importantly, its variation in every actual situation.

The observations must be sacrosanct. It is no science to come up with sloppy, inaccurate, imprecise observations. One must gather data with utmost care.

One must never say that the datum itself is erroneous, that it contains statistical error. Simply put, if there is any error in data, one must go back and gather accurate data and throw away allegedly erroneous data. One must not manufacture unobserved regressions by denouncing observed data.

It is not valid to explain variation by random error. Variation is not random: it has cause. One must find the cause by observation.

2.4.2 Causality and Power

The second Socratic dictum says that knowledge gives power. Only knowledge of causality can give power. The goal of science is therefore to learn about causality.

Every event has a cause. But what event? Each science has its own unique class of events. Physics has physical events, chemistry has chemical events, and biology has biological events. There must be something to distinguish these events to give special character to the realm of physics, chemistry, and biology.

In economics, the uniquely economic event is exchange (which subsumes allocation and entrepreneurial gains as two subclasses). It must have a unique character of causality. If economics is distinct from chemistry, it must be because the economic event does not have the same structure of causality as that of the chemical event.

The determining conditions in economics must be uniquely economic. There must be certain fundamental patterns of causation applicable to every economic action. Once those patterns of causation are known, one can search for the possible options to engineer actions in a desired manner.

Economic policy is the technological counterpart of economic science. Just as engineers apply the knowledge of science to fashion useful technology, economic engineers can devise useful economic policy.

In short, consistent economics must seek to learn about and explain the causal relations of economic actions, after these have been observed with care and without observational error. It must avoid any discussion of unobserved events and must firmly refuse the futile pursuit of prediction. Only then can it help policy makers rely on its guidance.

2.5 Methodology: How to Know?

Methodology is the set of analytical tools and concepts with which a scientist analyzes the observed data to discover causality. Every science must have its own unique methodology suited to its own special realm of causality. The epistemic dicta provide these tools and the concepts.

2.5.1 Analytical Tools

Epistemics gives guidance regarding the proper analytical tools.

To explain is to make plain what was hitherto not plain. This is accomplished by clear exposition of the causal process. The exposition requires analysis for clarity.

**People offer opinions
only if they cannot offer explanations.**

Analysis means breaking down something into its component elements and uncovering the structure of relations between components or chains of events. Analytical tools allow the scientist to analyze the observed data to uncover the causal relations and articulate an explanation. Economic science must have its own special analytical tools to analyze and explain economic events.

Consistent economics uses two tools.

- Constrained optimization to analyze allocation
- Consistency analysis to analyze exchange

The tool of constrained optimization is inherited from neoclassical economics. It provides the means to discover how human intentions determine the pattern of allocation. The conventional idea of micro events refers to allocation events. The tool of constrained optimization allows the economist to analyze and explain observed events of allocation.

The second tool is consistency analysis. This is the tool to uncover the exchange relations between buyers and sellers as reflected in agreements on the prices and means of payments. These relations are causally linked to entrepreneurial actions devoted to pure gains. Consistency analysis deals with what was previously supposed to be macroeconomics.

The two tools can be combined for a seamless integration of micro and macroeconomics in a single unified body of theory.

2.5.2 Analytical Concepts

Analytical concepts themselves are concepts of causal explanation. These concepts link one observation with another and ascribe causal dimensions. As such, these are themselves not observational terms.

For example, scarcity is an analytical concept to understand allocation. It cannot be observed, but it is a character of any object that is bought by someone. If it was not scarce, one would not buy it, but simply have it for free. If there is no scarcity, there is no need to allocate.

Likewise, rationality is an analytical concept. It is a logical notion of some action being purposeful. If an action is not purposeful, it cannot be explained or understood. One cannot have more or less rationality than someone else. It is not a part of human character, but an attribute of the intelligible action. It is an idea in the analyst's head.

Consistency of choice is an important analytical concept. It is a concept to understand the character of choice. It is a character of the relations between the quantities and the kinds of objects of allocation and exchange.

Consistency in individual choice in an allocation action requires that the objects of allocation must not have both higher and lower utility or cost compared to another object of allocation. It must be possible to rank the objects of allocation in an irreversible order.

Consistent social choice requires equivalence and double coincidence. These can be expressed formally in mathematical terms for precise meaning. Equivalence means that the two goods that are exchanged against each other must have equal value. Double coincidence means that the two goods must be preferred in opposite order by the two agents so that what one sells, the other buys. The seller likes it less than its payment and wants to get rid of it, but the buyer likes it more than its payment and wants to get hold of it.

Consistency itself is not observable, but it is needed to characterize what has been observed. Once again, it is a way for the brain to create an image of the observed world outside the head. Such a concept gives the idea a meaning.

Economics, like any other science, defines its field of inquiry. That means that there are certain causal factors that are themselves not explained. In economics the tastes (preferences), perceptions, and expectations are taken without explanation or question. Technologies and endowments are also accepted as given. To this list is now added institutions. Economic analysis requires them, but they require no economic analysis.

2.6 Theory: How to Explain

A theory explains actual observations. It makes a statement about observed events in terms of a causal structure of relations. It fulfills the epistemic goal and uses the correct methodology. Its articulation requires the use of analytical concepts to make clear how the causal process works.

2.6.1 Pure Theory

Perhaps the most important epistemic notion in this regard is the distinction between pure and applied theory. Pure theory deals only with the pure essence of events. But real life events are not the theoretically pure ones: they are mixed up with many impurities.

Thus pure water does freeze at 0 degree centigrade, but people trying to solve problems of freezing may deal with impure water, which may not freeze at 0 degree centigrade, but may freeze at higher or lower degrees. This presents a major challenge for theoretical knowledge of causality. This leads to the notion of essentialism and pure theory.

2.6.2 Essentialism

The logical idea of essence is that of causality: it is something which is both necessary and sufficient for the entity to exist (or the event to occur). In developing a theory, the epistemic dictum is that of essentialism. One must extract or distill the pure elements (=essence) of the subject of study, and then observe the behavior of the pure entity. This may be explained with an example of the greatest significance for progress in economic theory.

2.6.2.1 What is the Essence of Money?

Early economists were puzzled by the character of money. There is a nursery rhyme that says:

"Money is a matter of functions four;
A medium, a measure, a standard, a store. "

The author of this rhyme certainly did not think about essence of money, but was overwhelmed by the bewildering concrete diversity of functions of money. The result of this has been tragic confusion. People have studied accidental properties of money and remained confused about its essential function.

The practical outcome of the confusion is that humanity missed harnessing the power of money to solve poverty, indebtedness, and instability.

Luckily, it is quite simple to apply the test of necessity and sufficiency to determine the essence of money.

First, nothing that fails to be a means of payment (= medium of exchange) can be money. It is necessary for money to be a means of payment.

Secondly, there are four kinds of pensations, and money is only one of them. Calling it a means of payment is not enough. The test of necessity shows that it must also be an intermediated (=medium) means of payment. Hence the definition of pure money is 'the intermediated pensation'

Thirdly, 'an intermediated pensation' is sufficient to constitute money.

There are three other accidental aspects of money.

- Money need not be a measure of value, and a measure need not be money.
- Money need not be a standard, and standard need not be money.
- Money need not be a store of value; and a store of value need not be money.

The store of value function is accidental: it occurs under the regime of long circulation of money where the same token is used again and again to transfer claims. Monetary tokens give a proof of claim to the bearer of the token. Of course the bearer has the right to claim goods of the value of the token. This in itself has nothing to do with storage of value.

People do not take money necessarily because they want to store value in it. In reality, people may borrow money while they have stores of value in possession, so that they can make payments. Theory of pensation must explain this in detail.

The task of pure theory is to explain the observed behavior of the pure entity. Just as the object itself may be contaminated by impure or accidental elements, the observed behavior may also include effects of the accidental element.

Thus the behavior of pure money cannot be the same as the behavior of money that also accidentally serves as a store of value. Theory of pensation must explain why:

**To prevent involuntary unemployment
we must prevent money from being a store of value.**

The analogy of water is worth repetition here. The behavior of pure water is not the same as that of water accidentally polluted with salt. The freezing point of saline water is different from that of pure water. This implies the need for abstraction and falsification in the methodology.

2.6.3 Abstraction

In the search for the pure element of an entity, the theorist must identify and throw away all impurities. Logically, abstraction is the process of extraction or finding the essence by elimination of accidental elements. The idea that money need not be a store of value, but it must be a means of payment is an example of an abstraction.

For abstraction the theorist must apply two tests of essentialism:

- The first is falsification to test necessity
- The second is verification to test sufficiency

2.6.3.1 Falsification to Test Necessity

The theorist attempts to falsify every alleged causal element by trying to take it away to show that the event under question happens without the alleged causal factor. Thus one throws away salt from water to falsify the idea that water is made of salt.

But one cannot throw away the necessary elements (oxygen and hydrogen). Likewise, one can find money that is not a store of value, but one cannot find money that is not a means of payment.

It is always possible to confirm the presence of some accidental element. This does not prove necessity. Falsification is needed to prove necessity. This is a process to distill the pure elements which cannot be falsified.

2.6.3.2 Verification to Test Sufficiency

Sufficiency cannot be attested without verification. By controlled experiment, the scientist shows that when the elements that cannot be falsified are present, they give rise to the event. The test of sufficiency can be applied only after the necessity has been established.

For example, a pure theory of money will falsify the claim that money is a store or a measure or a standard by showing that money can exist even when it is not a measure, not a standard, and not a store of value. But that leaves the character of being a means of payment, which cannot be falsified. The failure to falsify means that the element is necessary. Thus it is necessary for money to serve as an intermediated means of payment.

The remaining task is to show that an intermediated means of payment is sufficient to serve as money.

The test of sufficiency is done by verification. It verifies that when the necessary causal elements are present, the effect always occurs.

2.6.3.3 Pure Theory and Variation

Once the theorist is able to identify the essence of something, one is able to add accidents to the essence, and observe the differences made by the accidental factors. For example, unemployment is not caused by race. One cannot say that being black means being unemployed, because there are black people who are not unemployed, and there are unemployed people who are not black. It is neither necessary nor sufficient to be black in order to be unemployed.

But it does not mean that being black has no effect on unemployment at all. There may be discrimination against the black. This may compound the pure factors responsible for unemployment. However, discrimination itself is not unemployment. It must be something different from unemployment. That something may be present even among the employed black people.

For example, the employed blacks may have lower wages, lower job security, lower rate of advancement, lower access to senior management positions and so on. Lower access to education and job search assistance, lower access to networking etc. may turn discrimination into unemployment. The task of theory is to separate the elements and find out their separate effects.

Pure theory insists on sharp precision and distinction. Without the sharpness, an indistinct lump of the pure added to the impure leads to ignorance and confusion. Reliance on such unclear notions is punishable with failure in practice.

2.6.3.4 Commitment to Pure Theory

Progress of science is not possible without a firm commitment to pure theory. Without rigorous tests of necessity and sufficiency, one is at

risk of the seduction of the impure and a costly journey up the blind alley of ignorance.

**Without the test of necessity and sufficiency
science degrades into superstition.**

The failure to pursue pure theory has already saddled humanity with grave tragedies. Mistaking fiat money for real capital has already resulted in the needless poverty and unemployment of more than half of all humans. It has also led to undue burdens of excess debt.

Economic science must pursue pure theory. Such theory gives useful or powerful knowledge. However, the usefulness is not the aim of the scientist. The aim of the scientist is to get clear and correct knowledge, sharply defined, precisely measured, and flawlessly explained.

2.7 Rhetoric

When scientists talk, they illuminate. They must be sharp. Their words may be few, but those carry power. And power needs no adornment.

Joseph Pulitzer advised how to do the art of journalism. It may be instructive to scientists who want to write for others. Pulitzer's advice:

- Write it briefly, so they will read it;
- Write it clearly, so they will understand it;
- Write in picturesquely, so they will remember it;
- Write it truthfully, so they will be guided by its light.

For science, writing truthfully comes first.

The next is clarity of presentation.

Sadly, economic writing has a problem. We cannot see what goes on in the minds of people when they undertake economic actions. We cannot publicly observe the intentions. But science must produce public knowledge, open to scrutiny by anybody who wants to scrutinize.

This compels us to consider a limitation of what we can do. We need to develop a format in which we can present our observations clearly. We need a formal method to present the evidence. If we cannot formalize what we see, we cannot conduct a public debate. We need to develop a common way of seeing and describing the observations.

One of the first things to go is then a verbal presentation. Words may be vague. They are liable to be abused to carry different meanings. We try to define words as precisely as possible. We create a taxonomy to distinguish one thing from another, even though they may differ only in fine details. We develop a jargon of our own.

In a formal analysis, we want to become as precise as possible. A mathematical formulation allows us to reach a highly satisfactory degree of precision.

Writing clearly in science usually means using mathematically precise descriptions of what the economic universe looks like and how it works. A single graph and a table or an equation may make it crystal clear what money is and how it circulates and affects output and employment, making millions of verbal pages superfluous.

However, economics is not mathematics. Whenever one is resorting to purely mathematical issues, one is straying from economics. Mathematics should clarify, and not discover. It should only expose, not propose.

Mathematics is necessary to clarify the causal relationship. The most important mathematical notion in any science is that of function, which shows how the cause is linked to the effect. The cause is represented by an independent variable, while the effect is called a dependent variable. The function provides precise details of the relationship. If one has trouble writing down a function, one has yet to learn how do talk to good scientists.

**Those who know, write equations;
those who don't, write opinions.**

It may be helpful to contrast between writing literary articles and scientific reports. They use generally opposite approaches.

The goal of a fiction writer is to engage the readers' emotion, and then entertain and inspire. The aim of the scientist is to disengage the reader's emotion, and then to inform and warn.

The fiction writers must employ creative imagination to conjure up possibilities bordering on the fantastic. Indeed, some writers do present fantasies. The scientist is forbidden to be creative. One must make sure that imagination is absolutely absent in scientific writing.

Would-be scientists wrestle with testing hypothesis in order to discover causality. They must never misguide the public by publishing guesses such as permanent income hypothesis, natural rate of unemployment hypothesis etc. Such publication amounts to public perjury.

They may privately circulate working papers to fellow scientists, with the bold red-letter warning:**:**

> ## THIS IS FALSE UNLESS PROVEN TRUE.

The scientist must not appeal to emotions and must not inflame passions. The fiction writer must appeal to emotion. Art fails if it is not passionate, science fails if it is.

Science appeals to reason and expects skeptic readers to demand proof. Art tries to turn the unreasonable into a matter of sympathy or antipathy, and usually derogates reason. Art thrives on creating suspense, uncertainty, and surprises. Its aim is to distort and confound, and to create an aura of mystery, a thrill of uncertainty, building up a playful concurrence of hope and despair. It must excite curiosity. Science requires solving mysteries, eliminating suspense and uncertainty. It must put curiosity to rest. In short, science is meant to be boring.

Literature thrives on playing with words so that they mean what they do not say, and say what they do not mean. A word may be used in the opposite sense or carry double meaning, or may be deliberately dubious, ambiguous, puzzling. It may try to use a part to represent a whole or a whole to degrade into a part. In short, it plays with words and their meanings to make the story entertaining.

The job of science is just the opposite of art in this regard. If possible, it should not use a word that may ever be used to mean anything other than what it means. Thus a scientist precisely defines words, and uses symbols for them, so that the linguistic games cannot be played. The term is made immune to switching meanings.

A creative fiction writer can use the term income to mean anything. He may write about the rising income of sorrow and the constant expenditure of a dwindling stock of hope, and an accumulating investment in despair. Science must forbid such license. Hence if income is a subject of a science, it should be written in symbols such as (y) or (k) so that there is no chance of using it to mean anything other than what it is. The term should be something open to observation, measurement, and classification.

Science must use mathematics to prevent lapsing into creative distortion of meanings of words. If one cannot report the findings in symbols, one has yet to become a scientist.

Most economists seem to have forgotten Alfred Marshall's dictum: use math to present what you have found, and not to find what you are looking for. The sad situation is that there is an immense mountain of pointless mathematical articles with no economics in them. Instead of using math to aid understanding, it is used to hide meaning. Just as too many words bury the meaning, too much math destroys the clarity. We must denounce this.

To present the finding in a memorable picturesque way, a good scientist uses graphs and charts and other visual devices. The facts are described in statistical tables and charts. Once again, the role of statistics is to describe and not to investigate. The task of investigation remains with economics.

While we must use descriptive statistics to present factual information and evidence, we must forbid statistical inference to find what human intelligence must find. The reason is that statistical inference is based on the counter-scientific notions of randomness and probability, and hence cannot serve as tools of inquiry.

The reason we did not talk about mathematics and statistics under methodology is because these are not methods of learning about the cause. We have placed them under rhetoric, because these are tools to present the findings. We talk math, we talk data, but we do not let math or data talk back to us. We use analysis really to shut the data up. We describe what we have found with mathematical precision and we present the facts with statistical descriptions. But neither mathematics nor statistics can help us learn about causality.

> ## Tools work for us. We don't work for tools.

In economic science, our goal is to gain the power to improve our economic conditions. That power rests on our ability to discover the causal connections accurately, and precisely. Accuracy means certainty. Probability is not admissible. One who is not sure about the finding is not supposed to say anything.

In consistent economics, the focus is on economics. The rhetoric is that of science, whose business is to look at the facts and see if there is any mystery that needs to be explained. In this effort, statistics is used strictly to aid in gathering and describing the observations properly. It is never used as a tool to infer causality. As a science, it bans any use of the term 'random', because everything has a cause and nothing is random.

Many beginners don't seem to get the idea that the relation between statistics and science is analogous to the relation between a stethoscope and the physician. The stethoscope is a tool of observation. It cannot itself understand or interpret the observations. It has no intelligence in and of itself. The physician must do the interpreting. Statistics must limit itself to gathering and presenting facts and resist the temptation to understand or interpret facts. As soon as the stethoscope starts writing diagnostics and prescriptions, the patients are all dead.

The reason for this warning is simple. Science begins with the axiom that nothing can happen randomly, that everything must have a cause. It is the very job of science to find the cause. Statistics supposes that events can happen randomly. It annihilates science at the root.

Randomness is impossible. For example, it is certain that if one knows the initial position of a six-faced die, and then knows the direction and number of turns the die makes at it is tossed, one can tell with absolute certainty which face will lie on top, and bottom and on east, west, north and south directions.

For example, suppose that the die initially has 5 at its top face, 6 at bottom, 3 at south and 4 at north, 2 in east and 1 in the west face respectively. Now, define a turn as one change in the face in any given direction. For example, a push from the east to west, with one turn, brings the east face 2 to the top position, pushes 5 to the west face and the 1 to the bottom and 6 to the east. The north and south faces remain the way they were.

Because statisticians refuse to observe the initial position, and the direction and the number of turns, they think that there is a probability that any one of the six faces will turn up on top. But with the defined scenario, it is certain that a single turn from the eastern direction towards the west will bring the eastern face to the top. There is zero probability of any other face coming on the top. One can change the direction and the number of turns and work out the exact position of each of the six faces.

Nothing is random. Which face comes on the top is exactly and precisely determined by the causal process defined by the direction and number of turns in a toss. The refusal to observe is then compounded with the renaming of ignorance as probability. It is a blunder, and science has no room for this.

The most anti-scientific statistical notion is that of regression. One takes the average, and then subtracts the actual observation from the average. The difference is called error. Some are positive and some are negative. By the very definition of average, the errors add to zero. There is nothing that can be done to entertain people with zero. So one squares the errors, so that negative and positive errors all become positive. Then the squares are added. Then the square root of the sum of squares is taken.

Now, there is absolutely nothing anywhere to say why one is taking squares? Why not raise them to the 37th power? Why take square roots, why not be cubic root? And why stop taking just the square root? Why not take the logarithm of reciprocal of the square root? The point is clear: it is done without any reason. It is absolutely arbitrary.

Now, a regression coefficient is found by doing an exercise that minimizes the sum of squares. But why would anything regress to a minimum sum of squares? Why would it not regress to the sum of squares of just the largest and the smallest observation together?

The issue should be settled by evidence. Is there any evidence that the so-called random variables in fact adhere to any regression line? The answer is crushing: not in the last few billion years of the existence of the planet. There is not the slightest evidence that variables actually regress to the least square regression.

Inference based on the absolutely arbitrary fantasy has absolutely no place in science.

It is a mistake to confuse probability with risk taking in the face of uncertainty.

Economics is not a study of how people foresee the future and plan for it, bear risk, and adopt contingency plans. Economics is a study of the quantities and kinds of valuable products. The preferences and expectations that economists use are analytical concepts to make sense of observed outcomes. These are not empirical concepts. There is just no need to look into the minds of people. Even if psychology can do it, economics does not need it.

Here is an example. A woman got drunk and ended up with a pregnancy. She desperately tried to terminate it, but in the end, she gave birth to a baby and raised it. Since she did actually bear the child, the economist must say that she preferred to have the child rather than not have it. There is just no need to ask her about it. It matters nothing what went through her mind.

Is her decision rational? It has nothing to do with her. It is the economist who wants to understand the number of children. To him, the

decision to have one child instead of zero must be deemed rational. Otherwise it is the economist who cannot understand why the woman would not want a child and yet have one. Since it is the economist's problem, he should not bother the woman for his problem. It is not her problem.

Rationality is not a part of human character. It is not an empirical fact. One cannot be less or more rational than another person. Indeed, it has no connection with the person. It is a way to understand the relation between the quantities. When a man buys a blue shirt for ten dollars while the shop had many other colors of shirts all available at ten dollars, the economist finds that the person must have preferred the blue shirt to the red. Rationality is not a matter of the person, it is matter of why the red shirt is not sold but the blue shirt is. It is a relation between the red and the blue shirt, between what is chosen and what is not chosen. A different man may choose the red shirt and not the blue one. In that case, the red shirt is preferred to the blue. The buyer need never think about rationality, far less exercise it.

Expectation is also not an empirical concept. It is just none of our business to inquire what people prefer and expect.

When people do something, they use rules of art. They are not concerned with accuracy and precision. Instead they follow rules of thumb, and leave room for adjustment and contingency. Nobody sits down and writes down his or her utility function, carries out the optimization exercise precisely, and goes to the market to buy 13.9754 eggs, spend 41.7863279 minutes to get a hair cut plus $21.87 with tax for a hair cut. It is not fruitful to learn exactly how they behave in each instance.

What economists need to grasp is that people habitually act with a plan, which may remain vague, with a wide margin of tolerance. A taxi driver does not get paranoid if one day he earns 87 dollars and the next day he earns 146 dollars. It is pointless fit a function that describes his earnings as if he planned all according to some expectation function.

Despite uncertainty, and the occurrence of surprising events, on the whole the economy displays certain regular patterns. It is not worth gathering too much information to learn every little detail precisely. It would be spurious precision, a mere pretension of knowledge. One needs to understand the broad patterns on which one can rely. It is a game of power. The knowledge gives power when it relies on some core determining elements.

For example, no matter how people form their expectation, learn to adapt their plans or make adjustments, the effect of a rise in the cost of borrowing is going to compel them to reduce the size of the borrowing. The constraints matter. Monetary policy has effect because it can affect the constraints (i.e. the cost of borrowing).

Likewise, no matter how people think and reason and argue, and no matter what religion or culture they have, if they live in modern cities, and want to raise children and give them an education comparable to the children of other people, they must end up raising fewer kids. It is pointless to look into the mindset of people in this regard.

In the end, economics does not deal with many things at all. All it really studies is the kind and quantity of the traded products and allocated resources.

Future generations of economists will not waste time on writing articles that nobody wants to read, but which nevertheless adds to one's scholarly capital. They will focus on learning what gives them real power to make real change. They will want to get reliable knowledge on the basis of which they can make plans for actions. They will have no luxury to worry about probable scenarios, because there is more than enough certain data that they still need to understand in order to gain powerful and profitable knowledge.

Millions of economists have wasted their productive years in worthless pursuit of econometric and statistical adventures. Regression analysis, no matter how sophisticated, and done at how many stages, has never produced reliable prediction. If it is not good to make predictions, it has no purpose at all for which it can be kept in use.

In the meantime, graduates of business schools, with far less sophistication in esoteric matters of statistical and econometric inference, looked at hard data of actual business and made themselves rich and successful. Descriptive statistics, at relevant levels of detail, are enough to earn the real life money that allows one to lay claim on real goods. Statistical inference does not help earn money, even when Nobel Prize winners use it.

Econometrics has not even learned why people are unemployed. The people who actually were able to do something about unemployment or hunger, or sickness or illiteracy or homelessness are uniformly people who simply ignore econometrics.

Science should check the data for accuracy, precision and completeness before allowing it as a raw material of study. The next task is to identify if there are unsolved mysteries. Then the job of science begins. The cause and the causal process must be in the observation. But there are all kinds of non-essential accidents. The job is to throw the non-essential elements away and distill the essence. Descriptive statistics is enough for this purpose.

Similarly, from Marshall's dictum, mathematics is used as an aid to exposition and not as a tool of inquiry. Mathematics clarifies how rational choice is made. But it has no legitimate application to import assumptions that just happen to catch the fancy of the student. One has no ground to just assume that a father can borrow money from unborn generations of progeny merely because one can write it as a function.

Science has no business making predictions. That is what astrologers and palmists are for. The job of science is to explain what has been observed. Its discovery of the causal relations is timeless.

Science requires certain knowledge. The test of necessity is applied to make sure that the cause is certainly present in every instance of the event, that an effect never happens without the cause. The test of sufficiency ensures that whenever the cause is present, the effect is certain to occur. There is just no room for probability.

The idea of probability as a basis for prediction was sponsored by gamblers. They refuse to observe, and they refuse the players to control the outcome of an action. The whole point of gambling is the thrill of uncertainty. It is entertainment. But science is not entertainment. It has nothing to offer for thrill. It is mandated to observe, and to control.

In fine, economic science needs formal presentation tools of mathematics and descriptive statistics. It needs precise language and clear meaning. It may be boring, but it must be powerful.

3. A FIRST LOOK

The point of philosophy is to start with something so simple as to seem not worth stating, and to end with something so paradoxical that no one will believe it. - Bertrand Russell.

3.1 Looking at the Economy

3.1.1 The Economy

Economics is supposed to study the economy. Then the immediate question is: what is there in the economy? What makes something economic as opposed to non-economic? At the least, we must discover one thing that animates everything in the economy. If we can find it, we will perforce get a unified economics, something that Debreu (1991) thought was 'out of reach'. Now, here is economics in one sentence:

> People pursue **gains,** and make **agreements** on what and how much to **exchange.**

This treatise stands on the theme that exchange is the one thing that holds together everything in the economy. It may appear rather paradoxical that classical economics intended to be a study of exchange (see Whately 1832), but really failed to become one. It may also seem incredible that neoclassical economics is a study of allocation (see Robbins 1932), which is in may ways contrary to exchange.

3.1.2 Detectives and Fugitives

There are many perplexing paradoxes in economics It is useful to be aware of the paradoxes, and learn how to escape them.

If things were just what they appear to be, there would be no need for science at all. Then the causal relations would be self-evident. No special effort would be needed to discover them. Indeed, the term 'discover' would be meaningless if things were not covered by some disguise that kept their true identities hidden from view.

Scientists are like detectives looking for disguised fugitives. However, the story may be more bizarre. As they said: we have found the enemies and they are us. We ourselves put the disguises on the facts. We prevent ourselves from seeing the naked truth as we fail to observe precisely, and to think causally.

First, the inherent limitation of our sensory organs, unless aided by observational tools, create paradoxes. Natural sciences regularly confront such paradoxes. The earth rotates on its own axis and moves fast in its orbit, but the naked eyes cannot perceive this motion. Again, the unaided eyes cannot see the micro-organisms or distant objects. The sense organs suffer from all kinds of illusions.

Secondly, uncritical intuition about human motives is the commonest source of paradoxes in all social sciences. Economics is full of such paradoxes. If we look and think carefully, we can resolve them.

We look at the same economy that our predecessors studied, but with the help of some tools to remove the factors that tend to hide and distort the essential realities. These tools make the difference. With a few examples, let us learn how to use the tools to remove the illusions and intuitions.

3.1.2.1 Diamond-water Paradox

It may seem odd that highly useful water is cheap, and indeed free, while the rather useless diamond is dear. This may appear odd, but it is not really so. The uncritical mind supposes that the price is based on demand, as linked to a vague sense of usefulness, and forgets to consider the matter of supply. Include supply, and the paradox disappears.

3.1.2.2 Paradox of Hunger amidst Plentiful Food Supply

It may seem paradoxical that a very large number of people starve to death while unsold food piles up in stocks. And the real price of food keeps falling far below cost to make farmers bankrupt despite subsidies.

To resolve this paradox of hunger amidst plentiful food supply, one needs to remember that food is a traded good, and that those who do not have the income to buy it cannot get it just because it exists. The uncritical mind supposes that food is consumed by the producer. The fact is that 96% of the well-fed people do not produce food, while 92% of the food producers do not eat enough (See Jazairy et al 1994).

The problem is that the simple mind does not consider the relevant facts that have reversed the relation between food production and consumption. Marginal farmers and landless farm workers, as well as traditional foragers and fishermen are starving, because the oversupply of food drives the price down to such low levels that their wages are too low to allow them to keep enough of what they have produced themselves. They need industrial products and a wide range of necessary services, and they just cannot afford to keep the food.

In our detective work, we are about to find that apparently simple premises lead to paradoxical conclusions. We are going to see that much of the previous literature threw away the relevant and wrestled with the irrelevant.

Here is very short list of shocking paradoxes about previous economic theory:

- Everybody believes that demand and supply together determine the price, but this is not so.
- Everybody believes that trade must occur when demand is equal to supply, but it is not so.
- Everybody thinks that economics does study the market or the exchange process, but it does not deal with exchange in any real sense. It studies allocation and mistakes allocation for exchange.
- Everybody knows that money is a means of payment, but nobody has ever treated it as such. Everybody treats money as a store of value, but it is irrelevant to money as means of payment.
- Everybody thinks that economics cannot be unified, that it must stay divided between micro and macro. But this is not so. There is simply no need for this division at all.

3.1.2.3.What Determines Price?

The generally accepted idea is that the demand and the supply of a good together determine its equilibrium price. But then one must note that the price of a particular good is measured by the number of units of another good which pays for it. Thus if 2 apples are paid for by 3 bananas, the price of one apple is 3/2 bananas. The demand for and supply of apples together determine only the quantity of apples to be traded. The price of apple, counted in bananas, cannot be determined by the demand and supply of the apples only.

At the next step, we must note that the number of bananas paid against the apples is also determined by the demand and supply of bananas. Again, if 3 bananas are paid for by 2 apples, the price of one banana is 2/3 apples. Once gain, the demand and supply of bananas alone cannot determine the price of bananas; one must consider the demand and supply of apples too.

Taken together, the price is a relation between the quantities of the two goods that pay for each other. This relation is established by some principle that previous economic theory never considered. That is the relation of equivalence. If 2 apples are to pay fully for the 3 bananas, and the 3 bananas are to pay fully for 2 apples, then the value of 2 apples must be precisely equal to the value of the 3 bananas.

Going one step further, one must see that the equivalence relation is determined by mutual agreement of two traders, both of whom both buy and sell. Thus one agent sells the apples and buys the bananas, while the other buys the apples and sells the bananas. As soon as two people have to agree, a whole new dimension must be examined. Why would anybody agree to sell something if not for profit or gain? And how can both parties gain? Simple and obvious answers to this question lead to results totally unexpected by previous economics.

If we pursue this matter, we end up with the inescapable conclusion that price is determined by agreement of a special type called arbitrage. Among the two traders, at least one must act as an arbitrager to finalize the price, namely the ratio between the quantities to make them of equal value. And arbitrage is something that leaves net profits for the sellers on both sides. We will see that price is determined as a matter of exchange and not as a matter of allocation, meaning that price is not based on either marginal cost or marginal utility.

The above must come as a shock to the readers of the previous literature. If the prevailing theory of price is not valid, what is left? The answer is rather disheartening: not very much is left intact. But the void is filled with something more acceptable.

As we proceed further, we dig deeper and deeper to uncover the essential causal structure underlying the economy. A rigorous formal tool

of analysis is used. This tool helps us identify what is relevant and what is not. Then we see that previous economics overlooked the relevant and pursued the irrelevant.

Historians of thought may use the following example from natural science to see how the problem of relevance arises. Consider Newton's contribution to the discovery of the natural law of gravitation. Everybody ought to have seen that a small apple falls towards a very much larger earth, but everybody overlooked it. Instead, they tried to find some flaw in the apple itself that made it fallible, such as its ripeness that weakened the stem. But the character of apple being ripe or rotten itself was not relevant: its relative smallness was. They missed the essence.

The ordinary observers also did not see the other thing to get a complete picture. The apple is near the earth and falls to the earth, but distant stars do not fall to the earth. It was always easy to see, but somehow people overlooked it.

Next consider the matter of unifying theme from Copernican astronomy. To an ordinary observer, the following events do not seem to be connected at all: (1) the cycle of night and day; (2) the change of seasons; (3) the solar eclipse; (4) the lunar eclipse; (5) the phases of the moon; (6) the change is tides; (7) whether the earth is lying still or not; and (8) whether the earth revolves around the sun or not. Yet if one draws a diagram depicting the sun, the earth, and the moon in their axial and orbital motions, one sees that all of the above phenomena belong to the one and the same mechanism. The connections are not obvious unless a formal tool captures all in one body of a model.

3.1.3 Economics in One Page

If we are able to do economic science at all, we ought to be able to draw a simple diagram and explain how everything in the economy hangs together. Figure-1 below does just that. It shows an exchange with three goods (x_{AB}, x_{BC}, x_{CA}). The first subscript indicates the producer/seller and the second shows the buyer/consumer.
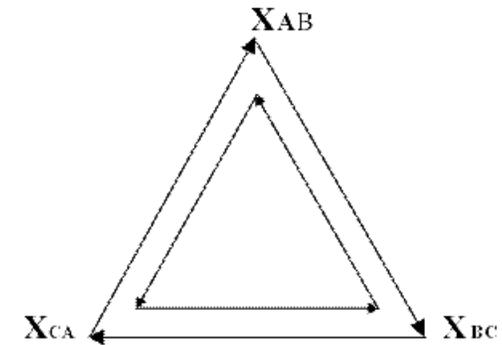
Figure-1: Indirect exchange

The outer triangle shows the direction in which the goods move. The inner one shows the direction of money payments. Chapter 5 will show how this triangle covers everything in economics.

In isolation, the quantity and kind of each good is determined by the allocation model. When put all of them together, the values and the payments are determined by agreements, within institutional arrangements, and with the help of intermediaries, to permit each participant to achieve gains.

This is it: this is all of economics.

3.2 Anatomy of an Economy

3.2.1 Economic Anatomy

Economics is unified by the following theme:

Exchange is the one thing to hold together everything in the economy.

The key analytical idea about exchange is that it involves voluntary agreements between free people on what and how much to exchange.

The idea of deliberate agreement compels us to abandon classical economics, in which there is no such thing as agreement, but merely a naturally inescapable equilibrium. Agreement makes the market an institution rather than a mechanism. An institution permits, facilitates, and enforces agreements.

The analytical core of economic science is agreement, not equilibrium.

Agreement involves the freedom of the agents to agree or not to agree. To explain why people agree to exchange one good for another, we must consider the notion of gain. People agree to exchange, because they stand to achieve gains.

> **Gainful trade is the hallmark of economics.**

If the pursuit of gain is the soul that animates the economy, and agreement among traders is the heart, we need something to give them a body where the heart and the soul can reside. Exchange as a formal construct is that body.

If we pushed this anatomical metaphor further, money would be the blood of the economic body. Unless it circulates to carry the power to pay for purchases, all indirect trades are dead. The main thrust of the analysis is to capture money and see what it does to affect the quantities and kinds of goods to keep them alive or make them dead.

> **Money as a means of payment is the lifeblood of the market economy.**

As explained below, the economy is anchored in observations on exchange, which formally serves to unify the analysis. The economy is animated by the pursuit of gain, which culminates in voluntary agreements on what and how much to exchange. Most trades are indirect, and these are kept in operation with the use of fiat money.

3.2.2 Anchored in Observations

Like any proper science, economics must anchor itself in factual observations. Formally, the description of observed exchanges provides that anchor. It makes economic science a study of the kinds and quantities of real output in an exchange.

The empirical anchor compels the analyst to connect one observation to another observation, even though the causal connection is understood in terms of unobservable subjective elements such as preferences, perceptions, and expectations. There is no need to observe these elements, as explanation requires only a stylized set of relations.

It will be very clear that economics is not a study of human behavior. It is a study of output, whose determination involves human actions. Economics explains how the output behaves, but not how humans behave.

3.2.3 Unified by Exchange

Consistent economics is unified by its anchorage in the observed facts of exchange. As explained in detail in Chapter 5, the issues of exchange can be broken down into three parts dealing with value, pensation, and intermediation respectively.

The theory of value studies how the quantities of output are determined. The analysis of output under subsistence by isolated agents can be handled by the existing model of allocation. Fundamental new elements are then introduced to make a transition to output under trade. The key difference is that trade allows additional output that would not be produced under subsistence.

The relation between the quantities of goods that pay for each other is price. A new analysis of price shows how agreements on prices are made in the market through an arbitrage process. The process must be observable at every stage.

The analysis of the structure of output requires a new method. Since one kind of good pays for another kind, including artificial goods, each traded good is a pensation. Pensation theory deals with everything that macroeconomics tried to study.

The market agreements must be understood within the framework of an institution. Then one looks at entrepreneurship, transaction cost, competition, and institutions. The framework lets one separate economic issues from political and cultural issues.

3.2.4 Animated by Gain

The job of the theoretician is to explain the observed patterns of exchange. However, trading activities cannot be explained with the notion of mechanism as applied in natural science. Instead, it requires the subjective notion of intentions which provide the motive for the human actions.

Perhaps the supreme paradox in economics is that the simple idea that people engage in trade to get gains is admitted verbally but denied formally. Sellers are supposed to maximize profit, but in equilibrium, profit is shown to be zero. The paradox arises because the analyst overlooks the transparent manner in which the gain occurs, just as people overlook the transparent largeness of the earth relative to the apple that falls to the earth.

The key is to notice that people sell one kind of good worth one

dollar to buy a different kind of good also worth one dollar. This difference in kind carries the gain. When analyzed formally, this completely changes economics.

At first it seems absurd, but after reflection it seems self-evident that different kinds of goods of equal market value have unequal levels of utility. Thus if one sells apples worth one dollar and buys bananas worth one dollar, one must get more utility from the bananas than from the apples, despite their being of equal dollar value. However, if one buys 1 dollar of apples and also buys 1 dollar of bananas, then the apples and the bananas are of equal utility.

Formally, we must distinguish between allocation and exchange. The former gives no room for gain, but the latter is gainful. This distinction will reveal economic matters that were previously hidden from view. It will resolve the paradoxes. Sections 4 and 5 below explain this.

3.2.5 Instituted by Agreements

The most important change in outlook is that kinds and quantities of traded output are determined by deliberate agreements. Even though the formal expression may look exactly like a mechanical equilibrium, the notion of agreement is distinct from equilibrium in fundamental ways. The analysis of agreements calls for a fundamental rethinking of the foundations of philosophy, of social science, and the worldview of the market as a social institution.

First, the unresolved debate between mechanism and teleology must be resolved. We must recognize that there is really no sound basis to assume that the entire universe must have a single verse, be it either mechanism or teleology. We must acknowledge the existence of diversity. Some objects are inert and they behave mechanically. Other entities are alert and animated, and they act purposefully. There must be tests to determine whether an entity is inert or alert.

An inert object has an immutable nature, which it cannot change from within. An alert being has a mutable character which it can change from inside. For example, it is the nature of chemically pure water to freeze at temperatures below 0 degree Celsius and to evaporate at temperatures above 100 degree Celsius. Water can not refuse to abide by its nature. But a thirsty man has a character. He may drink water when he is thirsty, but he may also refuse to drink when he is thirsty, for example, if he is fasting during the day hours in Ramadan, or for some other reason.

An alert organism is alive, and it grows and it dies. The most important matter is that it can change itself without any external stimulus. It can be creative and it can discover novel ways of doing things.

Secondly, the presence of free will or creative freedom of choice does not mean that the activities of an alert organism are random. While the actions are not mechanically determinate, there is still a very large degree of regularity of the pattern of behavior. Social science can discover this regularity. The idea of rational action is to ascribe a minimalist restriction on the types of actions human may undertake. Actual actions may not always fall within those types, but a social scientist cannot analyze any action unless it is rational.

The key is to recognize that human plans of action leave a large margin of tolerance and a preparedness to deal with departures from the regular pattern. Thus the office may open precisely at 8:30 in the morning, but employees may show up within a margin of 15 minutes before or after this target. It is usually not worthwhile to make all arrangements to ensure a perfect arrival at 8:30, neither a millisecond earlier nor a nanosecond later.

Social science does not have to discover exactly how each individual behaves. It is enough to have a broad rule of thumb that can work effectively within a chosen margin of tolerance.

People may in fact act impulsively at times, and later regret having done something unwise. While social science must recognize this, it is still able to analyze the overall patterns of action within the limits of rationality. In short, the fact that it is not possible to achieve as much precision in social science as is possible in natural science does not mean that social science should not seek any precision at all.

The third issue regarding agreement is that social interaction among humans must be seen to rest on some clear concept of agreement. The market needs to be seen as an institution that permits and facilitates the making of agreements on exchanges. The presence of the institutional rules makes it possible to articulate a regular pattern of economic conduct.

The bulk of this treatise is devoted to elucidating how the market as an institution permits and facilitates the operation of three laws of the market, to determine the quantities (values), the kinds (payments) and the intermediation activities to finalize the agreements on values and

payments.

The rest of this chapter deals with the two axioms of consistent economics. The first is that trade is gainful. The second is that the agreements on prices and payments reconcile the interests of different individuals who carry inconsistent preferences and conflicting goals. The idea of a consistent social choice helps avoid the many paradoxes that bedeviled previous paradigms.

3.3 Trade is Gainful

3.3.1   Gains from trade

The idea that trade is gainful is the starting point for the standard presentation of the theory of trade. Thus suppose that Crusoe lives in an isolated island. He lives under subsistence (autarky), until somehow a relation is established with a neighboring island of Defoe. Crusoe produces and consumes Fruits (F) and Grains (G) before trade.
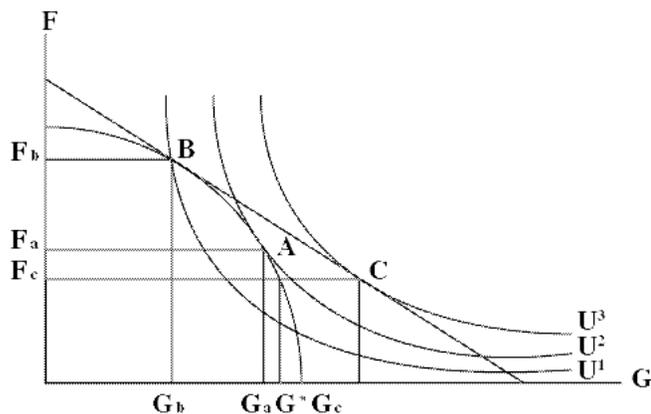
Figure-2: Gains from trade

In Figure-2, Crusoe's autarkic production and consumption of (F, G) occur at point A at utility level U^2. But once trade with Defoe is possible, he shifts production to point B but consumption to point C. While production is still on his production possibility frontier (PPF), his consumption is outside the frontier. At world prices, his budget line allows him to reach the highest possible utility level U^3, outside his PPF. His gains from trade may be expressed in terms of opportunity

cost and price. He exports $F^x = (F_b - F_c)$ and imports $G^m = (G_c - G_b)$. Crusoe's opportunity cost of F^x is $(G^* - G_b)$ under autarky, but he makes a net profit $(G_c - G^*)$ by trade. The gain from trade is positive $[(G_c - G^*) > 0]$

3.3.2 Measurement of Gains

It is worth repeating that the gain made by Crusoe from the trade with Defoe has been shown in two ways. First, it is a shift from a lower utility level U^1 to a higher utility level U^3. Second, it is a net profit measured in units of output $(G_c - G^*)$. To measure the gains from trade, these two ways will help, as shown in Chapter 5 on Value

3.3.3 Formal Statement of Gains

The idea that trade is gainful may be called Menger Dictum in honor of Carl Menger (1871) who recognized this explicitly. It is not necessary for the gain to come from increased material output, but it is necessary that the utility be increased.

In the trade between Crusoe and Defoe, let Crusoe sell Fruits (F) and buy Grains (G). Let U denote the level of utility, and a superscript denote the agent. Then Crusoe's gain from trade is shown by:

$$U^{Crusoe} (F^x) \; < \; U^{Crusoe} (G^m) \qquad \{Menger\ Dictum\}$$

The dictum just says that Crusoe prefers what he buys (imports) to what he sells (exports). The increase in utility $[U^{Crusoe} (G^m) - U^{Crusoe} (F^x)] > 0$ is necessary for trade, but not sufficient.

The other necessary part is the 'anomaly' in the original endowment of the goods, such that the individual prefers what he does not possess to what he does. Consider three possible scenarios:

3.3.3.1   Peaceful coexistence without trade

Crusoe prefers fruits to grains, and already has the fruits. Defoe prefers grains to fruits and already has the grains. Trade is not possible, because there is no available gains. Both agents remain in subsistence, and co-exist peacefully.

3.3.3.2   Violent War

Crusoe prefers fruits to grains and has the fruits. Defoe also prefers fruits to grains, but has the grains. Crusoe cannot gain from trade, and indeed must endure a loss. So he refuses to trade. Defoe stands to gain if Crusoe would give the fruits. But as Crusoe refuses, Defoe may undertake plunder.

Resistance to plunder imposes a cost, and the rational decision compares the costs and benefits. Trade is preferred to war if the cost of paying is lower than the cost of plundering. This is an important notion to understand the many tensions in political economy.

3.3.3.3 Peaceful Trade

Crusoe prefers grains to fruits, but has fruits. Defoe prefers fruits to grains, but has grains. Trade is possible, because it is gainful for both. There is an anomaly in endowments. Without this anomaly, the opposite preferences alone would not lead to trade, as in the first scenario. Further, something must be present to ensure the seller's right to get payment.

3.3.4 The Allocation Model Denies Gains!

The main body of prevailing microeconomics apparently denies the existence of gainful trade. A core belief in microeconomics is that in equilibrium, the net profit is zero.

It is possible to resolve the apparent contradiction between the trade model and the core idea of zero equilibrium profit, if a clear distinction is made between allocation by an optimizer, and an exchange by an entrepreneur. The issue may be clarified with Figure-3. It is really the same as Figure-2, except for deletion and addition of some curves.

Here, points B and A belong to the same PPF. The straight line passing through both B and A can be seen as the domestic resource budget. Crusoe could reallocate resources to produce an extra amount $(G_a - G_b)$. His ability to reach point C at world prices may therefore be said to have a price effect, by making G cheaper abroad than at home. By standard practice, the price effect is split into an income effect and a substitution effect. The income effect shifts the budget line outward to reach point C, giving a net gain of $(G_c - G_a)$. The substitution effect $(G_c - G_b)$ is a shift from a lower utility level at point B to a higher utility level at point C, along the budget line given by the world prices.
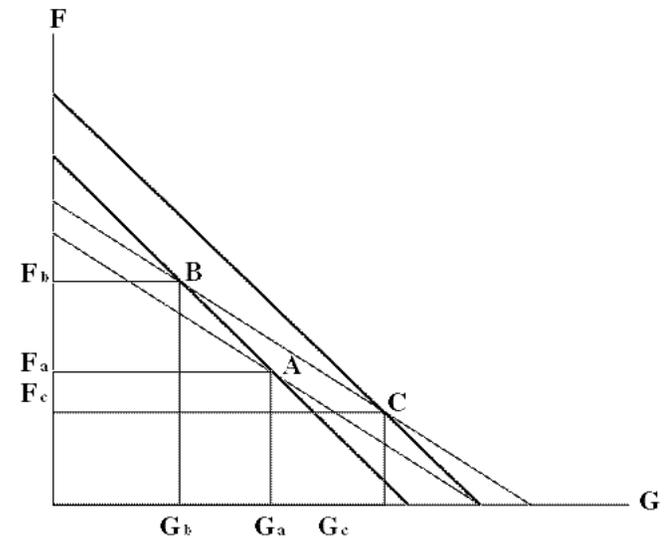
Figure-3: Income effect of trade

While the [...] effect and a substitution effect is a standard part of microeconomics, the income effect seems to be promptly forgotten. It also loses sight of entrepreneurship.

This happens by way of imputation of the income effect in the budget constraint. At world prices, the marginal cost of exports F^x is $[(G_c - G_a) + (G_a - G_b)]$ rather than just $(G_a - G_b)$, because it imputes the net income $(G_c - G_a)$ to the factors. In short, the world prices put a higher value on the exports than is attainable under autarky.

The imputation of the pure entrepreneurial income from trade seems to take place without clear awareness. The standard supply function does not specify a fixed factor endowment, but merely fixed factor prices. The world price of course already includes the net income effect. The imputation presumes that the firm can procure the factors from the market at the given factor prices. This effectively removes the factor endowment constraint, because there is nothing to ensure that global factor endowments are not exceeded. It means that the imputation of net income and the presumption of the firm's ability to buy factors hides the gains from trade.

For theoretical progress, it is necessary to recognize the income effect and acknowledge the presence of net profit in equilibrium. It is also necessary to take note of the risk of loss taken by the supplier.

Crusoe's optimal production is at point A under autarky, but he moves to point B, which is inferior in terms of utility, in the expectation of successful trade. If for some reason Crusoe is unable to sell the output meant for export, he suffers a net loss.

In a dynamic model, the possibility of net losses in equilibrium adjustment must be acknowledged. The possibility of losses must be an integral part of a proper model of business cycle.

The analytical issue raised by the presence of pure entrepreneurial gain is that this cannot be explained with an allocation model. The net gain has no cost or budget constraint. It is a free bonus from trade. Its analysis must be based on entrepreneurship. That cannot be done with the tool of optimization analysis. There is a need for a new analytical tool.

3.3.5 Divergence Between Value & Utility

The challenge for the new analytical tool is to reconcile the balance in the budget with the imbalance in utility between points B and C. The market value of exports F^x must be the same as that of the imports G^m, and yet the imports must yield higher utility than the exports. Thus, let V denote the market value. Hence let $V(F^x) = P_f F^x$ where P_f is price of F. Then it must be true that both of the following relations hold:

$$V (F^x) = V (G^m) \quad \{Equivalence\}$$
$$U (F^x) < U (G^m) \quad \{Crusoe's\ gains\}$$

The prevailing literature recognizes the substitution effect of moving along the same budget line, which keeps the budget intact and yet allows the consumer to move to a higher level of utility. Despite the clear recognition that the same budget line passes through many levels of utility, the idea that two baskets of the same market value may have different utility levels seems incredible on first intuition.

The allocation model's uncritical intuition is that if there is any further gains to be made, then the optimizer can seize it by changing the demand or supply until all opportunities for gain are exhausted. Apparently, the thinking is that if the marginal utility of G is higher than that of F, the optimal response must be to increase the supply of F (= reduce consumption) and the demand for G (= increase consumption) until the gap in marginal utility disappears.

This allocation is not possible, because the agent is already on the boundary of the PPF. This thinking ignores that the choice of producing at B and consuming at C is already optimal. It forgets that the original endowment was anomalous, and trade has created gains by virtue of a move to point C from point B.

Readers familiar with Menger's writing will note that while Menger clearly recognizes the presence of gains, he himself constructs a limiting case of barter where the agents keep on trading until all further opportunities for gain are exhausted. This is an inescapable conclusion if one limits trade to barter between just two agents. But if one allows competition or allows more than two goods, the picture changes fundamentally. An individual may run out of purchasing power long before the opportunities for gain are exhausted.

3.3.6 The Challenge of Pareto Optimality

Had there been an exchange model to explain how the output produced by one agent goes to another, there would be no need to ask how the output is distributed. But an allocation model has no tool to show how goods belonging to one agent goes to another. Hence, the political issue of distribution posed a major problem.

Distribution is a valid political problem inside a family, whose commanders may use political rules to decide both the allocation of resources and the distribution of output. It is not a distinct economic issue apart from the analysis of exchange.

The task before Pareto Optimality is to evaluate the welfare effect of a transfer of wealth from one individual to another. A properly formulated model of transfer would look into the institutional context. In politics, taxpayers are plundered to feed the recipients of subsidy. There must be some political rationale to judge the merit of one-way transfers.

Pareto Optimality did not see the issue as one of politics. Instead, it looked for some kind of economic optimum in which transfers may give benefits to some, as long as nobody is burdened with a loss. The result of the search is that there is a social optimum in which the parties neither gain nor lose anything. This social equilibrium fulfills Pareto Optimality. In it, the ratio of marginal utilities is the same for all individuals, since everybody equalizes it with the given ratio of market prices. Let the prices be (p_f, p_g) and let u denote the marginal utility for the good in the subscript. Then

$$(u_f/u_g)^{\text{Crusoe}}= (u_f/u_g)^{\text{Defoe}} = (p_f/p_g) \quad \textbf{[Pareto Optimality]}$$

In a standard allocation exercise, Crusoe would maximize $U^{\text{Crusoe}}(F, G)+\lambda(I- p_fF -p_gG)$. The first order condition for utility maximization gives

$$(u_f/\lambda)=p_f ; \quad \text{and} \quad (u_g/\lambda)=p_g \quad \text{or} \quad (u_f/u_g)= (p_f/p_g)$$

There is no harm in redefining the physical units so that the price ratio is 1, giving $(u_f/u_g)=1$ or

$$u_f = u_g$$

Notice also that since the entire sale of F^x is against the entire bundle of G^m, it is proper to regard the associated utility as marginal utility, namely

$$\mathbf{U (F^x)= u_f; \quad U(G^m)= u_g;}$$

Then the contrast is evident from putting the Menger Dictum and Pareto Optimality side by side

Menger Dictum for Crusoe: $\quad u_f < u_g$
Menger Dictum for Defoe: $\quad u_f > u_g$
Pareto Optimality for both: $\quad u_f = u_g$

It is not possible to reconcile the above without changing the theory of price so that it allows income effects for both buyers and sellers! Let us suspend the issue here, and come back to it later in Chapter 6.

3.3.7 Can all parties gain?

The Menger Dictum applies to all individuals. The participation in exchange is not costless- it imposes transaction costs. Hence it is unlikely that exchange can occur even if one party finds it gainful while the other party merely gets a zero benefit. It is generally not possible, because exchange must necessarily occur between strangers who are not friends, and who cannot play a futile game merely to let somebody else win. (See Chapter 5).

If exchange is gainful for both parties, the following must be true for Crusoe and Defoe.

$$U^{\text{Crusoe}} (Fx) < U^{\text{Crusoe}} (Gm) \quad \{\text{Crusoe's gain}\}$$
$$U^{\text{Defoe}} (Fx) > U^{\text{Defoe}} (Gm) \quad \{\text{Defoe's gain}\}$$

The above relations together define what is known as double coincidence. Jevons (1875) used the term, but its verbal meaning was soon repudiated by the formal statement of Pareto Optimality. Verbally, there is a double coincidence of wants in barter, if the good sold by the first agent is bought by the second and vice-versa. But its formal meaning was not available.

Double coincidence, stated formally as above, immediately reveals an inconsistency in the preference orders of the two agents. The intuitive reaction is to reject double coincidence for this apparent inconsistency.

3.4 Consistency of Choice

3.4.1 Consistent Choice

The most important challenge to the double coincidence relation (Menger Dictum) comes from the highly remarkable idea known as Arrow's Impossibility Theorem, which is a generalization of Pareto Optimality. The theme is that it is impossible to formulate a social welfare function due to the linear inconsistency of preferences of different individual members of society. In short, double coincidence is inconsistent!

The rationality of an individual's choice may be defined by linear consistency or transitivity. For example, let three points x, y and z lie on a line. Now, if x is preferred to y, and y is preferred to z, then x must be preferred to z. Let an arrow show the direction of preference. The line below shows linear consistency:

z ⸺⸺⸺ y ⸺⸺⸺ x

Figure-4: Linear consistency

In an indirect exchange between agents, each with preferences inconsistent with others, it is indeed impossible to get linear consistency of social choice.

However, as explained below, indirect exchange does take place with rational choice of each agent. It does give the most preferred good to each agent, and hence it does maximize social welfare. And it does

reveal social choice. All these happen without linear consistency.

This means that the linear viewpoint of one agent may not properly judge a social decision. Another notion of consistency may be appropriate to study social choice. That notion is called circular consistency, as represented by a circle. In a circular consistency, the two ends of the line are joined to make a circle. The result is that if x is preferred to y, and y is preferred to z, then z is preferred to x. It sounds illogical and impossible at first, like the clock's dial, where 1 comes after 12 and also before 12. But the dial cannot work unless the day begins where the night ends and vice-versa. The day's 2 PM cannot be later than the day's 3 PM, but it can be later than the night's 3 AM. The independence of the day from the night is the clue to circular consistency.

Figure-5: Circular consistency
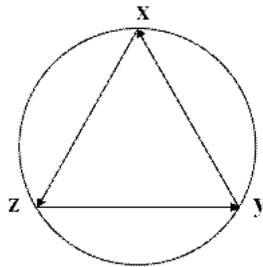
Is circular consisten   n for an answer, a critical distinction mus   decision of one agent and the exchange decision of many agents. The logical distinction is that the social decision may ignore the preferences of uninterested agents, that is, because agents are independent.

There are three steps to see this.

- The first step recognizes that social decision is a sum of different parts made by different agents.
- The second step sees that each part ignores the agents who neither buy nor sell.
- The third step shows that each part has linear consistency, and yet when all parts are joined, the joint decision does not have linear consistency.

The logical issue is to consider the relevance of the preference of agents who neither buy nor sell. If the preferences of agents who neither

buy nor sell can be ignored, then circular consistency is logical. To explore the issues, one may begin with linear consistency and see where it stops. One then proceeds further with a different notion of consistency.

Linear consistency defines rational choice from the viewpoint of a single agent. The simplest way to see its limitation is to consider an example of indirect exchange. Let there be 3 agents (A, B, C) who want to buy and sell three goods (x, y, z) among themselves. Let U denote the utility of the good to the agent and let a superscript denote the agent. Let the preference orders of the agents (A, B, C) over the three goods be:

$$\{U^A(y)<U^A(x)<U^A(z)\}; \qquad y \qquad x \qquad z$$
$$\{U^B(z)<U^B(y)<U^B(x)\}; \qquad z \qquad y \qquad x$$
$$\{U^C(x)<U^C(z)<U^C(y)\}, \qquad x \longrightarrow z \longrightarrow y$$

In the example, each agent has linear consistency. However, the group decision on social choice based on a unanimous majority of 3 cannot be formed at all. Next, a coalition of 2 agents cannot lead to linear consistency. A majority (A+B) prefers (x) to (y), a majority (B+C) prefers (y) to (z), and a majority (A+C) prefers (z) to (x). This means that there is no linear consistency among the coalitions.

Indeed, each coalition fails to have linear consistency. Thus coalition (A+B) prefers x to y, but finds z both superior and inferior to x or y or both. Coalition (B+C) finds x both superior and inferior to z and y. Coalition (A+C) finds y both superior and inferior to x and z.

What limits linear consistency? The two ends of the line are open, one missing a buyer and the other missing a seller. Thus, for the coalition (A+B), the line (y   x   z) indicates that y has no buyer and z has no seller. If a third agent C joins them as both a buyer of y and a seller of z, then the points y and z must be connected such that y is preferred to z, giving circular consistency, as in Figure-5 above.

In short, a linear consistency cannot possibly describe an exchange where all goods are both bought and sold. It cannot describe even direct exchange between two agents. Thus if A prefers z to x and C prefers x to z, the two agents can do barter, but linear consistency fails, as in Figure 6 below. The agents must ignore each other's preference and focus on what each wants.

Figure-6: Circular consistency in barter
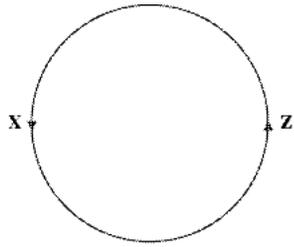
In indirect exchange ... ood is most preferred by one agent, least preferred by another agent, and weakly preferred by the owner. In the example, the most preferred goods are z for A, x for B, and y for C. But z, x, and y are least preferred by B, C, and A respectively.

3.4.2 Social Choice

Linear consistency cannot possibly describe the same good being least preferred and most preferred in the same choice. And yet every agent is acting rationally. Their social decision is to be deemed rational if it gives the most preferred good to each agent. This is just what indirect exchange actually does: it gives each agent the good most preferred by that agent. This happens despite and *because* of the fact that each good is least preferred by one of the agents while it is most preferred by another.

The preference of the agent who finds the good least preferred is irrelevant, because that agent neither buys nor sells the good. It is impossible to assure linear consistency if the preference of the irrelevant agent is included. But if the preference of the uninterested agent is ignored, there is no reason to seek linear consistency.

The agents who actually buy and sell can take a direction of preference opposite to that of the agent who neither buys nor sells. This leads to circular consistency. Logically, if every good is both more preferred to one good and less preferred to yet another good, then they all belong to a circle. In a circle, each point is both higher and lower to any other point in any direction. A circle has no endpoint while a line has endpoints.

To explore circular consistency, the following concepts are needed: ruling coalition, changing composition of ruling coalition leading to changing direction of preference, dominance of ruling coalition, strong and weak preference, and exit of the uninterested agent.

Ruling coalition: The ruling coalition consists of the buyers and sellers. It makes the decision on what and how much is exchanged between whom. It excludes or ignores other agents who are neither buyers nor sellers.

Changing composition of the ruling coalition: After a decision to exchange one good is made, the buyers leave the coalition. They are not interested in the decisions on other goods which they neither buy nor sell. The seller of the earlier coalition remains, and becomes the buyer of the next good. The sellers of the next good join the new coalition.

Consider good x. Agent B wants to buy it while agent A wants to sell it. The ruling coalition is formed with A and B. It does not include C, or it ignores C, as C is neither the buyer nor the seller of x. The decision is made so that A sells x to B. Then B leaves the coalition and C enters. Now, the job is to decide on the good z. A wants to buy it and C wants to sell it. The decision is made so that C sells z to A. Then A leaves the market, having both bought z and sold x, and having no interest in y. But C wants to buy y and B wants to sell y. They form a coalition. The decision is made so that B sells y to C. All trades are completed by the three successive coalitions.

The result of the social decision is to give each agent the good most preferred by that agent. The important point is that the social decision on all three goods has been made by successive partial decisions with different ruling coalitions. Each individual and coalition behaves rationally. The social decision process is rational as it gives each agent the most preferred good.

Dominance of coalition: Buyers dominate the coalition because they have the strongest preference for the good being considered for exchange. They get support from the sellers. The dominant agent chooses the direction of preference with the support of the seller. Buyers must overlook the preferences of irrelevant agents who dislike the good.

Strong and weak preference: The agent with the strong preference for the good is the buyer. Strong preference means that the buyer has no other good preferred to the one being bought. The seller's preference is weak, but consistent with the buyer's direction of preference. The term weak preference implies that the seller prefers some other good to the one being sold. For example, both A and B prefer x to y, but B prefers it strongly, while A prefers it weakly. A wants z strongly. The coalition has a segment over which the preferences overlap, so that they move in the same direction. The strong preference implies buying while weak preference implies selling. In short, the coalition is pair of a buyer and a seller of one good.

Exit of the uninterested agent: The agent who is neither a buyer nor a seller voluntarily leaves the coalition. It means that the preference of this uninterested agent can be ignored. The direction of preference is reversed due to the exit of the uninterested agent. If the agent refuses to exit, involuntary unemployment occurs due to a blockade from the irrelevant agent. (See Chapter 7)

Shown below are the preferences of two agents in a coalition. In each coalition the solid line shows where the preferences match. At the tail ends, there is one good that is less preferred by one agent which is more preferred by the other. There is no linear consistency except in the middle segment.

Coalition (B +A):   z   y   x   z
Coalition (B +C):   x   z   y   x
Coalition (A +C):   y ──────►x ──────►z ──────►y
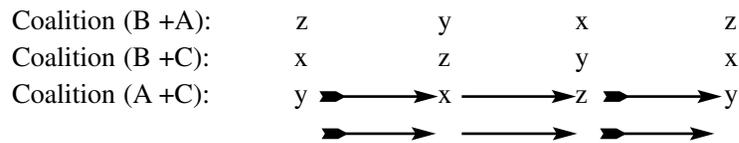
It is possible to show how these coalitions can make partial decisions on one good at a time. They can successively make decisions on all goods. The combination of the partial decisions lead to a social decision with circular consistency.

Figure-7: Social choice
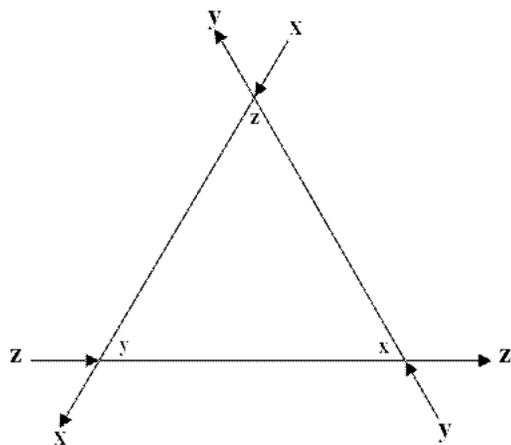
By succes[s]... triangle, one gets a triangle of choice in a 3-good exchange. The circle is its

generalization. On each side of the triangle, there are two goods over which two agents have the same order of preference, but they have an opposite order of preference over a third good.

Thus (y   x   z) of A coincides with (z   y   x) of B only on segment (y   x) on the line z   y   x   z. The line (y   x   z) of A matches with line (x   z ──►y) of C in segment (x   z) on line (y   x   z ──► y). Lastly, agent C's (x ──► ──► y) matches segment (z   y) with agent B's (z   y   x) on line (x   z   y ──► x).
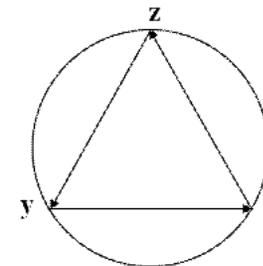
Figure-8: Triangles and circles of choice

The segments together constitute circular consistency, but violate linear consistency.

The idea is that the society may ignore the preference of the agent who neither buys nor sells. In Figure-7, the tail of the coalition's preference line comes from the preference of the agent who does not buy or sell the product. That preference is irrelevant. The tail can be chopped off. We see later that an artifice actually overcomes irrelevant choice.

Circular consistency means that every good has both a buyer and a seller. But a buyer has a strong preference for it, while the seller has a weak preference. Therefore for each good, there is one good more preferred and another good less preferred to it. For this to happen to every good, it must be so that each good is both more preferred and less preferred.

It is logical, because each good is less preferred to one good but more preferred to a different good. In isolation, each good meets linear consistency. Also, each agent's preference has linear consistency. But the combination lacks linear consistency. This happens because the uninterested agent's preference can be ignored or reversed. If everybody

has acted rationally, then the social decision must be rational. Indeed, it would not be rational to judge the merit of a decision according to the preferences of the agents who are not concerned with the decision.

To sum up the discussion, a single agent's linear viewpoint is not suitable to study social decisions. There is no need for independent agents to have the same preference order. As long as each agent can act rationally to participate in social decision, the social choice is rational.

Circular consistency is required to describe social choice such that each good has both a buyer and a seller. Without this circularity, there would be one good without a buyer, and another without a seller at the two endpoints of the line. That would fail one seller and one buyer. Linear consistency would not reveal social choice or maximize welfare or establish equilibrium.

3..4.3 Arrow's Impossibility Theorem

It is important to notice that Arrow sought to solve a problem that does not exist in economics. It is not a problem for society to choose only one good out of many when different people prefer different goods. There is nothing wrong with producing every kind of good. Diversity of goods is a market fact.

Economics can deal with two kinds of economic problems, either involving allocation or exchange. Arrow does not set up either an allocation or an exchange problem.

Arrow's theorem does not clarify who owns the resources and why many agents must make a single choice. Even if the resources were jointly owned, the solution would lie in producing all three goods according to some rule to decide who gets how much. To set up the allocation problem properly, the budget of each agent must be specified. Arrow's theorem does not specify the budget.

There is a real economic problem in the existence of an anomaly in endowment so that an individual may prefer something that does not belong to him or her. The problem for society is to find out how best to organize a transfer of goods to those who desire them most out of a given collection of goods, from those who rank the same goods on a lower scale but happen to own them.

Thus if agent A prefers z most but owns x, while B prefers x most but owns y, and C prefers y most but owns z, then it is not a problem of deciding which of the three goods the whole society should consume. The problem is to allow A to have z in exchange for x, B to have x in exchange for y, and C to have y in exchange for z. Arrow is thinking of an allocation problem in place of an exchange problem.

In an allocation problem, one single individual controls the choices. In an exchange problem, several independent agents have their own preferences such that they may or may not find options for gainful exchange. In neither case do all people have to have linearly consistent preferences.

Sen (1981) sees the issue correctly as a political one of entitlement.

Even the political issue of choosing a single leader out of many candidates is misleading. If in a society there are different voting blocks supporting many different candidates with no clear choice for one leader, an efficient solution is a parliament where many leaders represent the many blocks.

The problem of choosing a single leader for the whole nation has no parallel in economic analysis of allocation or exchange. Even in politics, the scenario with multiple candidates or parties with divided loyalties means lack of political equilibrium, and may involve fragile governments built on unstable coalitions. If the underlying preferences of people display a divided society, there is no *a priori* reason to propose a centralized society rather than a confederation. But that is not an economist's task.

Neither does culture present a problem of a whole society choosing a singular ideal. The history of culture is a history of diversity. In the end, the monomaniac search for a single good or a single leader or a single cultural norm for a whole society animated by a single mind may be misguided.

It is important to recognize the institutional background of exchange and plunder. A political authority may impose taxes and provide subsidies according to some political rationale. May be politics considers some balancing of power through one-way transfers. Economics has nothing to say about political acts of one-way transfer of wealth.

More importantly, economic science has no reason to study welfare as such. Exchange happens to be gainful, whether one likes it or not. The focus on welfare imports value judgments and violates the sanctity of science. The job of science is to explain, and not to judge.

3.4.4   Double Coincidence is Necessary

The notion of circular consistency says that it is logically valid to admit the existence of double coincidence in exchange. The linear inconsistency is not a problem. Indeed, it is necessary for trade to be gainful for both parties. As shown later, money arises as an artificial means of payment to fulfill the double coincidence requirement. This changes all of macroeconomics.

It has special relevance for central issues of economic policy on (involuntary) unemployment, (unintended) indebtedness, and (undue) instabilities unrelated to tastes, technologies, and endowments. The key once again is to note that the gains from trade occur by way of getting one kind of good with higher utility in exchange for another kind of good with lower utility, even though they must be of equal value.

3.5 Two Axioms of Economic Science

The new body of economic theory may be called consistent economics in view of the critical role played by the notion of consistent choice. This new economics stands on two axioms of gainful trade.

3.5.1 First Axiom: Menger Dictum

The theme that trade is gainful for both the buyer and the seller of each good is taken as an axiom called Menger Dictum. This is expressed formally as the condition of double coincidence.

To derive the implications of the Menger dictum, the need is to extend the analysis of choice over varying kinds of goods of given value. This leads to a new model of exchange in which choices have two dimensions: over varying quantities of goods of given kind, and over varying kinds of goods of given value. The formal analysis requires notions of offer, acceptance, and (single, double, multiple) coincidence to deal with the choice over kinds.

3.5.2 Second Axiom: Circular Consistency

The notion of gains for both parties cannot make sense without the notion of circular consistency of choice. This notion defines a rational outcome for social choice. This leads to a unified model in which individual choices are combined to arrive at social choice. This opens up a new vista and provides a new analytical tool. This tool may be called consistency analysis. This analysis uses a graphic payment circuit, an algebraic matrix of payments, and a set of equations of exchange.

3.6 Allocation versus Exchange

If economics must acknowledge that trade is gainful, it must make a clear distinction between allocation and exchange. The following four dimensions of the distinction may give a clue to the development of a tool to analyze exchange. These are (1) character of consistency in choice; (2) the presence of pure entrepreneurial gains and risks of loss; (3) the presence of artificial payments in indirect exchange and (4) the presence of intermediation.

3.6.1 Character of Consistency of Choice

Individual choice gives the individual total control on the choices over substitutes in allocation. However, social choice gives the individual partial control over non-substitutes in exchange. The three distinguishing elements are: preference relations between the goods (substitutes or not); degree of control (total or partial), and the integrity of the good (whether or not the buyers and sellers have agreed on the kind and quantity of the good).

3.6.1.1 Preference Relations between Goods

The first distinction between substitutes and non-substitutes shows why the equilibrium conditions under allocation must differ from those under exchange. Under allocation, an individual chooses among alternatives. The distinction in kind is not essential. This is because different kinds of goods are in essence the sources of the same utility or productivity, though they come in bundles of different sizes. If 2 apples are a substitute of 3 bananas, then a banana is just 2/3 of an apple.

In an exchange, the goods are not substitutes. They are preferred unequally so that one is bought while the other is sold. The reason exchange occurs is that each agent is able to pay for a more preferred good with a less preferred one. One cannot make the transition to an analysis of exchange without recognizing this distinction.

3.6.1.2 Degree of Control over Decision

The second distinction, between total and partial control, contains the seed of rationality of linear and circular consistency. When an individual has complete control over the decision, it is rational to abide by linear consistency, to reach the end of the line of preference. Thus if the arrowhead shows the direction of preference over different goods all

of the same value, an individual rationally decides to sell the good at the bottom end, and to buy the good at the top end.

However, social choice can work only if the agents who have no interest in a good as either buyers or sellers exit from the coalition that makes the decision. This means that each agent has only partial control, in one segment of the circle. If an individual has total control on social decisions, Arrow's impossibility stops it from being rational.

Freedom of choice cannot exist if each individual's preference is the same as that of others. In that case, the whole concept of rational choice becomes irrelevant. Instead, if all individuals have the same preferences, they might be regarded as nothing but inert objects with immutable physical properties. A mechanism would describe their mechanical behavior. The issue of gains would not arise at all in that case, as in conservation in physics.

3.6.1.3 Social Integrity of Choice

The third distinction between allocation and exchange concerns integrity of choice. An isolated individual may optimally choose the quantity to buy, but the good's quantity still lacks integrity. This is because there is nothing to say if this demand is consistent with its supply from other agents. Similarly, the quantity of supply chosen by an isolated individual lacks integrity, without assurance of matching demands from others.

Social choice must ensure the integrity of the good's kind and quantity. It means that the good's quantity demanded is matched exactly by its quantity supplied. This also means that the good's kind is offered by the seller and accepted by the buyer.

The need to apply circular consistency becomes clear in regard to the determination of the kind. The seller must have weak preference for a good, but the buyer has a strong preference for the same good. Circular consistency in the double coincidence must exist to induce one to sell what the other wants to buy, to confer integrity on the good's kind.

The matching of the quantity hides the circularity in social choice. To the seller, the market value is higher than the cost. To the buyer, the market value is lower than the cost of production the buyer would incur if he or she had to produce. And yet they must be able to agree on a value of the good to give it integrity. Separately, the seller and the buyer both obey linear consistency. Together, their social choice has circular

consistency. This circular consistency is the source of the integrity of the good's kind and quantity.

3.6.2 Entrepreneurial Gains and Losses

Exchange is an entrepreneurial action undertaken for the purpose of pure profit, and does not involve optimization. Allocation involves optimization, but does not involve entrepreneurial gains or risks. Because the same individual may function in two different capacities, it is necessary to separate them analytically.

In Figure-2, Crusoe's optimal choice before exchange is to produce and consume at autarky equilibrium point A. It involves efficiency gains from any other point on the PPF, but one does not presume which suboptimal allocation Crusoe might have used before choosing the optimal. A rational Crusoe would never choose any other point. Hence the efficiency gain would not be part of the analysis.

However, when Crusoe becomes an entrepreneur, he seeks to break out of the constraint of the PPF. His first move is to undertake a risk by moving to point B, which is suboptimal under autarky. This move is entrepreneurial. An allocation model can make no sense of such a move. The next move is to consummate the actual trade itself. By selling F^x and buying G^m, Crusoe achieves a net gain. An allocation model looks at the budget line at world prices, and does not see the gain, nor the risk of loss in case the trade failed.

The analytical problem is that the allocation model has no clue how the world price is determined. Standard microeconomics makes a major mistake in this regard. On the one hand, it presumes that the prices are already given, and the agents optimally choose demands and supplies. But it then says that demands and supplies determine the price. This is not a valid proposition.

Demands and supplies determine only the quantity, but not the price. Something else determines the price. That involves an entrepreneurial process that seeks pure profit and bears risks of losses. An equilibrium market price is determined by entrepreneurial arbitrage, which may leave pure profits or losses in equilibrium.

The conventional theory of price cannot be retained if gainful trade is to be admitted. In its place, a new theory of price is needed. That theory will allow positive gains from trade. Chapter 6 presents such a theory. Its gist is that setting a market price is a dynamic process led by

arbitrageurs. In the first step, producers and consumers assume a given market price to choose demands and supplies. In the second step, the arbitrageur clears the market by setting a price such that demand becomes equal to supply in value, not in quantity alone.

This market clearing is formally accomplished by taking equivalence as a necessary condition of exchange equilibrium. Equivalence is stated as the equality of value of the goods that pay for each other in exchange. Thus since Crusoe pays for G^m with F^x, it must be the case that

$$V(F^x) = V(G^m) \quad \text{\{Equivalence\}}$$

This condition imposes a constraint that the allocation model forgot. Chapter 6 discusses the significance of this equilibrium condition and shows how to use consistency analysis to impose this requirement. It avoids a major oversight in the standard multi-market model of allocation, often mistaken to be a model of exchange.

The allocation model requires that for each good, demand must be equal to supply. This is a necessary condition, but not sufficient. It is further necessary to ensure that each agent's total income from sales must be equal to total expenses on purchases. Furthermore, this restriction must be true item by item.

Thus, suppose that Crusoe sells fruits to many buyers. It is necessary that the value of fruits sold to any particular buyer be equal to the value of payment received from that buyer. It is possible that Crusoe sells fruits to Defoe, but does not buy anything back from Defoe, but instead buys something from Eto to whom Crusoe does not sell anything. This indirect trade messes up the budget balance and disables demands from being effective. Without the equivalence condition, there is nothing to impose the budget constraint.

Setting the market clearing price is the job of the arbitrageur. Crusoe may serve as an arbitrageur on his own behalf or for others. He can buy cheap and sell dear. He can buy the fruits from himself (at price equal to marginal cost, for example) and sell them to Defoe at a higher price. The pure profit is without a constraint. It is not an optimization exercise.

3.6.3 Artificial Pensations

The allocation model apparently does not recognize the existence of a payment. The Walrasian model has no money in it. It does not consider the issue of indirect exchange mentioned above where Crusoe sells to Defoe but buys nothing from Defoe, while Crusoe buys from Eto but sells nothing to Eto.

Indeed, Arrow's impossibility theorem denies the possibility of indirect exchange implicitly, because of linear inconsistency in the preference orders. An exchange model must allow indirect exchange and must find out how payments are made. The formal problem is to acknowledge all of the following:

$$V(F^x) = V(G^m) \quad \text{\{Equivalence\}}$$
$$U(F^x) < U(G^m) \quad \text{\{ Crusoe's gains\}}$$
$$U(F^x) > U(G^m) \quad \text{\{ Defoe's gains\}}$$

An analytical tool to acknowledge both equivalence and double coincidence may offer a breakthrough. Things of equal value may have unequal utility only if they are of different kinds. The analysis must find ways to study how the kinds of goods are determined, not just quantities. The solution lies in formally articulating the preferences over different kinds of goods of the same market value. (See Chapter 6)

3.6.4 Intermediation

Since an allocation model is essentially individualistic, it has no room to talk about intermediation between different agents. The attempts to study the buying and selling of information products, or the various probabilistic modes of search cannot handle the essential character of entrepreneurship, or of transaction cost, or of institutions as parts of intermediation. This is because there is nothing to optimize.

A theory of exchange cannot avoid talking about intermediation in indirect exchange. It includes issues of transaction cost outside the control of the producer and consumer. It covers entrepreneurial discovery of gainful arbitrage and seigniorage opportunities that arise in exchange. And it must address the issues of economic institutions.

3.7 Integration

The analytical distinction between allocation and exchange must be recognized. However, in a unified model, both allocation and exchange are studied together. Formally, allocation is a special case of exchange where the buyer is identical with the seller. In a matrix of exchange, each individual's trading partners are identified. The matrix allows the analyst to look at the social decision governing the trades. Thus the micro decisions are placed in the macro context while the macro issues are linked to micro origins. The idea of agreement or consistent social choice provides the glue.

4. ALLOCATION

Neoclassical economics is defined as the study of allocation of scarce resources to alternative uses. An allocation decision rests on linearly consistent individual choice. It is not apparent that the allocation model is perfectly applicable only to subsistence where an individual has full control.

Pareto Optimality, Walras' Law, Say's Law, and Quantity Theory all apply perfectly only under subsistence. All of these break down when exchange is introduced. Hence it is very useful to review the allocation issues under subsistence before showing how the introduction of trade brings fundamental changes in the analytical model.

4.1 Allocation under Subsistence

4.1.1 Meaning of Subsistence

A subsistence agent is one who produces for himself or herself, and hence is in full control over all economic decisions. The agent may be single individual, a household acting as a single decision maker, or even a Pharaoh who owns millions of slaves and subjects under his control. The key is the presence of singular control over the allocation decisions, and absence of any buying or selling. A communist state with complete control over allocation decisions is a subsistence agent.

The pharaoh or the communist leader may use political procedures to consult the subjects, but that has no bearing on the economic outcome, so long as the decision is finally under the control of one decision maker. The economic issue is that the preference function must be linearly consistent. In this sense, allocation subsumes distribution.

Here is a brief summary of the allocation model under subsistence. It is built on three fundamental parameters of output. These are (1) tastes or preferences as described by a utility function, (2) technologies as described by production functions, and (3) factor endowments described as production possibility frontier under the given technologies.

Suppose that Crusoe lives in an island. He has an endowment of two factors called L (land) and H (hand). Suppose that he can produce two goods F (fruits) and G (grains) by using the hand on the land according to their production functions. His goal is to maximize utility by consuming F and G. His actions are modeled in three steps as follows:

4.1.2 Preferences

Crusoe's Preferences are described by a utility function U(F, G). This function gives a map of indifference curves, each of which shows the varying combinations of (F, G) that yield a given level of utility. Figure-8 below shows an indifference map with just 3 indifference curves, although each point on the graph has an indifference curve passing through it.

An indifference curve shows the different combinations of (F, G) from which Crusoe gets a given level of utility. Consider utility level U^2 described by the function $U^2 = U(F, G)$. Let marginal utilities be $U_f = \delta U(.)/\delta F$ and $U_g = \delta U(.)/\delta G$. Then $dU = (U_f \delta F + U_g \delta G) = 0$. This implies a substitution between δF and δG such that an increase in Fruits by δF raises utility by $U_f \delta F$, but it comes at the expense of G of grains incurring a loss of utility $(-1)U_g \delta G$. There is a choice between gaining $U_f \delta F$ and losing $U_g \delta G$ such that $U_f \delta F = (-1) U_g \delta G$
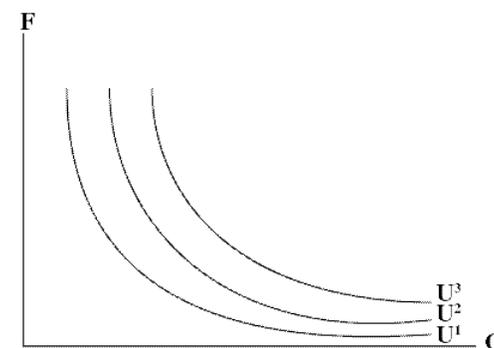
Figure-9: Crusoe's indifference curves

Rational choice means that the subsistence agent wants to maximize utility. This is constrained by the agent's own ability to produce the various goods. This ability is formally described by the budget constraint. This shows a fixed rate at which one good can be substituted for another for a given market value. Figure-9 shows a budget line F^G^ as a straight line with a constant slope.
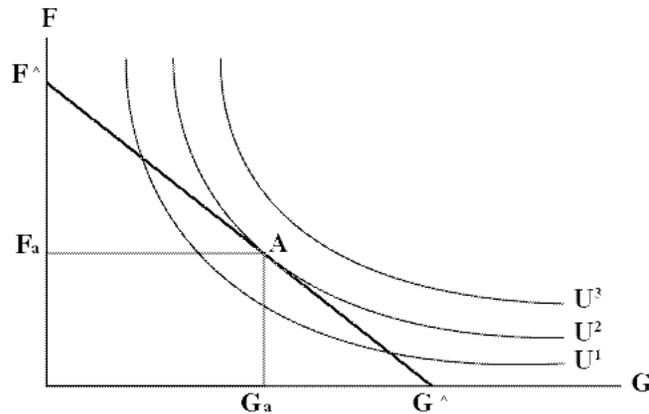
Figure-10: Budget line

Crusoe cannot reach the utility level U^3 because it is outside the budget line. The budget line cuts through utility level U^1, but Crusoe wants to reach the highest level of utility. This is U^2, which is tangent to the budget line at point A. At this point, Crusoe maximizes utility by consuming (F_a, G_a) at point A on the budget line.

4.1.3 Technologies

The technologies are described by production functions. They show how different combinations of factors may lead to a given level of output. Let the production functions be

$$F = F(H^f, L^f);$$

$$G = G(H^g, L^g);$$
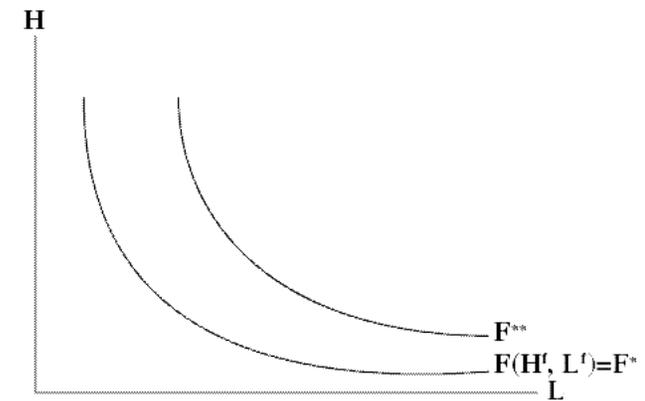
Figure-11: Crusoe's fruit isoquants

An isoquant shows the production function for a given level of output with varying combinations of factors (H, L). Figure 10 above shows one possible isoquant for Fruits of the quantity F* and another for F**. Similarly, there are isoquants for Grains.

Let the marginal products be (F_L, F_H, G_L, G_H). Any point on F*(.) gives $(F_L \delta L^f = (-1)F_H \delta H^f)$. This implies that either δH^f or δL^f can produce the same marginal output dF*. However, the increase in output due to greater use of factor L is matched by a decrease in output due to a lesser use of factor H, to keep the output of F* the same. Analytically, the choice of factors to reach the highest possible output level is analogous to the choice of products to reach the highest possible indifference curve.

4.1.4 Production Possibility Frontier

Under subsistence, there is no market and hence no market prices. The budget line is therefore not derived from given market prices. Indeed, there is no budget constraint in the usual sense, but a resource constraint described by a production possibility frontier (PPF). Crusoe's factor endowments impose the restrictions that given stocks of factors L*, H* cannot be exceeded.

$$(L^f + L^g) = L^*, \quad \text{and} \quad (H^f + H^g) = H^*$$

Given the production functions $F = F(H^f, L^f)$ for fruit, and G =

$G(H^g, L^g)$ for grains, the PPF is given by $\{Z = Z(F(H^f, L^f)\, G(H^g, L^g))\}$. It shows the combination of products that Crusoe can produce by using the entire stock of the factors, when these are allocated between the products such as (F_a, G_a) at point A.
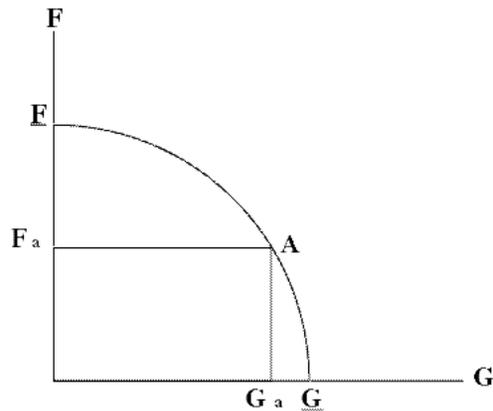
Figure-12: Crusoe's production possibility frontier

4.2 Subsistence Equilibrium

Crusoe maximizes utility by choosing a point on the PPF that reaches the highest indifference curve. This is given by point A in Figure-12, where the indifference curve is tangent to the PPF. At this point, the slope of the PPF is the same as the slope of the indifference curve U^2.

4.2.1 Equilibrium

The first derivative or slope of the PPF shows how the same factors may be allocated to produce either $\delta F(.)$ or $\delta G(.)$. Let $Z_f = (dZ/dF)$ and $Z_g = (dZ/dG)$ be the marginal resource costs in units of G. Then at any point on the PPF, there is a substitution so that $(Z_f\, \delta F = (-1)\, Z_g\, \delta G)$. The equilibrium condition is

Production = Consumption

This condition is fulfilled when the rate of substitution in consumption is the same as in production, as given by the slopes of the indifference curve and the PPF respectively at A.
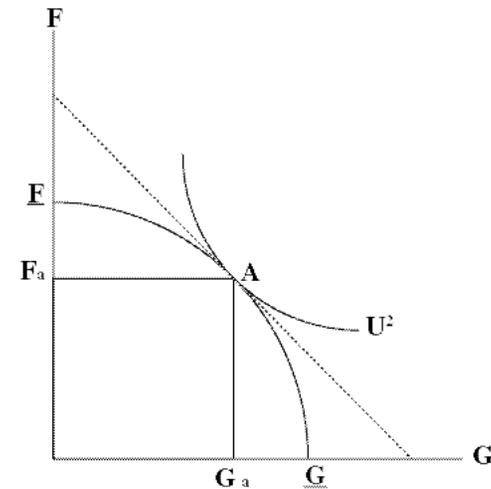
Figure-13: Subsistence equilibrium

In the neighborhood of point A, the tangent shows the rate at which δF may be substituted for δG to keep the utility level the same. As total change in utility is zero, $\{dU = [U_f\delta F + U_g\delta G] = 0\}$, so $[U_f\delta F = (-1)\, U_g\delta G]$. In absolute value, this implies

$$(U_f / U_g) = (\delta G/\delta F) \text{ [Substitution in consumption]}$$

The PPF shows the function $Z(F(H, L), G(H, L))$ in which an incremental output δF increases the resource cost by $Z_f\delta F$ through increased use of factor H and L. This is balanced by a reduction in resource cost $Z_g\delta G$ as the output of G is reduced by δG. Thus $[Z_f\delta F = (-1)\, Z_g\delta G]$. In absolute value, this implies

$$(Z_f / Z_g) = (\delta G/\delta F) \text{ [Substitution in production]}$$

Equating production to consumption, this means

$$(U_f / U_g) = (Z_f / Z_g) \text{ [Subsistence equilibrium]}$$

This condition of equilibrium of subsistence allocation means that the ratio of marginal resource costs is equal to the ratio of marginal utilities. It is easy to extend the model over many periods, many products and many factors, but the essential theme remains the same: equilibrium

occurs when the ratio of marginal costs is equal to the ratio of marginal utilities. It also involves optimal allocation of factors such that the rate of substitution of any two factors is the same in any line of production.

4.2.2   Shadow Prices under Subsistence

It is unnecessary but convenient to treat the ratio $(\delta G/\delta F)$ as a product price ratio. Since $(\delta G/\delta F)$ is the rate at which incremental output δF is converted into δG, it looks like (P_f), the price of F in units of G. Let $P_g=1$. Then $(\delta G/\delta F) = P_f =(P_f/P_g)$. Hence the allocation equilibrium of subsistence may be rewritten as

$$(U_f/U_g) = (P_f/P_g) = (Z_f/Z_g) \text{ [Walrasian equilibrium]}$$

One can also interpret $(\delta H/\delta L)$ as a factor price ratio (W_L/W_H) in units of factor H. Solving the ratio $(\delta G/\delta H)$ from the equilibrium conditions, the product and factor ratios (P_f/P_g) and (W_L/W_H) can be converted in units of either a product or a factor. Such a unit of account has been thought of as money, although it is not a means of payment.

4.2.3 General and partial equilibrium

Figure-13 shows a general equilibrium solution where given factor endowments, technologies, and tastes are formalized to allow Crusoe to choose the production and consumption of products as well as allocation of factors to the various products, all of them together. However, this equilibrium is broken down into parts for ease of exposition in partial equilibrium models of consumption (demand) and production (supply).

4.2.4 Consumer Behavior and Demand

Crusoe's consumption decision may be isolated for study. Suppose that there are *n* different goods $(x_1, x_2,…, x_n)$ Pretending that the shadow prices $(p_1, p_2,…, p_n)$ are given, Crusoe maximizes his utility $U= U(x_1, x_2,…, x_n)$ subject to the budget constraint $I= (p_1x_1 +p_2x_2+…+p_nx_n)$, where I is his income devoted to purchases.

The solution of this problem gives the equilibrium condition $[(U_i/U_j)=(p_i/p_j)]$ for any pair of goods (x_i, x_j), where U_i is marginal utility of x_i.

The solutions are written as $D_i = D (x_i (p_1, p_2,…, p_n, I)$ for good x_i.

Ordinarily, a demand curve is thought of as the relation between quantity and price for a single good. Thus $(\delta x_i/\delta p_i)$ shows the effect of an increase in the price of good x_i, while all other prices and the income remain the same. For normal goods, this is negative, giving a downward sloping demand curve.

The effect of income on demand is measured by the relation $(\delta x_i/\delta I)$. It is usually positive, as an increased income allows people to buy more. However, its elasticity varies greatly, and is crucial for a theory of economic development. The structure of consumption changes with increasing income, pushing the structure of production to match it.

4.2.5 Firm Behavior and Supply

Crusoe's production decisions may be isolated in a partial equilibrium model. He maximizes profits $\Pi=(R-C)$ where $R= (p_1x_1 +p_2x_2+…+p_nx_n)$ is his revenue and $C=(c_1x_1 +c_2x_2+…+c_nx_n)$ is his cost. The marginal cost c_i is calculated from given factor prices w_j, for factor y_j. The solution of the production decision gives the condition $p_i =c_i$ for any good x_i, indicating equality of marginal cost and price (=marginal revenue) in equilibrium. Mathematically, profit maximization implies cost minimization.

Under the usual assumption of increasing marginal cost, the production decision is shown as an upward sloping supply curve.

While it is necessary to adopt the assumption of ceteris paribus (other things remaining constant) for an easy exposition of partial equilibrium, it is a danger to many students who do not seem to complete the general equilibrium analysis. For example, partial equilibrium analysis has gravely hurt economic theory by aborting gains from trade. The ceteris paribus assumption is for undergraduate students, not for professors writing articles.

4.3 Significance of Equilibrium

The principal significance of the allocation equilibrium under subsistence is that it identifies the only rational solution of the allocation problem of a subsistence agent. There is no trade and no opportunity for entrepreneurial gains.

If one forgets that the shadow price under subsistence is not a market price, one may imagine that this autarky equilibrium describes a market equilibrium. One can then make the mistake that this obeys the theorems

known as Say's Law, Walras Law, and Quantity Theory. It fulfills Pareto Optimality. One may also think that Arrow's Impossibility Theorem holds, and makes it impossible for different individuals with linearly inconsistent preferences to agree.

4.3.1 Walras Law and Say's Law

Since the subsistence agent is in full control of both production and consumption, there is no difficulty at all in reaching the point of equilibrium, which is a full-employment equilibrium. Crusoe cannot possibly refuse to hire himself, or deny himself the pleasure of using unused factors to make useful goods for himself.

This remains true for any number of products and factor and periods. Thus suppose that Crusoe produces and consumes n different goods (x_1, x_2,...,x_n). Using the [consumption = production] condition for each good, one writes down n equations for the Walrasian general equilibrium model. On the consumption/demand side, the equilibrium solutions are dependent on prices and incomes. The incomes depend on factor prices.

$$D(x_1 (p_i, w_j)) = S(x_1(p_i, w_j))$$
$$D(x_2 (p_i, w_j)) = S(x_2(p_i, w_j))$$
$$\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots$$
$$D(x_n (p_i, w_j)) = S(x_n(p_i, w_j))$$

The fundamental determinant of the product prices under subsistence are the marginal rates of substitution in consumption and hence come from the preferences. Likewise, the factor prices are determined by the marginal rates of factor substitution as given by the technologies. However, factor demands and factor prices themselves depend on the demand for the products.

The n equations impose the equilibrium condition [consumption = production] and are solvable for preference functions and technologies that are not inconsistent with each other. For a single decision-maker, any inconsistency is inconceivable.

4.3.2 Pareto and Arrow

Since there is a single decision-maker under subsistence, the basic idea of conflict of interest in the formulation of Pareto Optimality and Arrow's Impossibility Theorem would not seem to apply here. Yet the subsistence equilibrium does fulfill the requirements of Pareto

Optimality and Arrow's Impossibility Theorem, if one supposes that the demands and supplies of the different goods come from different personalities of Crusoe. As explained later, trade requires Menger's dictum, which rules out Pareto Optimality and Arrow's impossibility.

4.3.3 Quantity Theory

It is clear that there is no money and no need or room for money under subsistence. But there is no mathematical problem in supposing that any one of the goods can be taken as a numeraire and the prices can all be quoted in terms of that good. One can readily apply the quantity theory of the numeraire here. The real or relative prices reflect the rates of substitution (in production and in consumption) and a proportionate change in the nominal price has no effect at all. This proposition has nothing at all to do with money (=means of payment).

4.4 Beyond Subsistence

The transition from subsistence to barter poses major problems. Two entirely new elements affect the output and market prices. One is payment. The other is intermediation. Means of payment affects the size of the demand, while intermediation affects the way prices are set

For barter, Crusoe deals with a stranger, say Defoe. Why would Crusoe agree to pay Defoe rather than simply plunder him? How are they supposed to know about each other's intentions? Where and when can they meet? How are they to arrive at an agreement on what and how much to exchange?

Most of all, why would they bother to undertake the hassles of trading? Why can't they themselves just keep on producing whatever they need? The new issues raised by trade are studied by the theories of payment and intermediation.

Intermediation theory explains how formerly isolated agents are brought together and persuaded to institute a market. The institution defines certain basic rules of making agreements on what and how much to trade. The agreements are worked out such that conflicting objectives are reconciled by using circular consistency.

The theory of payment explains how one kind of good may pay for another kind, including the case where an artifice is used as a means of payment to deliver real goods against real goods indirectly.

4.5 Allocation under Trade

Readers familiar with prevailing microeconomics may have to struggle to recognize that the Ricardian trade model (and its subsequent refinements) and the Walrasian model of general equilibrium are not models of trade, but of allocation under subsistence.

To turn them into genuine trade models, one must introduce agreements on market prices, bring in genuine money as a means of payment, and allow intermediaries to lead the social decisions on settling prices and payments. The following sections introduce the changes in several steps.

4.5.1 Pure Profit Opportunities

Exchange in a market offers an opportunity to earn a pure profit. This happens because there are other people who ascribe relatively high utility to the product the individual is able to produce, compared to a given good. For example, suppose that in isolation, Crusoe is observed to produce at a point where 2 baskets of fruits have the same utility to him as 2 bags of grain. Optimally, his resource allocation is such that he can produce either 2 bags of grain or 2 baskets of fruits with the same inputs (dL, dH).

However, stranger Defoe wants to consume fruits with a much stronger desire and is willing to offer 4 bags of grain for 2 baskets of fruits. Thus Crusoe is able to get 4 bags of grain in exchange for 2 baskets of fruits, rather than merely produce 2 bags of grain. The pure profit from exchange is 2 bags of grains.

The paradox arises from the idea that Crusoe would continue to produce more fruits and buy more grains until all further opportunities for profit are exhausted. This thinking is mistaken, because it forgets the constraints on Crusoe's factor endowments, as well as the constraints on Defoe's income. Here is a simple graphic reminder of the issue.

In Figure-14, Crusoe produces at point A under subsistence, but at point B under trade. He sells $F^x=(F_b-F_a)$ and buys $G^m=(G_c-G_b)$. The shadow price ratio under subsistence is given by the slope of the dotted price line. The market price ratio is given by the slope of the solid price line.

At the market price ratio, fruits are dearer and hence grains are cheaper, so that Crusoe sells fruits and buys grains.
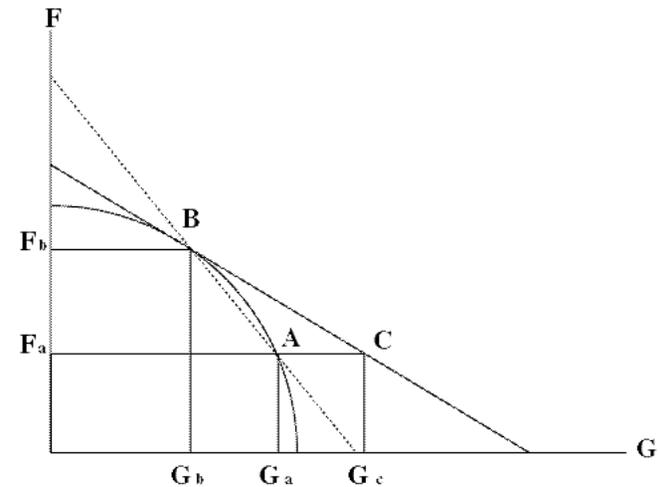
Figure-14: Pure profit from trade

Crusoe's net profit is given by the extra grains he can get for a given quantity of fruits under trade than under subsistence. Thus by sacrificing F^x of fruits, he can get as much as $[(G_c-G_a)+(G_a-G_b)]$ under trade, while he could get only (G_a-G_b) under subsistence. Hence (G_c-G_a) is his net profit compared to autarky. In short, measured in G, Crusoe's marginal cost is (G_a-G_b), but marginal revenue is $[(G_a-G_b)+(G_c-G_a)]$.

The allocation model sets the market price equal to the shadow price without imposing the budget constraints on both buyers. Crusoe cannot keep on selling more fruits to reach a point where no more pure profit opportunity remains, just as Defoe cannot keep on buying more fruits, because he too has a limited income.

An allocation model implicitly imposes an endowment constraint which defines the income at shadow prices. It is understood that the agent makes full use of all available income or endowment. But when two agents are involved, the allocation model forgets to define a global endowment or income constraint.

The exchange model imposes the global income constraint in the form of the equivalence principle. This is explained in the following chapters.

4.5.2 Expanded Production Opportunities

Trade allows people to make use of hitherto useless resources and thereby expand the potential and actual output. The allocation model cannot grasp this crucial material impact of trade on the expansion of production opportunities.

To see the theoretical issue in concrete terms, let us consider the rather striking fact that the planet's stock of natural resources has remained the same for all practical purposes. But compared to 10,000 years ago, far more of the resources are being used now. The greater part of the increased use of previously unused resource is made possible by trade. One can think about population growth as the other factor.

How does the expansion occur? Consider Crusoe's fruit output under subsistence. His island may very well be full of fruit-bearing trees. But he cannot possibly use up all the resources, because he has a limit of consumption. His time is scarce and his work is costly (painful). He will gather fruits until the marginal utility of the last basket of fruit is equal to the marginal cost or disutility of the last minute of work. He is not willing to work any harder to gather more fruits.

However, now suppose that Defoe wants some fruits from Crusoe. It is not optimal for Crusoe to produce more fruits if he has to consume them, but it is worthwhile for him to do so if he can consume more grains. The key here once again is to remember that Crusoe can also produce grains, but his grain output per minute is much lower than what he can get from Defoe in exchange of his work to gather fruits per minute.

This seems like a reallocation only because we have used a two good example. Most people cannot produce most goods at any cost. To buy more, they just work more to produce what they can produce.

In the allocation model, Crusoe is more productive in gathering fruits than growing grains. This means that at Defoe's request, Crusoe may work harder than before and produce more fruits, and expand his consumption of grains. He just turns hitherto useless fruit trees into useful factors of production. They may still not show up in his PPF, because he may still have unused trees at the margin. But his labor is definitely increased.

One can check the facts of increased use of labor through successive epochs of economic transitions from forager to pastoral to agrarian to industrial to post-industrial economies.

In an exchange model, a decomposition of output shows that the output is the minimum under subsistence. Much of what is traded would simply not be produced if not for trade. Thus, it would be hard to imagine Stigler lecturing himself with so much devotion if there were no students to pay for his lectures, and to enable him to get things he would

otherwise not be able to produce at all.

This is also the root of unemployment in a market economy. People are specialized to produce certain goods and services. Today, they are usually without access to the natural resources that subsistence producers used to have before agrarian economies privatized land. If they cannot sell what they produce, they cannot produce much at all.

In short, it is not just a gain in efficiency, but also an expansion in the size of resources brought under use. The efficiency gain is explained below.

4.5.3 Competitive Market Constraints

Ceaseless competition in the market involves ever changing constraints and opportunities. It compels the entrepreneur to stay alert and try to adjust to the changes in the market.

A review of the Ricardian trade model may expose the problem. Let us look at Crusoe's PPF once again. At the extreme ends, the PPF reveals some feature of factor endowment that is apt to escape notice. In the vicinity of the PPF touching the vertical axis F, the curve is nearly horizontal, implying that a small reduction in F may allow a large increase in G. This means that there are some resources which are more suited to produce G than F, for example, fertile croplands are more suited to produce grains than fruits. At the other extreme, the curve is nearly vertical, where a small decrease in G allows a large increase in F, again because there are some resources that are better suited to produce fruits than grains.

The PPF of course is derived from combining technology and endowment. If one likes, one may use a difference in technology to split Crusoe's resources into 'two countries', say Fruitland and Grainland. In Fruitland, the resources and technologies make it easier to produce fruit than grain. It is the opposite in Grainland.

Having split the resources into two countries, it is easy to set up a joint allocation problem. That will give rise to the Ricardian model of joint allocation that is more commonly known as the trade model.

The Ricardian model implicitly assumes that both countries (Fruitland and Grainland) are owned by the World's owner (Crusoe), whose business it is to consider the efficient or optimal allocation. If indeed the world's sole owner wants to maximize value of output, the optimal allocation is to let Fruitland produce the fruits and Grainland produce the grains according to comparative cost.

Why is it not a trade model? In a trade model, the agents do not grant mutual monopoly. In the Ricardian model, Fruitland confers monopoly of grain production to Grainland, and in return is granted the monopoly of fruit production. In actual trade, the different countries or agents are

independent. They have no rational basis to worry about comparative cost advantage at all. Competing agents abide by what Smith called absolute advantage.

Genuine trade does not abide by comparative advantage, but by absolute advantage. The more competent producer is able to produce at lower cost, or provide better products at the same price. The greater the absolute advantage, the higher the margin of profit. Indeed, the producers who are at the bottom of absolute advantage run the risk of being driven out of the market, regardless of the comparative advantage.

Comparative cost is an idea appropriate for a joint allocation model, and not for an exchange model. This idea can be very misleading when one studies economic development. Compare the illiterate lowly paid rural peasant to the literate and highly paid urban lawyer. According to comparative advantage, the peasant would remain a peasant, doing low-paid work in a stagnating sector, while the lawyer would keep increasing his relative income in an ever-growing sector.

But Smith would encourage the peasant to become a lawyer to compete for absolute advantage. That is exactly how economic development has to happen: by turning less productive factors into more productive ones, that is, by turning comparative advantage into absolute advantage.

A joint allocation model generates what is known as factor price equalization theorem (See Samuelson 1948,1949). It does not describe competitive trade. Competition means that there is no evidence to show factor price equalization.

4.5.4 Price Constraints

The logic of allocation forces the model to take the shadow price and suppose that it is the market price. The problem of course is that the other people in the market do not have the same preferences. Hence a single price ratio at which all different individuals reach allocation equilibrium is not a real possibility. The culprit is the difference in income constraint.

For example, the market as a collective entity may reach a market clearing price ratio such that a certain quantity of food has exactly the same value as a theater ticket. At this exchange rate, a hungry man may just lack the income to buy both in quantities enough to make them of equal marginal utility. His income and his consumption of food may be so low and the marginal utility of the food so high that he will certainly not consider giving equal importance to the theater ticket.

In short, the market offers producers an opportunity to sell at a price significantly above the marginal cost, because buyers do not have enough income to buy to the point where the marginal profit is zero. The producer also runs out of factor endowments long before the output reaches the point where the marginal profit is zero. At last, one may find some evidence of scarcity in the presence of what may be called scarcity rent by an allocation model.

The opposite happens when the producer is relatively incompetent and incurs a marginal cost so high that buyers are not willing to offer a price high enough to match the cost. It is also possible that there is persistent oversupply.

Adjustments in prices and quantities are supposed to eliminate the imbalances between demands and supplies. This requires intermediaries to carry out the adjustments. The discovery of the opportunities of pure profits from organizing the adjustments, the creativity to actually design and implement the transactions, and the charisma to obtain legitimacy of the new transactions are all dependent on entrepreneurial perceptions. These adjustments are not automatic, because the entrepreneurs may suffer from ignorance, and lack creativity and charisma until an accidental discovery or creativity changes the situation.

4.5.5 Payment Constraints

Perhaps the most sweeping change in analysis comes from the payment problem that arises with trade, but is absent under subsistence. The problem is that the seller of something requires a payment in a kind of good which gives him higher utility than the good he sells. The values are the same, but the utilities differ as the kinds of payments differ.

Say's Law fails under trade, because even when the values of the two goods are equal (making demand equal to supply), their utilities are not equal. Hence the seller may refuse to accept a particular payment, and insist on being paid in a different kind of good of the same value. Money is necessary to transfer claim over real goods of definite kinds.

5. EXCHANGE

Consistent economics is a study of exchange. It uses a formal tool of consistency analysis to understand exchange. However, it is useful to have a sense of the concrete reality that the abstract formal model seeks to capture.

5.1 Substance of Exchange

The substantive model looks at the concrete realities of exchange. A substantive definition says that exchange is an act of voluntary and reciprocal interchange of valuable objects between strangers. This definition involves four elements of exchange: voluntariness, reciprocity, compensation, and estrangement. They may be presented in reverse order for an evolutionary perspective on the emergence of the market as a social institution.

5.1.1 Estrangement

Exchange occurs between strangers who are not members of the same family, and hence do not share things without immediate, direct, and equivalent compensation. Inside the family, people share the work and the output. There is transfer, but no exchange. To qualify as an exchange, the agents must require and receive compensation, which must be immediate and equivalent. Immediacy means that each object must be linked to a specific payment against it at the time of bargain, even if the actual real payment comes at a future date. The price must be settled.

This notion of estrangement lies at the root of the institutional background of exchange in an economy without exchange. In the state of nature, there is no exchange. Animals just forage, namely, gather and hunt. Gregarious animals of course use some politically and culturally determined rule to divide the group's work and output, but that is not exchange.

The natural law of subsistence imposes the dictum that each animal must produce what it wants to consume, and consume only what it produces. The predator may indeed hunt, kill and eat the prey, but never buy or pay. Predation is subsistence.

The distinction between transfers within the family and exchange between strangers may be uncovered by a study of the evolution of politics, and the transition from a natural subsistence economy to a market economy. The theme in this exercise is that exchange emerges as a cheaper alternative to war.

The evolution of politics may be seen from an evolution of gregarious animals. Early creatures were small and often lonely. The mother fish would lay a large number of tiny eggs and do nothing to protect them. She might even herself eat her own eggs. But something happened so that at a later stage, the reptile mothers began to build nests to lay eggs and protect them from predators and cannibals. The mother snake's effort to protect her eggs shows a possible beginning of family life, and the beginning of politics.

Collective self-defense defines the primitive motive behind politics. It involves a sacrifice made by the defender out of a primordial sentiment of love for the members of the family.

One may note that the mother eagle kills the chicks of other birds to feed her own chicks. Her own chicks are her own family, and she makes sacrifices for the family without any demand for reciprocity and equivalence. Some primordial passion in her very spiritual being impels her to put her own life at risk to protect her eggs and chicks, and to invest in their protection and nurture. Yet she deals harshly with strangers, whom she fights, kills, or eats.

In more advanced animals such as mammals the mother hatches the eggs inside her womb, and produces the food for the child in her own body. She makes large biological investments to raise her children. She gets the support of the adult male consorts in raising and protecting her family. The point is that the gregarious family is primarily a naturally selected political organization for collective self-defense.

The pay-off for the biological investment apparently lies in the bigger body and brain sizes, and longer life expectancies. Biology

unfolded a reproductive strategy in which greater parental investment gave the offspring a longer period of gestation and childhood, a greater facility to learn, and above all become more intelligent and skilled.

Humans are one of the largest animals, have one of the longest periods of childhood, and are the most intelligent of animals. They are one of the longest living animals. These qualities could not have emerged without the formation of families that took up the nurturing and defense of the young and the weak.

Within the family, the natural process involves a political structure. They young obey the seniors, and the strong lead the weak. The natural political organization of the family allows a disciplined collective defense. As an extension of this defense, the family uses some scheme to share the work and the output. Politics can very well explain the division of labor and the distribution of output inside the family without any reference to economic concepts of profit and efficiency.

In the scheme of nature, strangers do not voluntarily produce for each other or engage in peaceful exchanges. They are enemies engaged in predation, cannibalism, and war. The eagle does not negotiate a price with its prey: it simply kills its prey. Yet it freely gives this up for its chicks. Between strangers, there is war, and no caring or sharing, sacrifice or love.

The issue for the theory of exchange here is to identify the conditions that gave birth to exchange out of state of nature. Here is a likely scenario, to be filled in by historical studies.

Anthropological studies suggest that in the natural subsistence economy of hunter-gatherer people, the equilibrium size of the group is about 25 individuals of all ages and sexes. These nomads would move from place to place in search of food and would generally not linger in one place, and defend the territory or lay claim of ownership. If by chance other groups were to come by, the newcomers would probably simply keep walking to another unoccupied place, sometimes after a skirmish.

Only under conditions of food crisis would they engage in fights to snatch the food. But the extremely large body size of the human suggests that food shortage could not have been a general and constant feature of human existence. The omnivorous humans numbered just a few hundred thousand even when they occupied much of the planet. Newcomers would more likely disperse rather than fight to take over a territory for mere foraging.

It seems that just a few thousand years ago, humans came up with the idea that they could compel other animals to work for them in raising food. While the fox catches and eats the chicken right away, the human smartly decided to keep the chicken alive, let it feed on what the human would not eat, and let it lay eggs, namely, produce food. The day the hen stopped laying eggs, she would be killed and eaten. Man also learned the art of raising cattle. Man let the cow eat the grass to breed calves and give milk. When it stopped breeding, it would be killed and eaten. Other animals have not learned this trick.

This pastoral technology created the first economic basis for cannibalistic war (within the same species) and its subsequent resolution in exchange. It also created the conditions for a demographic revolution leading to a much larger population living in one group.

The investment of labor in the breeding and raising of poultry and cattle justified the pastoral people to lay a claim of exclusive ownership over the stock. This would be unintelligible to the foragers, who had always simply gathered and hunted whatever came their way. It is inconceivable in a natural economy to forbid others from hunting or gathering on account of private ownership.

There is no doubt that the foragers would attempt to hunt the animals raised by the pastorals and hence would invite unavoidable war. The pastoral must defend the right to own the cattle, namely, to exclude others.

The emergence of private property as a surplus over current consumption created the wealth that became the target of plunder. The pastoral communities must have created armies of shepherds to fight off the marauders. It is possible that the negotiation for ransom to secure the freedom of captured warriors gradually paved the way for peaceful exchange. People found that it was more costly to fight for something than to buy it.

The ransom would not emerge if one group was more powerful than the other to completely suppress it. A state of stalemate created the option of ransom.

Some people might be too strong for one group, but not strong enough for another. The slave hunter could capture the weak and sell them as slaves, while the slave buyers were not powerful enough to take the slave-hunters themselves as slaves, nor weak enough to be hunted down.

Another possible route for the emergence of exchange is the new custom of dowry. In a forager society, there is never much surplus to distinguish individuals according to wealth. But in a pastoral society, one shepherd may have a larger herd than another. For a husband, a woman might have found it reasonable to prefer the shepherd who owned a larger herd. Formerly, a man's attraction was based on his physical and personal qualities, and not on his wealth.

Indeed, the concept of marriage must have undergone fundamental change with the emergence of dowries. In a forager band, marriages are fluid and principally based on love. But in a pastoral economy, the woman may demand a dowry in cattle, and further insist on a priority of her children on the inheritance of the property.

The notion of an illegitimate child out of wedlock would have no place in a forager economy. In pastoral society, a woman could threaten to leave the husband unless she received the status of wife, a permanent companion with recognized property rights. Her husband may father children with other women, but the wife is in a position to deny them a share in the inheritance. In short, the bargains for dowry provided an example of economic contracts, which might have articulated the idea of exchange contracts.

It is also likely that the pastoral communities were able to organize festivals and communal worships. The places where the festivals and worships occurred might have provided an opportunity for people to exchange gifts. Although the giving of gift is not in origin an exchange, it is likely that people began to apply some notion of equivalence in judging the proper reciprocity in gifts. The notion of equivalent reciprocity in giving gifts becomes a permanent aspect of exchange. When giving is conditional on taking, the gift ceases being a gift and becomes a payment, a part of exchange.

The principal issue in estrangement is that people who are not members of the same family (or clan or tribe) cannot expect gifts or transfers. They have the option of violent plunder or peaceful exchange.

It seems that until about four thousand years ago, plunder was the more common approach to getting goods belonging to strangers. The stronger party could plunder the weaker one and refuse to provide any compensation. However, long after agriculture created vast wealth and

compelled people to a sedentary life, the strong plunderers established kingdoms with vast populations.

To keep order within the kingdom, some rules were made to enforce a right of the weak to get a fair compensation. War booty was probably the first to be legally recognized as private property of the soldier.

The early literature on economics deals with the issues of fairness of price rather than the determination of price by cost and utility, because the institutional context of early authors involved the presence of strong plunderers against weak people. The stronger might try to hide the plunder with a token payment to the weaker party. The study of fair price is a study of the creation of the market, not the operation of it after its creation.

There is some evidence of early markets being created as an option to avoid war. Marching armies might send emissaries to advice the people about to be invaded that the soldiers would much rather pay something for the produce they need rather than fight for tidbits. This is because the soldiers might be carrying some tidbits from previous plunders, and would find it less costly to spare some of those instead of getting into another fresh bout of battle for vegetables and chicken and eggs and such.

It is important to recognize that the institutional precondition for peaceful exchange includes the legal recognition and protection of the right of the weak to receive equivalent payment. Without an enforceable obligation to pay, the market could not arise and function. Then there would be plunder.

5.1.2 Compensation

Within a subsistence family, which may be as large as a Pharaonic empire, people share the work and output without any notion of compensation. Family members are not supposed to require compensations for what they contribute. They are supposed to make sacrifices out of love and loyalty. They are entitled to get shares of output simply because they are members of family and not because they are to receive wages for their work.

The defender patriot, the king for example, is willing and ready to give up his life to defend the family, his nation. He seeks no compensation. However, he deserves honor and loyalty. The king is supposed to get tributes and taxes. The king also does not sell anything to his subjects: he gives away bounties, privileges and pensions.

Compensation is an obligatory payment. It carries a notion of fairness in that the loss suffered by the victim is repaired by an equivalent compensation. When strangers negotiate an exchange, the compensation becomes a payment. The court may coerce the offender to give a compensation, but it is not an exchange for lack of voluntariness.

The most important aspect of payment is that the seller is entitled to ask for the kind of compensation which gives him the highest utility from among all goods of equal value. The seller has the right to choose the kind of payment. This aspect of payment changes economic analysis in fundamental ways, especially by leading to the use of money.

5.1.3 Reciprocity

Reciprocity in the exchange means that the two strangers must specify the two goods that are to pay for each other, both in kind and in quantity. It is not an exchange if the reciprocity is not specified. Thus even if a child provides an equivalent support to the parents in old age, against the support given by parents in the child's childhood, it is not an exchange. There is no direct link to oblige the child to pay the parents for their kindness. A gift may very well be later reciprocated, but they do not constitute an exchange. The reciprocity must be fully specified at the time the exchange is bargained.

The so-called implicit contract is not an exchange for not being explicit. The payment must be specific, explicit, and immediate. The price must be specified. The immediacy may involve the payment with a credit, which is a current promise for a future delivery of real goods or claims on real goods (=money). But the promise itself is immediate. In short, an exchange must have a determinate price, specifying how much payment is required by the seller.

5.1.4 Voluntariness

The idea that exchange is voluntary means that it is not the result of a tribunal where the plunderer is ordered to compensate the victim. The market is a place for peaceful negotiations between strangers who voluntarily agree on reciprocal payments.

The significance of voluntariness lies in the correctness of methodology. The presence of voluntaries means that the idea of mechanism is not applicable, and that the idea of teleology (= rational choice) must be applied.

Bertrand Russell (1945) thought that teleology led science up a blind alley. This indeed happened in previous ages, as primitive teleology was not restrained by empiricism. Superstitions are possible if one can get away with the unobservable intentions of unobserved agents. But the dictum of science can be reestablished by requiring that while subjective intentions are not open to public observation, one must provide an empirical anchor of the agents, their actions, and their outcomes.

It must be possible to build formal connections between two sets of observations, even if the connection is subjective. Empiricism can lead science up the enlightened path by linking observations. The link between observed income and observed demand may be shown in terms of unobserved preferences, perceptions, and expectations, but the link itself is nevertheless open to empirical tests.

The concepts of rationality and alertness provide ways to handle subjectivism without the descent into superstition. That is where the formal model comes in.

The explanation of the cause of exchange is teleological: it occurs because people intend to achieve net gains in utility by performing it. The intention cannot be observed, but its consequence can. The methodology of economics must then proceed to show the observed outcomes and link them to the unobserved intentions. Superstition rests on unobserved agents and unobserved actions. Science can demand that the agents must be objectively identifiable. They must be seen to perform the actions.

In rhetorical terms, this means that it is improper to use the term mechanism in economic analysis. The market is not a mechanism: it is a teleological institution, created purposefully by human beings who are free not to create it. People engage in exchanges, without a natural compulsion to do so. They are free to exchange and also free not to.

A mechanism gives no freedom, no choice. Teleology means that the agents have freedom of choice. Rationality is the idea that the choices are made according to intelligible reasons or intentions. People have the freedom not to act in certain predictable ways, but they have reason to act so.

Austrian School economists are fond of saying that every major advance in economic theory is another step towards subjectivism. This is true of consistent economics.

First, a major change occurs as the idea of preference is extended to cover the preferences over varying kinds of goods of given value.

Neoclassical economics knew only about the preferences over varying quantities of given kinds. It missed the issue of payment as it did not see the preference over varying kinds of goods of a given value.

Secondly, the notion of entrepreneurial perception is extended to serve as the basis for the theory of intermediation. No exchange, not even barter, is possible without intermediation. Voluntariness of exchange means that nobody provides information, organization, innovation, and legitimacy to compel the agents to engage in trades.

Instead, people willingly seek opportunities for gainful exchange. This pursuit is based on perceptions. Exchange cannot occur without subjective entrepreneurial alertness to discover the opportunities, and to create the innovations and organizations, and to secure legitimacy of exchange. In particular, the seigniorial perception of the opportunity to create fiat money out of thin air extends subjectivism.

A properly formulated teleological mode of explanation must utilize the concept of institutions. The market must be seen as an institution. The agents must be seen to undertake a process of voluntary agreements.

Exchange is not war, and it cannot occur unless people have a way to reach peaceful agreements. The institution of the market must be seen in the context of a society which is instituted to permit and facilitate the process of reaching voluntary agreements. It may involve disproportionate power, but that is another issue.

There are three laws of the market governing the making of agreements on what and how much to buy and sell. These are not natural laws, but are rules upheld by organized institutions.

The epistemological significance of the notion of voluntariness is that it provides a means of seeking and testing knowledge of social events. All social events are ultimately institutional. The subjective ideas of preferences, perceptions, and expectation all will find their place in such analysis. Human action, whether it is economic, political, or cultural, must have observable agents, actions, processes, and consequences.

By abandoning the improper idea of mechanism, social science can gain strength by adopting an institutionalist model. Neoclassical economics has done much to show the power of the idea of rational choice. Consistent economics may demonstrate even more.

Consistent economics insists on being thoroughly subjectivist. That is one reason why the term macroeconomics is not a part of the vocabulary of consistent economics. All social events are understood in terms of individual intentions. There is no place for relations between mere aggregates without reference to their origins in actions of individuals who have reason to agree with others.

5.2 Three Laws of the Market

The substantive definition thinks of exchange as a social action. It will be helpful to follow the classical tradition to discover the 'laws of the market' that govern this action. The emphasis is on the voluntary character of agreements, and the institutional character of the market to permit and facilitate agreements. The formal model captures the empirical outcome of the agreements.

The market agreements determine the kinds and the quantities of goods. The agreements obey three laws of the market, giving the conditions of equilibrium.

5.2.1 The Law of Value:

The buyer must pay the seller with something whose market value is equal to the value of the good sold by the seller to the buyer. This gives the equilibrium condition of equivalence to determine value.

5.2.2 The Law of Payment:

The seller must be paid, directly or indirectly, in that kind of good that gives him the highest utility from among all goods of equal value. This provides the equilibrium condition of double coincidence.

5.2.3 The Law of Intermediation

In indirect exchanges, intermediaries must play a leading role in settling prices through arbitrage to fulfill the law of value, and to settle payments through seigniorage actions (by creating and injecting money) to fulfill the law of payment.

The three laws of the market provide anchors for the formal model. They draw attention to those elements of exchange that may be amenable to precise analysis, as they are open to mathematical and logical presentations.

In a sense, the a formal model of exchange looks at the totality of exchange as a phenomenon with three distinct elements. Each law of market lends itself to the formulation of a theory. A theory of value

explains how the law of value operates. Likewise, a theory of payment exposes the operation of the law of payment, while a theory of intermediation tries to discover how intermediation occurs.

The critical focus is on the underlying notion of agreement behind each of the three laws of the market. The buyer and the seller must agree to ascribe a certain determinate value on each object of exchange, such that one can pay for the other.

They must also be able to reach an agreement so that each seller is able to receive, directly or indirectly, a payment in the kind of good that offers the highest utility from among all goods of equal market value. This is a complicated process of agreeing to the use of artificial means of payment. Each of these market laws are enforceable by formal legal rules.

The idea of the laws of the market provides a sense of regularity in the patterns of economic behavior related to exchange. A theory is possible if such regularities exist. Economics as a science of exchange wants to discover those regularities.

5.3 Formal Model

The substantive model provides a landscape of reality from which one needs to distill the essential empirical elements. The substance possesses a richness that an informed student should be able to enjoy. However, to work with scientific analysis, this richness is sacrificed in order to achieve strength or sharpness.

A formal model gains strength by uncovering essential causal linkages between observable events. Such a model captures some elements of the substance to make the connections analytically tractable.

The elements of reciprocity and compensation seem readily amenable to formal articulation. The notion of voluntariness is built into the analytical framework in which the agreements are based on intentions of individuals.

The notion of estrangement remains an area of further studies in search of a formal articulation. Theory of intermediation is an attempt to grapple with some part of it.

5.3.1 Steps in Developing a Formal Model

One may take the following four steps.

1 Articulate a formal definition of exchange.
2 Identify the questions.
3 Develop an analytical tool to look for answers.
4 Formulate the answers in the form of theorems.

5.3.1.1 Definition: Exchange as a Vector

In its most basic form, a direct exchange is a set of two goods that pay for each other. In order to keep track of the kinds of goods, let a first subscript denote the seller and a second subscript denote the buyer. One can easily define a seller for each different kind of good, and thereby allow the first subscript to denote the kind of the good too. Then the vector $x = (x_{AB}, x_{BA})$ denotes a direct exchange between agents A and B over kinds of goods (a, b).

An indirect exchange consists of 3 or more goods. It must be broken down into a series of direct exchanges in which one real good is traded first against an artificial good called money, and then the money is traded against another real good. For example, $x = (x_{AB}, x_{BC}, x_{CA})$ is an indirect exchange. In it, the first good (x_{AB}) is sold by agent A to agent B for money (here, commodity x_{BC} is money), and then the money is sold by agent A to buy the real good (x_{CA}) from agent C. Theory of payment explains why x_{BC} is money to A, but not to B or C.

This formal definition of exchange distinguishes the methodology of consistent economics in several ways from that of conventional economics.

5.3.1.2 From Agent to Object

The neoclassical approach is to look at the individual agents as buyers and sellers. The oddity is that when the agent is put on stage, it becomes a puppet in the hands of the hidden determinants behind the curtains. In the end, the agent is really a puppet while the income and the prices determine the demands, and the technologies and endowments determine the supplies. Tracing incomes and prices from individual levels becomes impossible.

In consistent economics, the roles are reversed. The objects of exchange are put on stage, while the agents are the ones who determine their quantities and prices, kinds and payments, from behind the curtains. From a substantive point of view, this tells the story more coherently and completely, by allowing the agents to exercise entrepreneurship, and by allowing many agents to reach peaceful agreements. Tracing incomes becomes easy.

The most important methodological advantage of defining an exchange as a vector of traded goods is that it makes an inescapable commitment to empiricism. It avoids the trap of descending into psychology by looking at intentions of individual agents.

5.3.1.3 The Focus on Agreements

The classical approach is to look at the market as a mechanism in which the human agents are nothing but levers in the machine. Such agents are capable only of behaving in immutable ways. In consistent economics, the mechanism is replaced by an institution to endow human agents with the power to make agreements. The agents are not bound by immutable economic propensities, but endowed with powers as active seekers of profit. They have the entrepreneurial power to change the quantities and prices, risk the losses, and seek the pure gains.

The neoclassical approach of dealing with individual agents leaves half the story out. While an individual as buyer chooses a quantity of demand, the actual observable outcome requires that there is a seller who agrees to sell just the same quantity which the buyer wants to buy.

Neoclassical economics knows that demand must be equal to supply, but it does not resolve the problem of how this equality is actually achieved. This is because demand is dependent on income, which in turn is dependent on what the buyer sells. Again, the seller must use the revenue to buy something. In short, the demand and supply are incompletely specified. For complete specification, the law of value must be imposed formally through the principle of equivalence, as shown below.

Exchange requires four different sets of determining equilibrium conditions, only one of which is known to neoclassical economics. This problem is solved by defining an exchange in a way that requires agreement from the beginning. The quantities and the kinds are determined by agreement between the two agents both of whom are both

buyers and sellers at the same time. In short, the definition of exchange as a vector of traded goods makes the issues more tractable through an integration discussed below.

5.3.1.4 Integration of Micro and Macro Issues

The definition of exchange as a vector of traded goods compels the analyst to integrate micro and macroeconomics from the start. It does not allow a splitting of micro and macro issues. Indeed, the issues traditionally studied by macroeconomics turn out to be issues of payment (linked to the kinds of goods and their relations). The difference of the approaches can be shown as follows.

For the simple barter $\mathbf{x} = (x_{AB}, x_{BA})$, neoclassical economics needs four different optimization exercises, which cannot be combined in a coherent manner. The four optimization exercises try to find

- A's demand for (x_{BA}),
- B's demand for (x_{AB}),
- A's supply of (x_{AB}) and
- B's supply of (x_{BA}).

In each exercise, there are predetermined constraints. A's demand for (x_{BA}) is dependent on A's income from the sale of (x_{AB}), but the neoclassical model does not study the source of income. This income in turn is derived from the supply of (x_{AB}), constrained by B's demand for (x_{AB}). But B's demand of course is dependent on B's ability to sell (x_{BA}) to A. Neoclassical economics simply cannot make all this interdependencies clear.

It does of course resort to the Walrasian equilibrium by asserting that the demand of (x_{AB}) must be equal to its supply, just as the demand for (x_{BA}) must be equal to its supply. By not directly linking the incomes, it has nothing to ensure that the equality of demand and supply will actually occur. It is possible for each good to have equality of demand and supply, without each agents having equality of income and expenditure or vice-versa.

The Walrasian model is underdetermined with respect to payments. That model has no clue that the seller of (x_{AB}) will not accept a payment in (x_{AB}) itself, but must be paid in some other kind of good. Thus even when every good has demand equal to supply, it is still the case that

exchange may not occur, because the kinds may not fulfill the payment requirements, as explained below.

The neoclassical approach to study the consumer and producer behavior of isolated individuals leaves no tractable method of linking the constraints for an integration of micro and macro issues. In contrast, the definition of exchange as a vector of traded goods compels the analysis to achieve integration by endogenizing the constraints (by imposing the equivalence).

Neoclassical macroeconomics does not see itself as a search for the determination of constraints through an exploration of incomes and prices seen in the micro constraints. It thinks of itself as a study of aggregates. Consistent economics shows how aggregates are derived from individual actions.

5.3.2 Raising the Questions:

The formal definition of exchange helps raise the questions in a tractable manner. The primary questions are about the observed properties of exchange. When looking for answers to the primary ones, secondary questions are raised about the process of exchange.

5.3.2.1 Properties of Exchange

Suppose that the exchange is described as

$$x = (x_{AB}, x_{BA}) = (2 \text{ Apples }_{AB}, 3 \text{ Bananas }_{BA}).$$

Then the theoretical questions are the following:

1. *Size of output*: What determines the quantity of each object? For example, why are there 2 apples rather than fewer or more?
2. *Structure of output*: What determines the kind of each object? Why is it apple rather than apricot?
3. *Prices*: What determines the relation between the quantities? Why are 2 apples exchanged against 3 rather than more or fewer bananas?
4. *Payments*: What determines the relation between the kinds? Why are apples exchanged against bananas rather than against berries?

5.3.2.2 The Process of Exchange

The secondary questions sharpen the primary ones by linking the process of exchange to the properties of exchange. These pertain to arbitrage operations to determine prices, and seigniorage operations to determine means of payment. The secondary questions fall in three broad categories:

1 *Transaction cost*: How are formerly isolated individuals brought together to undertake exchanges? What are the costs of organizing the transactions?
2 *Entrepreneurship*: Why and how intermediaries help settle prices and payments?
3 *Institutions*: Why and how institutions support the process of exchange?

The secondary questions are rather unfamiliar to the prevailing literature. These become pertinent once the fundamental distinction is made between direct and indirect exchange. The crucial distinction is that indirect exchange requires the use of an artificial means of payment. Indirect exchange also makes the presence of intermediation explicit. To clarify this distinction, it is necessary first to articulate the basic concepts of equilibrium.

5.3.3 The Equilibrium Concepts

In a physical mechanism, the concept of equilibrium refers to the state of rest where opposing forces have terminated each other or have become equal in some sense. For a teleological method, the concept refers to a conclusion of an agreement between opposing parties. In consistent economics, all equilibrium conditions refer to agreements among parties to the exchange.

1 Equality of demand and supply for each good to determine quantity;
2 Coincidence of offer and acceptance for each good to determine kind;
3 Equivalence between the two goods that pay for each other to determine prices;
4 Double coincidence between the two goods that pay for each other to determine payments.

5.3.3.1 Determining Quantity

Previous traditions answer the first question by saying that the equality of demand and supply determines the quantity of each good in isolation. However, this condition does not completely determine the size of output, which also depends on the prices and payments, which in turn depend on arbitrage and seigniorage operations. (See Chapter 6: Theory of Value)

5.3.3.2 Determining Kind

The second question is about the composition of output. It cannot be answered without new concepts unknown to previous traditions.

There is a need to formalize a notion of a preference function over different kinds of goods of the same market value, analogous to the utility function over different quantities of goods of the same kind. It involves notions of offer, acceptance and coincidence.

Suppose that A wants to sell 2 apples. He has the option to take any of the several different kinds of goods of the same market value in payment. Suppose that (from B, 3 bananas) or (from C, 4 coconuts) or (from D, 5 donuts) are available in the market against the same good (from A, 2 apples). Agent A as the seller of (2 apples) must accept a payment. It is rational for A to accept the payment that has the highest utility to A. In this sense, an acceptance is the kind of good, which has the highest utility to the seller who accepts the payment. Thus let the available payment set consist of the goods

Seller A's Receivable Payments: $(x_{AA}, x_{BA}, x_{CA}, x_{DA})$

To define Acceptance, let a preference function over the payment set be defined as

$$U^A (x_{AA}, x_{BA}, x_{CA}, x_{DA})$$

The set includes the (2 apples) that A can keep to himself. The rational agent prefers the kind of good with the highest utility to define Acceptance:

Acceptance (i): x_{iA} |max $U^A (x_{AA}, x_{BA}, x_{CA}, x_{DA})$

Likewise, as a buyer, an agent may have a large set of different kinds of good, each of which is acceptable to the seller. Thus suppose that B happens to own several kinds of goods, each of which is acceptable to A against (2 apples). Let us denote these goods by the

Buyer B's Payable Payment Set: $(x_{B\,A}^{1}, x_{B\,A}^{2}, x_{B\,A}^{3}, x_{B\,A}^{4})$

Which one will B offer? It is reasonable to suppose that B will offer the payment to minimize the cost of buying with the good that has the lowest utility to B. Hence we can define Offer as the kind of good that has the minimum utility to the payer out of all equally valued goods:

Offer(j): x_{jA} |min $U^B (x_{B\,A}^{1}, x_{B\,A}^{2}, x_{B\,A}^{3}, x_{B\,A}^{4})$.

Now, to determine the kind of each good in isolation, the convergence of offer and acceptance defines the equilibrium condition in kind:

$$\text{Offer } (x_{jA}) = \text{Acceptance } (x_{iA})$$

$$\min U^B(x_{B\,A}^{1}, x_{B\,A}^{2}, x_{B\,A}^{3}, x_{B\,A}^{4}) = \max U^A(x_{AA}, x_{BA}, x_{CA}, x_{DA})$$

The above may be called single coincidence for a single good. It looks like the maximin-minimax solution in a bargaining game.

5.3.3.3 Determining Price

The third question is about the relation between the quantities, namely, the price. A departure from previous approaches is required to tackle the question. Demand and supply interact only to fix the quantity of each good in isolation, but not their relation (i.e. price). An additional determining condition is required.

The essence of the determining force involves the consistency of the income in the constraints of the demand functions behind the two goods. Thus, B's demand for the 2 apples depends on B's income from the sale of the 3 bananas. On the other side, the demand for the 3 bananas depends on A's income from the sale of 2 apples. In the simplest case of direct exchange, it means that the two goods that pay for each other must be equivalent. It indirectly ensures that the income from sales is equal to the expense on purchases. It directly requires that the value of the sold good is matched by a payment of exactly equal value.

The concept of equivalence is the basis for a theory of price. Something must happen to make the market value of the two goods

equal. The 2 apples must be of the exact market value of the 3 bananas if they are to serve as payments for each other.

Let $v(x_{AB}) = v_{AB}$ be the market value of (x_{AB}) and $v(x_{BA}) = v_{BA}$ be the value of (x_{BA}). Then

Equivalence : $v_{AB} = v_{BA}$

The concept of equivalence may be applied in four different contexts, each with a different set of determining conditions. The four notions are of subjective, objective, competitive, and structural equivalence, each giving a different sense of price.

Subjective price is the rate at which one kind of good is subjectively equivalent to another kind of good. Subjective equivalence is a condition under subsistence, where the same individual undertakes a substitution of different kinds of goods such that at the margin of allocation of productive resources (say labor), the utilities are the same for any given expenditure unit.

We may say that subjective equivalence occurs when the utilities of two goods are equal at the margin of substitution. It is the familiar marginal rate of substitution. For example, in isolation, agent A may get as much utility from 2 apples as from 2 bananas, while agent B may get as much utility from 2 apples as from 4 bananas. The subjective price of an apple in terms of bananas is $[(2/2) = 1]$ to A, but $[(4/2) = 2]$ to B.

The objective price is a ratio of quantities that occurs under barter between two agents. This is an exchange rate to which both agents must agree. This rate must differ from at least one of the subjective prices. An objective price must lie in between the two subjective prices so that at least one agent makes a pure gain of utility through exchange. The issue is: how is the objective price chosen?

Suppose that the difference between the two subjective prices is called a core. The arbitrage operation leads to an arbitrary choice of a point in that core. In an extreme case, agent A might be able to persuade agent B to sell 4 bananas against 2 apples, which allows A to get the largest possible gain while B gets nothing. The other extreme is when A is persuaded to sell 2 apples for just 2 bananas, giving B all the gain, while A gets no gain.

A haggle may find a mutually agreed objective price in between the subjective prices. It is important to connect the term arbitrage to

recognize that price determination is arbitrary within the core. One may postulate various rules of bargaining game and hide the arbitrariness of the price by choosing arbitrary rules of bargaining. But one cannot avoid arbitrariness in bargaining. The essence of arbitrage is its arbitrariness. This is a very open issue. Instability unrelated to tastes, technologies, and endowments may have some causal connection to the alleged arbitrariness of the arbitrageur.

The crucial point to notice is the *divergence between the subjective price and the objective price*. The subjective gain from trade is based on this divergence. It involves a distinction between optimization and entrepreneurship. The subjective price (= marginal rate of substitution) arises under an allocation problem, where the single agent has no freedom to choose a price other than the one implied by the utility function. In contrast, an entrepreneurial freedom allows the arbitrageur to change the price. This is because the entrepreneur has no budget constraint within the core.

This may be explained by describing the arbitrage operation even in the simple case of barter. For example, one may see agent A first as an optimizer and then as an arbitrageur. As an optimizer, A finds that 2 apples are of the same utility as that of 2 bananas. But by virtue of entrepreneurial alertness, he discovers an opportunity to buy 2 apples from himself against 2 bananas, and then sell the 2 apples against 3 bananas from agent B. This act of buying cheap and selling dear is not constrained by a budget. The intention is to achieve a pure arbitrage gain in utility.

Within the core, any arbitrary point may be chosen. Thus A makes no gain at the extreme low end if he can get only 2 bananas for 2 apples, and he gets the largest gain if he can persuade B to give as many as 4 bananas for the 2 apples. B will not give more than 4 bananas, because that will mean losing utility.

The entrepreneurial function is not amenable to optimization. It is because entrepreneurship is free from constraints, and instead leads to changes in constraints of others. This distinction is crucial for progress towards a unified theory of exchange.

Objective equivalence refers to a case of barter or bilateral trade. When more agents enter, there are new complications. For example, 100 agents may have 4950 different barter prices for a pair of goods, but competition must somehow rule out all but one of them. Indeed, the competitive price need not be any of the barter prices. A competitive

price is based on **competitive equivalence**.

Competition allows additional buyers and sellers to enter the market. The result of competition is the narrowing of the core by what may be called competitive blockade. For example, suppose that another agent C enters the market and his subjective equivalence is between 2 apples and 3 bananas. Let us compare the subjective prices to see who can sell and who can buy. Between A and B, A prefers bananas more strongly than B so that A will buy bananas and sell apples. But C is able to sell 2 apples for as low as 3 bananas compared to A's 4 and hence C can block A from selling apples at a price any higher than 3/2 bananas per apple. However, C cannot block B from selling bananas, because B is ready to give as many as 4 bananas for 2 apples while C cannot give any more than 3 bananas for 2 apples.

In short, as more agents enter the market, the one who offers the lowest selling price blocks the others who need a higher selling price. It also means that the buyers who offer the highest price block the other buyers who are unwilling to raise the prices to that level. A competitive price is chosen within the narrowest core; but within that range it is still arbitrary, and based on arbitrage of entrepreneurs.

Structural equivalence takes into account the structural changes in tastes and technologies in a long-term adjustment process. Some apple sellers may leave the market and reallocate resources to produce bananas, if they discover that doing so would give them greater income from their productive factors. In the long run, the price is established partly by optimal reallocations based on changes in tastes and technologies involving all goods, but still leaving room for arbitrage.

5.3.3.4 Determining Pensation

To answer the fourth question about the determination of the relation between the kinds, the notion of double coincidence in kind is needed. This is a very old notion, but it was the most unfortunate orphan in the history of economic concepts. No model of money known to this author recognized double coincidence as a necessary condition for exchange, and hence never found the clue to the pure theory of money. The simple clue is that money is an artifice to create an artificial double coincidence to allow an indirect exchange that cannot occur without money.

It seems that Jevons (1875) made the concept of double coincidence an orphan by saying that money overcomes the inconvenience of barter.

Once people were assured that money would solve the inconvenience of lack of double coincidence, they had no further urge to worry about the notion of double coincidence. Nobody seems to have really bothered to ask how money entered into circulation and exactly how it served its purpose of avoiding the lack of double coincidence.

Conceptually, double coincidence is the statement of the circular consistency of preferences of two agents over the exact same pair of goods. It is an expression of Menger's Dictum. In isolation, one good may have both an offer and an acceptance (= single coincidence), but this condition merely determines the kind of one good. A good that has no offer cannot be exchanged; nor can a good without acceptance be exchanged. But the fact that a good has both offer and acceptance is not enough. If apples are offered against bananas, but accepted not against bananas but against some other kind of good (butternuts?), then exchange cannot occur between apples and bananas. It must be offered and accepted against the same other kind of good. Given the two goods, double coincidence is expressed in the linearly inconsistent reciprocal preference order as follows:

$$\text{Double Coincidence for } (x_{AB}, x_{BA})$$
$$\{U^A(x_{AB}) < U^A(x_{BA}); U^B(x_{AB}) > U^B(x_{BA})\}$$

This sharply contrasts with the concept of Pareto Optimality in allocation. It also looks very different from equivalence. They are shown together below:

Double coincidence : $\{U^A(x_{AB}B) < U^A(x_{BA}); U^B(x_{AB}) > U^B x_{BA})\}$

Pareto Optimality : $\{U^A(x_{AB}) = U^A(x_{BA}); U^B(x_{AB}) = U^B x_{BA})\}$

Equivalence : $\{V^A(x_{AB}) = V^A(x_{BA}) = V^B(x_{AB}) = V^B(x_{BA})\}$

5.3.4 Pareto Optimality Again

Double coincidence fulfills Menger's Dictum that exchange must be gainful in terms of utility to both parties. The limiting case of no gain is not consistent with the presence of transaction costs. Pareto optimality requires that there must be no further gain from the act of exchange. But the world is not rich enough to arrive at this point of futility.

Pareto optimality is the result of an allocation exercise in which there is no entrepreneurial pure gains. It is really not applicable to exchange. If both goods give the same utility, there is no reason why one good

would be sold and the other bought. There would be no pattern of trade, because one could either buy or sell something randomly. In short, Pareto Optimality is not tenable for exchange.

5.3.4.1 Market Value versus Utility

In an exchange, the two goods must be of equal value and yet they are of unequal utility. There is no contradiction in this as soon as one recognizes the entrepreneurial element in exchange. Thus although agent A may think that 2 apple are as good as just 2 bananas, he is not going to oppose B if B decides to give 3 bananas for 2 apples.   From the other side, although B thinks that 2 apples are as good as 4 bananas, she is not going to oppose A if A agrees to take merely 3 bananas in exchange for 2 apples. Both can agree to a value that leaves some net gain in utility. Menger's dictum requires that people sell something of lower utility in order to get something of higher utility. Exchange must be entrepreneurial.

5.3.4.2 The Persistence of Error

The exchange process allows exchanges to leave net profits for sellers, who find buyers willing to pay a price higher than marginal cost. The net profit may not be wiped out because the buyers may never discover that they could bargain the price downward or because others could not discover the opportunity to compete. This of course contradicts the allocation model's prediction that the seller will keep increasing supplies until the marginal cost becomes equal to the price.

The trouble is that the seller is supposed to take the price as given. The entrepreneurial problem is that the price is not given. Once the seller has produced something, he has of course a reserve price equal to marginal cost, but as an entrepreneur he tries to ask for a higher price from weak customers. When the tough customers come, he may indeed sell at cost. But there is nothing to assure that tough customers will come. Errors may persist, so competition may remain forever imperfect.

The remaining challenge is to recognize the arbitrariness of price within a range between the seller's marginal cost and the buyer's marginal benefit. This remains a field for exploration. Over time, all elements of transaction cost and constraints may change. A flexible price may reflect the market reality more accurately than a rigid long-term price under perfect competition.

5.4 Towards Indirect Exchange

To make a transition from direct exchange to an indirect one, the immediate question becomes: why indirect exchange? Why would an agent A sell real good (x_{AB}) for one dollar to agent B and get money, then buy (x_{CA}) worth one dollar with that money from agent C? Why would not the agent A simply sell the good (x_{AB}) directly to the other agent C and pay for the other good (x_{CA}) with it?

If double coincidence were present, A's offer of (x_{AB}) against C's (x_{CA}) would be reciprocated by C's offer of (x_{CA}) against A's (x_{AB}). Pareto Optimality contradicts the above explanation. If Pareto Optimality were correct, the marginal utility of (x_{AB}) and (x_{CA}) would be equal for both agents, because their values are equal (=one dollar) and hence there would be no gain from exchange at all. There would be no justification at all for the hassle of selling (x_{AB}) to some other agent for money and then use the money to pay for (x_{CA}).

Menger's Dictum that exchange must be gainful means that for agent A, the marginal utility of (x_{CA}) must be higher than the marginal utility of (x_{AB}), while it is the opposite for agent C, who takes money in order to pay for (x_{BC}) preferred to both (x_{AB}) and (x_{CA}).

The earlier literature did not discover that a condition of multiple coincidence must be present to permit indirect exchange, by letting the creation of artificial double coincidence.

5.4.1 Multiple Coincidence

Multiple coincidence is defined as the condition

$$\textbf{Offer } (x_i) = \textbf{Acceptance } (x_i) \textbf{ for all i = 1,2,..,n.}$$

Consider the simplest possible indirect exchange $\mathbf{x} = (x_{AB}, x_{BC}, x_{CA})$. In a direct exchange (x_{AB}, x_{BA}) between two agents (A, B) the subscripts of the two goods appear in reverse order (ABǀBA) to indicate direct reciprocity. But in the indirect exchange, there is no direct reciprocity. Each agent sells a good to a second agent and buys a good from a third agent. In the example (x_{AB}, x_{BC}, x_{CA}), agent A sells (x_{AB}) to agent B, but buys (x_{CA}) from agent C; Agent B sells (x_{BC}) to C but buys (x_{AB}) from A; and agent C sells (x_{CA}) to A but buys (x_{BC}) from B. The subscript orders (ABǀBC), (BCǀCA), and (CAǀAB) indicate lack of direct reciprocity in indirect exchange.

However, there is an indirect reciprocity in the orders (AB⏐BC⏐CA), such that for any single agent, the remaining two together have direct reciprocity. Thus, against agent A, the other agents B and C together can resolve (BC⏐CA) into (BA) by striking off C from (BC⏐CA). In practice, this means that agents (B, C) jointly can buy from and sell to agent A, provided that B gives (x_{BC}) to C to compensate for C's delivery of (x_{CA}) to A. The same exercise can be done for any single agent with respect to the rest.

It is possible to reduce all indirect exchanges to the 3-agent case by using the notion of Rest of the World (ROW) such that each individual sells something real to the ROW and buys something real from the ROW, while inside the ROW, the recipient of the real good compensates the supplier of the real good. Thus against agent B, agents (A, C) together constitute the ROW such that A delivers (x_{AB}) to B, against B's delivery of (x_{BC}) to C, being duly compensated by C with (x_{CA}). This possibility rests on the presence of a device to make transfers within the ROW such that the supplier of the real good is compensated by the recipient of the real good. That device is money, which cannot be created unless there is a seigneur to create it.

5.4.2 Payment Circuit

All exchanges must have a payment circuit in the sense that each good in the exchange must be paid for by one other good in the exchange, directly or indirectly. It is called a payment circuit, because the goods can be arranged in a circle such that each good is paid for by one other good, while it pays for a third good.

When each of the several goods has single coincidence, the exchange has multiple coincidence. This fulfills the first two equilibrium conditions, namely, (demand = supply) and (offer = acceptance) for each good. Its presence creates the payment circuit. This circuit is broken if any good lacks either demand or supply, or lacks either offer or acceptance.

The crucial new problem created by indirect exchange may be presented as follows. In the indirect exchange $\mathbf{x} = (x_{AB}, x_{BC}, x_{CA})$, each agent must balance the budget by the equivalence requirement. Agent A sells (x_{AB}) and buys (x_{CA}) and hence these two goods must be of equal value. Again, agent B indirectly pays for (x_{AB}) with (x_{BC}) and hence these goods must also be of equal value. In the end, all three goods in the indirect exchange must of equal value.

The issue is: why would an agent buy something of the same market value as the agent sells, rather than just avoid the hassle of exchange altogether by keeping the good he/she sells? The answer must be that even though the values are equal, the goods are of unequal utility, so that agent A prefers (x_{CA}) to (x_{AB}). In indirect exchange, the problem becomes more complex. Although agent B is able and willing to deliver an equivalent (x_{BC}) to pay for (x_{AB}), agent A must have refused to accept (x_{BC}) and must have preferred (x_{CA}) to (x_{AB}) and (x_{BC}), despite the fact that all three goods are of equal market value.

5.4.2.1 Creating Artificial Double Coincidence

The presence of multiple coincidence provides the basis to create artificial double coincidence. If there is an entrepreneur with seigniorial ability, he can turn a real good or a fiat into money to create the artificial double coincidence. In the cited example, let agent A make an entrepreneurial discovery that it is possible to buy B's good and pay C with that. Although A cannot as a consumer buy B's good (x_{BC}) because he prefers his own good (x_{AB}) to B's good, he can nevertheless buy it not to consume but to use it as a payment for the good he wants, namely (x_{CA}). He must know that C prefers (x_{BC}) to (x_{CA}), but does not accept (x_{AB}) in payment for (x_{CA}), because C prefers his own good (x_{CA}) to A's good (x_{AB}).

In this example, (x_{BC}) has become a commodity money. It is just one step behind becoming a fiat. This is because this commodity, despite being real, is not intended to be consumed and hence its utility does not matter. It might as well have zero utility. Again, since A does not produce it, its marginal cost does not matter to A. It might as well have a zero marginal cost of production (= be a fiat). Theory of intermediation shows that a fiat money reduces transaction below that of a commodity money to render the latter obsolete.

The artificial double coincidence violates the genuine principles of buying and selling by original producers and final consumers. A consumer does not buy anything without an intention to consume it, and certainly does not buy something whose marginal utility is lower than that of the good with which it has to be paid. Yet agent A actually may buy the less preferred good (x_{BC}) and thereby create an artificial double coincidence between (x_{AB}) and (x_{BC}). Similarly, the double coincidence between (x_{BC}) and (x_{CA}) is artificial. The original producer of (x_{BC}) is

agent B, who refuses to sell it against a payment in (x_{CA}) because it is less preferred to (x_{BC}). However, agent A, who is not the producer, agrees to sell (x_{BC}) to C in exchange for (x_{CA}). Here, (x_{BC}) is first bought by someone who does not consume it, and then sold by someone who does not produce it.

> The creation of artificial double coincidence severs the link between price and marginal benefit (=marginal utility measured in numeraire) and between price and marginal cost of the commodity used as money. This may be called seigniorial severance. The arbitrageur also severs the link by arbitrage.

5.4.2.2 Equivalence in Indirect Exchange

The equivalence condition applies to indirect exchange in the same ways as in direct exchange. All goods in the payment circuit must be of equal value. In the three-good example, it must be the case that $v(x_{AB})=v(x_{BC})=v(x_{CA})$ or $(v_{AB} = v_{BC} = v_{CA})$. Now suppose that it is already a monetized economy and hence (x_{BC}) is a fiat money. Even if its marginal cost or marginal utility is zero, it still must have the same value as any other good in the exchange. To agent A, the market value of (x_{AB}) must be the same as that of the money bought with it, which again must be of the same value as that of (x_{CA}) which it buys.

The so-called nominal value of money is derived from the original equivalence of the two real goods between which it serves as an interim payment. To agent A, the value of the sold good (x_{AB}) must be equal to the purchased good (x_{CA}) and hence the money that contains the value in the interim must have the same value.

It is important to realize that money cannot arise if the exchange has only two real goods. In that case, there is either double coincidence in the real good and hence barter occurs. Else, there is no double coincidence and no trade is possible. Thus suppose that Al wants to sell 2 apples for 3 bananas, but Ben wants to sell 3 bananas for 4 candy bars. There is no double coincidence between the apples and bananas. Ben wants to buy something whose supply is missing, while Al wants to sell something whose demand is missing. However, imagine that Cop joins the market and at once wants to sell what Ben wants to buy, and buy what Al wants to sell. Than the payment circuit is complete, there is multiple coincidence, and money can be created and used. Now it is possible for Ben to buy the unwanted apples and sell them to Cop for the candy.

5.4.2.3 Double Coincidence in Indirect Exchange

The creation of artificial double coincidence in indirect exchange occupies the crux of the analysis of payments. As shown later, this requires the use of two special matrices named Wicksell Matrix and Keynes Matrix, derived from the exchange matrix. Its algebraic treatment is to use two equations of equivalence, one of them adding and subtracting zero to allow for injection and withdrawal of money. These will be shown below.

5.5 An Analytical Tool

Once the equilibrium concepts have been formulated, it is time to think about an analytical framework to use those concepts. The neoclassical analytical tool of optimization is simply inherited along with the equilibrium condition for which it was developed: the equality of demand and supply.

For the three other conditions, a new analytical tool may be created from the formal definition of exchange. The main task is to find consistency of choice, as expressed formally by equivalence in quantity and coincidence in kind. The emphasis on the consistency of choice may justify calling this tool by the name of consistency analysis.

How to check for consistency of choice? First, extend the exchange vector into a square matrix. Secondly, articulate the equilibrium condition of equivalence in terms of the symmetry of the matrix. Thirdly, apply a number of simple tricks to impose the condition of double coincidence. The main trick is to transmute kinds into quantities by converting inequalities in the preferences over different kinds of goods into equalities in a formulation of balance of payment.

5.5.1 From Vector to Matrix of Exchange

The first step is to turn the exchange vector into a matrix. One can just add the subsistence output (produced and consumed by the same agent). Thus the barter $\mathbf{x} = (x_{AB}, x_{BA})$ can be expanded by including the subsistence output (x_{AA}) of agent A and (x_{BB}) of agent B. Then for each agent, one row shows the sales, including sale to oneself. The rows together create the matrix. Thus the barter $\mathbf{x} = (x_{AB}, x_{BA})$ is extended as the matrix $\mathbf{X}=$

$$\begin{pmatrix} x_{AA} & x_{AB} \\ x_{BA} & x_{BB} \end{pmatrix}$$

For *n* different kinds of goods, the exchange matrix is simply given by **X**=

$$\begin{pmatrix} x_{11} & x_{12} & x_{13} & . & x_{1n} \\ x_{21} & x_{22} & x_{23} & . & x_{2n} \\ x_{31} & x_{32} & x_{33} & . & x_{3n} \\ . & . & . & . & . \\ x_{n1} & x_{n2} & x_{n3} & . & x_{nn} \end{pmatrix}$$

It is interesting to note that this is a square matrix as a consequence of a trick to combine all sellers of a given kind of good as a sector and to show the purchases for sectors rather than by individual members of the sector. A square matrix has many convenient properties that make the analysis simple.

5.5.2 Imposing equilibrium conditions:

For each element in the matrix, one can simply apply the two conditions of 'micro' equilibrium, namely, (demand = supply) and (offer = acceptance). The complexity comes with the 'macro' conditions that apply to the relations between quantities and between kinds, namely, the equivalence and the double coincidence conditions. They determine certain properties of the matrix.

5.5.2.1 Imposing Equivalence

The equivalence condition may be formally stated as ($v_{AB} = v_{BA}$.) In an exchange matrix where the goods are replaced by their values, this means that the matrix must be symmetric. A matrix is symmetric when the element in the intersection of row A and column B is the same as the element in the intersection of column A and row B. If this holds for every pair of reciprocals (v_{AB}, v_{BA}), the transpose of the matrix is identical with the original matrix. A transpose replaces rows by columns.

Consider a 3-agent exchange **X**

$$\begin{pmatrix} x_{11} & x_{12} & x_{13} \\ x_{21} & x_{22} & x_{23} \\ x_{31} & x_{32} & x_{33} \end{pmatrix}$$

Replacing the quantities by their values, let the value matrix be **V**=

$$\begin{pmatrix} v_{11} & v_{12} & v_{13} \\ v_{21} & v_{22} & v_{23} \\ v_{31} & v_{32} & v_{33} \end{pmatrix}$$

Equivalence means that the following must be true:
($v_{12}= v_{21}$), ($v_{13}= v_{31}$), and ($v_{23}= v_{32}$). If this holds, there are 3 direct exchanges, but no genuine indirect exchange. Ignore the subsistence elements by setting them to zero. The direct exchanges are then

$$\begin{pmatrix} 0 & v_{12} \\ v_{21} & 0 \end{pmatrix} \begin{pmatrix} 0 & v_{13} \\ v_{31} & 0 \end{pmatrix} \begin{pmatrix} 0 & v_{23} \\ v_{32} & 0 \end{pmatrix}$$

However the indirect exchange below does not fulfill the requirement (assuming that $v_{12}>0$, $v_{23}>0$, $v_{31}>0$, while $v_{21}=v_{13}= v_{32}=0$)

$$\begin{pmatrix} 0 & v_{12} & 0 \\ 0 & 0 & v_{23} \\ v_{31} & 0 & 0 \end{pmatrix}$$

Here, agent #1 sells x_{12} to agent #2, but buys nothing back from #2; agent #2 sells x_{23} to agent #3 but buys nothing back from #3; agent #3 sells x_{31} to agent #1 and buys nothing back from #1.

The matrix above is an example of an indirect exchange in which no real good is bartered directly against another real good, and yet each real good ultimately pays for another real good indirectly. This matrix will be called Wicksell Matrix in honor of Knut Wicksell.

To fulfill the equivalence requirement and establish symmetry, transpose the Wicksell Matrix and add it to the original Wicksell Matrix. The transpose of the Wicksell Matrix is

$$\begin{pmatrix} 0 & 0 & v_{31} \\ v_{12} & 0 & 0 \\ 0 & v_{23} & 0 \end{pmatrix}$$

Let this transpose be called the Keynes Matrix. This contains artificial goods (money) of the same value as of the real goods. Let $(v_{12}=m_{21})$, $(v_{31}=m_{13})$ and $(v_{23}=m_{32})$. Then the Keynes Matrix can be rewritten as

$$\begin{pmatrix} 0 & 0 & m_{13} \\ m_{21} & 0 & \\ 0 & m_{32} & 0 \end{pmatrix}$$

Adding Wicksell and Keynes Matrices together gives the matrix

$$\begin{pmatrix} 0 & v_{12} & m_{13} \\ m_{21} & 0 & v_{23} \\ v_{31} & m_{32} & 0 \end{pmatrix}$$

This matrix has equivalence and splits the indirect exchange involving 3 goods into 3 direct exchanges,

$$\begin{pmatrix} 0 & v_{12} \\ m_{21} & 0 \end{pmatrix} \begin{pmatrix} 0 & m_{13} \\ v_{31} & 0 \end{pmatrix} \begin{pmatrix} 0 & v_{23} \\ m_{32} & 0 \end{pmatrix}$$

The important issue here is that in terms of real goods, the symmetry condition does not hold in indirect exchange. The symmetry is hidden by the use of artifices that allow payments to be balanced in money such that the values are equalized, but not in terms of real goods.

Artificial goods not shown in the exchange matrix are inserted into indirect trade to establish equivalence. But this also creates artificial double coincidence. The Keynes Matrix stays hidden and makes it difficult to know what Keynes means.

5.5.2.2 Imposing Double Coincidence

To impose the condition of double coincidence, a series of analytical tricks are needed. At the outset, the trouble is that coincidences (single, double, multiple) are expressions in utilities involving inequalities. For three or more goods, dealing with inequalities becomes an intractable problem. As an exercise in mathematics, it is blocked by Arrow's impossibility of resolving the oddity of the same good being both of a lower and of a higher utility compared to another specified good.

However, it is fortunate that the equivalence condition also implies a balance of payment condition. For the basic three-good indirect exchange given by the Wicksell Matrix, the balance of payment condition is found by adding an extra row and an extra column for the sums of the elements of the columns and the rows. Let the values be normalized by 1. Then the Wicksell Matrix cited before is

$$\begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{pmatrix}$$

Adding the extra row and column for the sums of the columns and rows gives

0	1	0	1
0	0	1	1
1	0	0	1
1	1	1	3

It is clear that each agent here sells (= row sum) as much as each buys (= column sum), thus balancing the budget. And yet the oddity is that against the real good (x_{12}) worth $(v_{12}=1)$, the First agent refuses to take real good (x_{23}) worth $(v_{23}=1=v_{12})$, but instead wants to get real good (x_{31}) worth the same $(v_{12}=v_{31}=1)$. The equality of value hides the inequality of utility derived from them.

The indirectness can be explained only if double coincidence is imposed. Thus even though the fiat money gives zero utility, the First

agent may pretend to prefer the money (m_{21}) to the real good (x_{12}), while the Second agent genuinely prefers real good (x_{12}) to his own good (m_{21}). Notice that the real good (x_{23}) is treated as commodity money (m_{21}), only to be given to the Third agent in payment for the real good (x_{31}). When money is taken from the Second agent, it is (m_{21}), but the same token (or commodity) becomes (m_{13}) when it is given to the Third agent. In case of a commodity money, what is money (m_{21})= (m_{13}) to the First agent is real good (x_{23}) to the original producer (Second agent) and the final consumer (Third agent).

More complications arise when there is a genuine balance of payment problem. Budget surpluses and deficits are balanced by introducing a special kind of real good called bond (store of value). One can preempt the problem by including a bond as a balancing item in the exchange matrix of real goods, and then apply the trick of using money to impose the double coincidence relation.

5.5.3 Deriving Equations of Exchange

By combining the equilibrium conditions of exchange, one can derive the following five equations to summarize consistency analysis.

(1) $v_{AA} = v_{AA}$;   Subsistence

(2) $v_{AB} = v_{BA}$;   Barter

(3) $\Sigma_B\, v_{AB} = \Sigma_B\, v_{BA}$;   Money

(4) $\Sigma_A \Sigma_B\, v_{AB} = \Sigma_A \Sigma_B\, v_{BA}$ Bond

(5) $\Sigma_h \Sigma_A \Sigma_B\, v_{AB} = \Sigma_h\ \Sigma_A \Sigma_B\, v_{BA}$ Liquidity

These equations are discussed in more detail in the remaining chapters. Here is a brief introduction.

Equation (1) collapses the equivalence condition to [consumption = production] condition because the buyer and the seller is one and the same (A=B). However, it is necessary to remember that under subsistence, an agent produces many kinds of goods and consumes them. The basic rules of economic choice under subsistence are made clear with the simplest case of Walrasian general equilibrium with two goods and two factors, giving almost all of prevailing microeconomics.

Next, equation (2) requires double coincidence in real goods. If this condition is met, barter occurs. Indirect exchange involves cases where

barter is ruled out. The equivalence requirement (2) in real output can be violated by the introduction of money, to create artificial equivalence between money and real output, provided that there is multiple coincidence in real goods. That is shown by symmetric budget balance of each agent. That is, equation (3) holds, even though equation (2) is violated, provided that real payments are replaced by artificial payments of the same value.

The algebraic tricks are (first) to define $\beta_{AB} = \beta_{BA} = \min(v_{AB}, v_{BA})$, then (second) to define $\mu_{AB} = (v_{AB} - v_{AB})$, and then (third) to replace (v_{AB}) by (μ_{AB}) and (fourth) to require $\Sigma\mu_{AB} = 0$. The gist of these tricks: replace a real payment by money without affecting budget balance.

Equation (3) is the ordinary budget balance equation for an individual agent. But this can be violated too, by introducing bonds, so that equation (4) still holds. The algebraic trick is to define a non-zero f_{JB} $=(\Sigma_B v_{JB} - \Sigma_B v_{BJ})$ for j= A, B,.. and require $\Sigma_J\, f_{JB} = 0$.

Equation (4) is the starting point of conventional macroeconomics: the national income identity. However, it is not an identity in the exchange model, because it is derived by violating equations (2) and (3). The aggregate demand is made equal to aggregate supply not by accounting, but by market forces through the use of barter, money and bonds.

Aggregate demand cannot be equal to aggregate supply if barter is not possible (= equation 2 fails) and yet there is no money to settle payments for agents who balance their budgets (= equation 3 holds). If the agents do not balance their budgets (= equation 3 fails), and there are no bonds to balance the sum of deficits with the sum of surpluses, aggregate demand cannot be equal to aggregate supply (= equation 4 fails). It means that equilibrium output depends on barter, bonds, and money.

Equation (4) can be violated too, by opening the economy to the rest of the world. One formulation is to restrict each nation to balance its world trade in total, but not with individual countries. That gives rise to the problem of international money. It is also the device to study liquidity, namely, the competitive quality of alternative national currencies.

5.5.4 Intermediation Issues

The formal model captures two of the substantive elements, namely reciprocity and compensation. The element of voluntariness is pushed in

the background to restrict the equilibrium concepts. The intentions of the agents are incorporated in the demand and supply functions.

The element of estrangement requires special treatment. Since the participants in the exchange are strangers, institutions are needed to ensure that they can meet and agree on exchange, with institutional support to the seller to receive payments and to the buyer to get the most preferred good available at a given value. A theory of intermediation can uncover how they meet and agree on exchanges.

5.5.4.1 Intermediation

Indirect exchange requires intermediaries. Indeed, intermediation is required even in barter, where at least one of the agents will act as an intermediary on his own behalf. It has no parallel in allocation. This is found from the distinction between primary and secondary agents.

5.5.4.2 Primary and Secondary Agents

Primary agents are the original producers and the final consumers of the real goods. In a formal model, their decisions may be treated as allocation decisions under given market prices. They are optimizers who maximize utility or profit and minimize costs or disutilities, subject to constraints.

Secondary agents neither produce nor consume, but nonetheless buy and sell. It is not possible to understand their actions as optimizers, because they neither produce nor consume. Their actions must be understood as entrepreneurial, which seek pure profits and bear risks. They change constraints on the primary agents.

There are two types of intermediaries. The first type are the arbiters (=arbitrageurs) who buy and sell without producing and consuming, but settle prices. The second type are seniors (=seigneurs), who do not produce, consume, buy or sell, but lend money, which they create out of nothing. They help settle payments.

5.5.5. Entrepreneurship

Secondary agents are known as entrepreneurs. Their contribution to the intermediation process lies in their ability to cut down transaction costs which the primary agents are unable to reduce. Their activities fall into two categories, one to settle prices and the other to settle payments.

5.5.5.1 Arbitrage

An arbitrageur (arbiter) buys cheap and sells dear and chooses a market price between the marginal cost of the producer and the marginal benefit of the consumer. This choice is arbitrary within boundaries.

5.5.5.2 Seigniorage

Seigneurs (seniors) are intermediaries who use their reputation to organize payments, especially by creating money out of thin air. They also serve as intermediaries of credit.

5.5.6 Transaction Costs

Transaction costs are costs of organizing exchanges, beyond the cost of production. These costs are not under the control of the producer or the consumer. These cannot be optimally chosen. In most cases, the original source of the cost is ignorance or error. Many potential transactions do not take place because people do not recognize the opportunity for gainful exchange. They may not figure out how to create the arrangements, organize the actions, and legitimize the agreements. This job is left to intermediaries, who may discover opportunities to organize and legitimize exchanges.

5.5.6.1 Information

The information on the existence of opportunities do not already exist and there is no way to search for them. This is frequently mistaken for existing information products. (See Kirzner 1979)

5.5.6.2 Organization

Some entrepreneurs may discover ways of creating firms to internalize economies of scale and scope. (See Coase 1988)

5.5.6.3 Innovation

Innovations make it possible to do things that were impossible before. This includes invention of new or improved products, processes, or arrangements. (See Schumpeter 1911)

5.5.6.4 Legitimacy

Some people are able to find ways to legitimize businesses that were

not legitimate before. Indeed, exchange for profit was considered absolutely illegitimate and even inhuman by cultures and politics before the rise of exchange. Even today, many trades are banned, restricted, or opposed on political or cultural grounds.

5.5.7 Institutions

The market cannot serve as a device to allow people to make profitable agreements without institutions to support them. The seller must have a right to receive a payment. The buyer must have a right to get the most preferred good at the given price. The intermediaries must have the right to do what they do. Society must create and enforce these rights.

6. VALUE

6.1 The Law of Value

The task of the theory of value is to explain how the law of value works, so that the seller is enabled to receive a payment of the same value as that of the good sold by the seller. It is the study of prices and outputs per period of production.

The market value [v=p*q] of an object of exchange is a quantity counted in a synthetic unit of accounting. It is a physical quantity q multiplied by a nominal price p, where the nominal price is the number of units of a reference good. The theory of value must explain both the quantity of output and the price.

The allocation model provides sound theoretical analysis of the determination of demand and supply at the individual level. It must assume given prices and incomes (or endowments) and apply the equilibrium condition demand = supply to determine output

Previous paradigms supposed that the equality of demand and supply would also determine the price. Unable to accept this view, consistent economics conducts a fresh investigation and finds three major issues in which new concepts are used to reach new conclusions. These issues are: (1) price determination, (2) output decomposition, and (3) profit and loss in equilibrium.

6.1.1 Theory of Price

The equality of demand and supply determines the quantity, but not the price. To determine price, the equivalence condition is applied to impose the income/endowments restrictions on top of the [demand = supply] condition. The price-setting process requires arbitrage and allows the price to leave room for positive profit for the seller and positive benefit (utility gains) for the buyer. It allows an equilibrium in which

marginal cost < price < marginal benefit

6.1.2 Decomposition of Aggregate Output

The equality of aggregate demand and aggregate supply is derived in successive steps. It begins with (1) the equality of values for each transaction, then moves to (2) the budget balance of each agent or sector through the use of money, and lastly looks at (3) the overall budget balance of all sectors through the use of money and bonds to exchange current surpluses over current expenses. This means that aggregate output depends on the structure of payment including money and bonds.

6.1.3 Measuring Profit and Loss

The formulation of the market equilibrium must leave room for positive profits and risks of loss due to any failure in trade. This part affects the analysis of the equilibrium between investments and savings in a dynamic setting. This is built on the concept of market price set by entrepreneurs who bear risks and attempt to get a profitable price.

6.2 Theory of Output (or Income)

The task of the theory of output is to describe and explain how the quantity of output is determined. Prevailing microeconomics provides a solid theory of the determination of output at the micro level. The gist: the quantity of output is determined by the equality of demand and supply.

However, the individual demands and supplies themselves depend on the prices and incomes (or factor endowments). The market equilibrium must determine the quantities, prices, and incomes together. The allocation model cannot put incomes, prices, and quantities together as endogenous variables. The level of aggregate output cannot be determined without considering these factors.

The issues may be clarified by considering the determination of output under autarky and then introduce direct and indirect exchange to see how the equilibrium configuration changes.

6.2.1 Output under Subsistence

Chapter 4 has shown that under subsistence, output is determined by the equilibrium condition where [consumption=production]. It occurs at a level of output where the marginal rate of substitution in consumption is equal to the marginal rate of substitution in production. By simple addition of individual output, once can get aggregate output. There is no need for a separate macroeconomics under subsistence.

6.2.2 Output under Trade

It is important to recognize that the presence of agreements, various means of payments, and of intermediaries under trade gives rise to economic phenomena that cannot occur under subsistence. They include involuntary unemployment, undue instability driven by prices and payments, and unintended debt, all with impact on output. None of these phenomena can be visualized at the individual level under subsistence. Had these phenomena been tractable at the individual level, there would be no need for macroeconomics.

Consider barter between Crusoe and Defoe. Using the notation for exchanged goods, let x_{CD} be the quantity of fruits sold by Crusoe to Defoe, x_{DC} be the quantity of grains sold by Defoe to Crusoe. Let x_{CC} and x_{DD} stand for the subsistence output of fruits and grains produced and consumed by Crusoe and Defoe respectively. Then the output under barter can be described by the matrix

$$\begin{pmatrix} x_{CC} & x_{CD} \\ x_{DC} & x_{DD} \end{pmatrix}$$

Would the bartered output (x_{CD}, x_{DC}) be produced under subsistence? There are two parts to the answer.
- The first is allocational efficiency.
- The second is the expansion of capacity utilization.

6.2.2.1 Allocational Efficiency:

If there was no trade, Crusoe could not buy x_{DC} of grains from Defoe, and would have to produce grains himself. He would have to reduce the output of fruits to release inputs from the production of fruit to the production of grains. For approximate measurement, we may suppose that Crusoe would reduce fruit output by the amount x_{CD}, and keep the output of fruits at x_{CC}. The graph below shows that there is a deadweight loss of output measured in G equal to (G_c-G^*). Crusoe would reduce fruit output to F_a, which is smaller by (F_a-F_c) than x_{CD}. A large part of the output (F_b-F_a) would not be produced.

Figure-15: Gains from trade

The important point is that Crusoe can produce merely (G^*-G_b) by reallocation of factors with net loss of grain output measured by (G_c-G^*). Thus, output under trade is larger than under subsistence owing to greater allocational efficiency.

6.2.2.2 Expansion of Capacity Utilization

The much larger impact of trade on output occurs by way of an expansion of capacity utilization. This includes bringing under use formerly unused natural and human resources. However, we have not found a neat formal analysis to measure this impact in the abstract. It shows up in comparative statistics on output before and after trade.

In the post-industrial economy, output is largely dominated by services. Most services are by their very nature tailored to serve customers, and are rarely open to consumption by the service provider. It is difficult, for example, to see how a receptionist or neurosurgeon or journalist or consultant or a commercial pilot or a teacher or entertainer can use much of the service for one's own consumption.

Most individuals in the post-industrial economy no longer possess the natural resources to produce food or other material things. It then becomes clear how a high degree of professional specialization creates the preconditions for involuntary unemployment.

Under autarky, involuntary unemployment is absent Indeed, people in subsistence economies cannot even imagine such a situation and would not have a term for it. (See Wasow 1976). The previous literature on unemployment did not see this structural factor. Say's Law implicitly presumes that what cannot be sold is consumed by the producer. Unemployment occurs if what cannot be sold, cannot be produced.

6.2.2.3 Output under Indirect Trade

Under indirect trade, money is necessary to enable buyers to pay the sellers, as explained in the next chapter. The presence or absence of money affects the demands through the effects on the ability to pay. A decomposition of output according to the means of payment reveals how the level of output depends on the structure of payments. (See the next chapter).

6.3 Theory of Price

Consistent economics cannot accept the view that the equality of demand and supply determines the market price. This condition determines only the quantity of output, but not the price. Price is determined by the equivalence condition.

Consistent economics imposes the balance of payment constraints through the equivalence condition. In its simplest form, the market value of the two bartered goods must be equal. Thus if Crusoe and Defoe barter $\mathbf{x} = (x_{CD}, x_{DC})$, the value of x_{CD} must be equal to the value of x_{DC}. Let p_C and p_D be the nominal prices of fruits and grains. Then the equivalence condition is

$$[\mathbf{p}_C * \mathbf{x}_{CD} \ = \ \mathbf{p}_D * \mathbf{x}_{DC}] \ \textit{[Equivalence Condition]}$$

The accounting is simple. The ratio of prices is the same as the ratio of physical quantities of two goods of equal value. Thus if 2 baskets of fruits have the same value as 3 bags of grains, the price of one basket of fruit must be equal to 3/2 bags of grains.

The theoretical problem is to describe and explain the process that brings about this equivalence. For this purpose, theory of intermediation is needed to provide an account of the arbitrage operation to settle market prices. Since the arbitrage process is entrepreneurial, the theory of market price must differ from the theory of autarkic shadow price.

The shadow price simply reflects the marginal rate of substitution in consumption between products to a given singular individual, but an entrepreneurial market price reflects the arbitrary selection of a price that leaves pure gains for one or both parties to the trade.

The presence of pure gains means that the market price does not reflect the marginal rate of substitution of one or the other trader. In general, the seller's marginal disutility or marginal cost must be lower than the market price, while the buyer's marginal benefit measured in the same numeraire units must be higher than the market price.

6.3.1 Price under subsistence

The formal model of output determination seems to be the same as in traditional presentations, because the equilibrium condition looks identical. The visible difference is seen in the analysis of price determination. The equilibrium condition for price is different under trade than under subsistence.

The marginal rate of substitution (the ratio of marginal utilities), is the determinant of subjective price under subsistence. It is the rate at which the quantity of one kind of good can be converted into another kind to attain equivalence in utility. Suppose that at the margin of consumption, Crusoe gets equal utility from either 2 apples or 2 bananas. The ratio of marginal utilities gives the ratio of subjective prices. In the example, the subjective price of 1 apple is 1 banana for Crusoe. However, for Defoe, 2 apples may yield as much utility as 4 bananas do. Hence the subjective price of 1 apple to Defoe is 2 bananas.

6.3.2 Price under barter

The concept of equivalence under barter is that of objective equivalence. It is necessarily different from subjective equivalence. Objective equivalence is the result of an agreement between two agents who decide the rate at which one kind of good is of equal market value of another kind of good. The term objective is not intended to denote a physically observed element: it is merely a way to distinguish the agreed price from the subjective price.

In isolation, Crusoe regards 1 apple to be as useful as 1 banana, but Defoe regards 1 apple as worth 2 bananas. They may mutually agree that 1 apple is as valuable as 1½ bananas. The objective equivalence of 1 apple with 1½ bananas differs from the subjective equivalence for both Crusoe and Defoe.

Let U be utility while V is the market value. Then the difference between subjective equivalence and objective equivalence may be expressed as follows:

$$U^{Crusoe} \text{ (2 apples)} = U^{Crusoe} \text{ (2 bananas)}$$
$$U^{Defoe} \text{ (2 apples)} = U^{Defoe} \text{ (4 bananas)}$$
$$V^{Both} \text{ (2 apples)} = V^{Both} \text{ (3 bananas)}$$

Let x_{CD} = 2 apples, x_{DC} = 3 bananas. Crusoe gets more utility from 3 bananas than from 2 apples, while Defoe gets less utility from 3 bananas than from 2 apples. The divergence between subjective and objective values is expressed as follows:

$$U^{Crusoe}(x_{CD}) < U^{Crusoe}(x_{DC})$$
$$U^{Defoe}(x_{CD}) > U^{Defoe}(x_{DC})$$
$$V^{Both}(x_{CD}) = V^{Both}(x_{DC})$$

The divergence between marginal utility and market price is necessary to make trade gainful. The market price is higher than the seller's subjective price, but lower than the buyer's subjective price. The notion of circular consistency explains how different people may have different orders of preference over the same pair of goods and yet manage to agree on a common rate of exchange.

6.3.2.1 Arbitrage

There is no entrepreneurship under allocation. The preferences give the marginal rate of substitution, which is the subjective price. But in an exchange the agents must act entrepreneurially to arrive at an agreed price that leaves net pure gains for each.

Economists have done some work in game theory to understand the process of bargaining (See Dixit and Nalebuff 1991, Fudenberg and Tirole 1995). Others have done useful work on the subject of negotiation. (Cohen 2002) In a barter, the agents must haggle (=bargain, negotiate) to discover the bargains. The central theme of arbitrage is that it is arbitrary within a range.

It may seem unsatisfactory that the market price is set arbitrarily between the marginal rates of substitution of the seller and the buyer. Thus in the example cited above, the marginal rate of substitution between bananas and apples is (2/2)=1 for Crusoe and (4/2)=2 for Defoe. It was observed that they agreed on an exchange rate of (3/2). There is no *a priori* reason why the market price would be 3/2 bananas per apple. It could be anything bigger than 1 and smaller than 2, including the limiting cases. Let (U_a, U_b) be the marginal utility of (apple, banana) and (p_a, p_b) be their nominal prices. Then the most that can be said about the objective price in barter between bananas and apples is that it will be

$$(U_b/U_a)^{Crusoe} > p_b/p_a > (U_b/U_a)^{Defoe} \text{ [Arbitraged price]}$$

6.3.3 Price under Indirect Exchange

In an indirect exchange, there are three or more agents involved in the trade. The role of the intermediary is visible. The notion of competitive equivalence allows the analyst to see a process of competition to determine the price.

The essence of competition is that it changes the range of arbitrage. The seller who asks for the lowest price blocks other sellers who ask a higher price. The buyer who bids the highest price blocks the other buyers who would pay a lower price. As more and more agents enter the market, the range between the lowest offer from sellers and the highest bid from buyers may change. There is no *a priori* ground to say if the range of arbitration will become wider or narrower. The common belief is that it will become narrower.

As demand grows, the buyers may compete to raise the price. As supply grows, sellers may compete to reduce the price. Again, there is no a priori ground to predict how the competitive price will change. If one can describe the various changes in demands and supplies, one may have a sharper view of the range of arbitrage.

The crux of the problem of price determination is the arbitrage process. A theory of undue instability in the market (fluctuations, business cycle) must ultimately be based on the inherent freedom of the entrepreneurs to change prices, especially that for the use of fiat money and capital.

Price is not indeterminate, it is only economic theory that may not have discovered a simple formula for setting entrepreneurial prices. There is much to learn about the arbitrage and competition process and the various pricing strategies used by traders to get a better sense of price formation.

6.4 Value over Time

The passage of time sees changes in technologies and factor endowments. The economy undergoes structural change and may achieve output growth through increased factor productivity and growth of reproducible factors (population, capital). The allocation model cannot fully grasp the process of change, because it cannot handle entrepreneurship behind growth in productivity and accumulation. Let us briefly look at two issues that have generated much debate on account of not seeing the entrepreneurial matters.

6.4.1 Savings and Instability of Output

People may prefer to save today and consume tomorrow. One may sell today and buy tomorrow, or lend today and get repayment tomorrow. The key new element is waiting. The lender agrees to wait and requires an interest to compensate for the waiting. The borrower cannot wait and agrees to consume now at the expense of not consuming in the future, essentially buying the waiting of someone else. The future good is sold now at a discount.

As such, the presence of interest and discount makes no essential difference in analysis. Just like any other good, the demand and supply of stores of value must be equal in equilibrium. Arbitrageurs can settle the prices (= real interest rate) of stores of value to establish equilibrium between savings and investments, or between lending and borrowing.

The trouble arises with the bond. It is a store of value sold by one and bought by another, while a subsistence agent stores real goods called assets. Buying and selling of stores of value cannot give rise to any special problem. But one may try to link instability in output with the storage of value. After careful scrutiny, one discovers that instability cannot occur as a result of mishaps with storage of real capital, but as a result of misuse of fiat money.

One may suppose that there is no interest rate at which the demands and supplies of bonds can be equal. One then sees a liquidity trap. Yet the key is quite simple. So far as value is concerned, the store of value should be treated just like any other good. A savings-investment disequilibrium cannot be sustained, because arbitrageurs can change the interest rate to clear the credit market. The period of adjustment must be long enough to permit the clearing.

The problem of instability has its origins in the issuance of fiat money as means of payment, and has no essential relation to the demand for and supply of bonds as stores of value. Bankers may create too much fiat and lend to risky borrowers, who are persuaded to borrow much in excess of their ability to use the credit productively.

Indeed, many borrowers are pushed to engage in speculation with the available funds. When the bubble bursts the banker panics, and the supply of fiat money contracts.

The instability of supply of fiat money happens without any necessary relation to the underlying preferences, perceptions, expectations, technologies, endowments, or productivities. It has little to do with real capital.

It is true that real capital goods do undergo wear and tear if they lie unused for a while, but this cannot cause economy-wide instability. Real capital can not be created or destroyed in a hurry like fiat money.

Instability is generated by hasty creation and destruction of fiat money, and it does affect real output and prices. The prices are set by an arbitrage process, which is able to change prices almost instantly, arbitrarily, and without any change in real output. A flood of fiat money may occur even when there has been no increase in real output. This then pushes the prices up fast. Fiat may be destroyed just as fast. It can bring depression without any actual reduction in productivity or demand.

The complication from entrepreneurship arises from two directions. Innovations by arbitrageurs may raise productivity of capital or indeed turn hitherto unproductive objects into productive ones. It may involve creative destruction, by making some factors obsolete. It changes the optimal allocation. It changes the relative prices. Can it be large enough to destabilize the economy? This is an empirical question.

The seigniorial ability to create fiat money out of thin air is the principal source of inflationary instability. The quick destruction of fiat is responsible for large shocks to the economy through a sudden drying up of liquid means of payment.

Business cycle theory needs to separate the real capital from the fiat money, and discover the manner in which instability is propagated. The

key to this discovery is the visualization of the payment circuits, as explained in Chapter 7 next.

6.4.2 Economic Development

Another area subject to somewhat milder controversy is that of economic development. It is at heart a matter of value, mainly output. It has been seen as a matter of allocation only, and then within narrow confines. To make progress, three extensions are necessary. They involve:

- More subjectivism: the discovery of new knowledge, the waiting, and the expectations.
- A more comprehensive approach to allocation.
- The means of payment including fiat money and real credit.

6.4.2.1 Knowledge Gives Power

A subjective approach is necessary to discover the reason why humans develop what was hitherto undeveloped. They put to use something that was not used previously. They make more productive use of things that were used less productively before. This cannot happen without new knowledge, whose application appears as an innovation.

If one takes an objective approach, one looks at the stock of endowment of productive factors and inevitably sees the necessity of natural resources. Then one is compelled to look for natural laws (=mechanisms) to find a cause of development in some natural process. The objective approach, as found in the Malthusian theory of population, is doomed to failure on epistemic grounds. It is looking for something that does not exist (e.g. mechanism), and it is not looking for what exists (e.g. rational choice, creative freedom of choice).

Consider the following **transitions,** each qualified as an episode of development:

- from natural forager economy to the pastoral,
- from pastoral to (traditional) agrarian;
- from agrarian to (modern) industrial; and
- from industrial to post-industrial information economy.

For each transition, some new knowledge is both necessary and sufficient. The natural economy of the foragers (=gatherers and hunters) offers the smallest possible output per person. Humans are already more advanced than their primate cousins in the natural economy, by virtue of their ability to make tools and use the energy of fire. But it is biological, and not economic development.

When they discovered that they could keep cattle and poultry to produce food for them far in excess of what would be forthcoming naturally, they made the first transition to the pastoral economy. They were now able to use hitherto unused grasslands, and get much enlarged supplies of meat, milk, egg, blood and even usable hides. Other primates simply never got the idea.

The second transition is from the pastoral to the agrarian. Already in the later stage of the pastoral economy, people must have made much greater use of fire to roast meat. The regular use of fire was a precondition to discover pottery, without which the transition to agriculture would be impossible. Humans are large-bodied animals that in a state of nature simply cannot take small grains as a regular source of food, especially if the grains are not readily edible. Knowledge of fire, pottery, and cooking was necessary to make the transition to grain consumption and production.

Seemingly, a primitive type of horticulture was invented by pastoral women, who were now less mobile than in forager eras. This was a new knowledge essential for the transition to agriculture. The floodplains had formerly not been used by humans, but they now became their chosen habitat.

The transition to agriculture completely severed the nomadic past from the sedentary life. People now must make houses and granaries, and raise standing armies to defend the crop land, the cattle, and granaries. It was a massive revolution with an explosion of new innovations in every field of human endeavor.

The next transition is to modern industrialization. Traditional agrarian economy already has industry, but it uses manual energy of man and beast. It uses simple manual tools. Modern industry uses natural energy to run complex machines. Modern industry is based on the use of natural energies that were not used before. Without the knowledge to make machines and harness natural energies, this transition could not occur.

The next transition is underway in the developed nations. In it, machines are run by other machines or mostly, by themselves, so that no human operator is needed. This comes from an explosion of knowledge about automation, which is linked to the use of 'information' in a mechanical sense.

The key theme is that in each transition, the driving force is new knowledge. It is embodied in two forms of capital. The human capital absorbs new knowledge to become more skilled. The physical capital absorbs new knowledge through new designs of machines and tools and methods.

None of the transitions are linked to natural resource. Indeed, one must agree that the stock of natural resource on a global scale is pretty much a constant throughout the several transitions. The change in human knowledge enables them to use hitherto unused resources. Without new knowledge, natural resources other than readily edible food are useless.

In each case, knowledge is both necessary and sufficient to lead to the transition. Knowledge that lets one increase value cannot be rationally wasted. That is why it is sufficient to entail transitions.

The objectivist approach does not see the necessary and sufficient role of new knowledge. It therefore cannot figure out why humans become richer and richer without any real increase in natural resources.

The principal source of the trouble in the objectivist approach may be called the fallacy of unreachable boundary. The objectivist approach thinks that natural resources are necessary to produce material goods, and that the stock of such resources is fixed. It therefore worries that humans will be unable to produce more than what the available stock of natural resources can support. It finds that development is stalled at the boundary of natural resources.

The reality is that human beings use reason to avoid having to reach the boundary. So far, natural resource has not been a constraint. There is no reason to believe that it will ever become a constraint. Indeed, the post-industrial economy is already in retreat from the boundary, because natural resource has a negative impact on growth.

The first retreat from the boundary occurs by way of attaching a scarcity premium. For example, the planet has a small quantity of gold and it is simply not possible for every human to have a large amount of gold. But the market economy attaches a higher price to a more scarce object. The price of gold is so high that most people can simply live without it.

The point is not that gold is unnecessary, but that the necessity is curtailed by a rational approach to limit its use to avoid hitting the boundary. Virtually everything has a substitute. The humans are out to find them, and thus avoid hitting the boundary of any particular kind of natural resource.

One may point to the necessity of food. Surely, people cannot stay alive without food. The answer is that the available cultivable land is able to feed as many as 60 billion people, 10 times the current population, provided that the best practice is used.

In reality, less than half of the perfectly cultivable land is in use, and less than one-third of the land in use employs best practice. There is simply no chance that the human population will ever reach anywhere near 60 billion. Indeed, they may never reach even 15 billion. The reason again is that industrial development compels people to raise fewer children than in the agrarian economy.

The evidence is crystal clear: every developed country, without exception, has a fertility rate below replacement (See Chesnais 1992) With economic development, the developing nations must inevitably reduce fertility. The cost of raising children with skills necessary for their employment in post-industrial society compels low fertility.

The objectivist approach also fails to ponder the mystery of life. Without a natural abundance of air, water, and food, animals that must have these elements could not evolve and survive at all. One also must look at the natural reproductive strategy. The large bodied animals use the strategy of raising a few long-lived large-sized offspring while the small bodied creatures lay large number of eggs for small-sized short-lived ones.

The so-called k-strategy of reproduction of a small number of children is a clear natural mechanism to retreat from the boundary. Added to this is human reason. The natural human fertility rate is about 12.4 children per mother. Long before modern contraceptives were available, human fertility was less than 1/3 to ½ of the natural fertility. (See Chesnais 1992). With modern contraception, people are reducing fertility rates below replacement.

Although it is natural for agrarian and pre-agrarian communities to have both high fertility and high mortality, the rapid spread of antibiotics etc has suddenly reduced mortality and led to very fast expansion of population. But the retreat is already at work. Developing nations are showing spectacularly rapid declines in fertility. Singapore achieved a fertility reduction in 30 years which France took more than 230 years to achieve. Even Bangladesh has achieved a very fast decline, despite being a rural country.

Parity-specific birth control is ordinarily irrational under traditional agriculture. In such an economy, the cost of raising a human child is not

much more than the cost of raising a calf. Given the high mortality rate, a low fertility would lead to extinction. In short, there is a rational approach to prevent an animal population from hitting the boundary.

Among humans, there is conscious cultural process to avoid hitting the boundary. Economic processes reinforce the cultural forces of retreat. Urban dwellers actually violate religious codes to adopt birth control measures.

The irrelevance of natural resource is an analytical proposition. Unless it becomes a constraint, it is irrelevant in a theory of development. However, the somewhat pervert case of natural resource becoming an impediment to growth must be explained. This is a special case only for post-industrial economy.

The cost of labor is very high in a post-industrial economy. It is dominated by an immense variety of services. Most material production is done by automated machines of enormous productivity. In this situation, the collection of natural resources scattered far away from each other imposes a labor cost so high that it actually reduces the value of total output.

Consider a very simple example even from a pre-industrial economy like Bangladesh. A small sample taken by this author in 2000 showed that fisherman use natural resource of the Titas river to earn about 55 taka a day, while the same person could earn as much as 115 taka a day by giving rickshaw rides to city folks in the nearby city. Urban buyers tend to arrive at the fish market in rickshaws, and take a rickshaw ride back home. If they wanted, they could walk to and from the bazaar and spend the same money to buy more fish, but they ride the rickshaw.

In this case, the allocation of labor to the gathering of natural resource (=fishing) imposes a net loss of productivity compared to the alternative use of the labor in providing services (=driving rickshaws). An objectivist disregards human preferences and thinks about the natural need to eat fish rather than waste income on frivolous rickshaw rides.

6.4.2.2 Waiting

The next subjective element in the development process involves waiting. It is the foundation of capital accumulation. People may decide to work today, but not consume the output. One waits by building human and physical capital. The fisherman may spend time making a net. An urban clerk's son may spend a decade or more to learn skills before joining the labor force. The objectivist approach ignores this waiting. It instead complains that people are destroying the future by overconsuming now.

Capital is a reproduced means of production by virtue of waiting. The objectivist view overlooks this essential factor. Instead, it wants to see natural resource, which is irrelevant. The emphasis has moved away from the verb 'invest' to the verb 'sustain'.

The element of expectation is crucial in organizing a reallocation of labor and capital. The fisherman eventually discovers an opportunity to use labor to drive a rickshaw for higher income. He overcomes the resistance of tradition, gives up the ancestral profession and abode to go to the town to become a rickshaw driver. This cannot happen if one does not expect the demand for rickshaw rides to persist. Expectation affects the waiting behind the capital formation.

6.4.2.3 Economic Development under Autarky

A comprehensive approach to allocation is necessary to reveal the many dimensions of the development process. It is not helpful to have one set of models to explain industrialization (Lewis 1954, Ranis and Fei 1961), another set to explain demographic transition (Becker and Lewis 1973), a third for migration to cities (Harris and Todaro 1970), a fourth to explain greater investment in human capital (Becker and Barro 1988) and so on. All of these are integral parts of the same single event. They must be treated together, in a general equilibrium framework.

There is a simple way to do it according to the standard textbook model of allocation in a general equilibrium. For simplicity, it is a two-good two-factor two-period model. This exercise was part of the author's doctoral dissertation at New York University.

Suppose that there is a single subsistence household. It has two factors (Low-skill labor L, High-skill labor H) to produce two goods (Rural good R, Urban good U). The current generation of the adults reproduce themselves through their children. They consume the current output R and U. Thus the goods reproduce the factors, which then produce the goods.

Suppose that all prices are measured in units of the rural good R. Then the price ratio $[p_U/p_R]$ governs the optimal allocation from both production and consumption sides. Since the household decides both of these, there is no severance of the relation between prices, marginal costs

and marginal benefits. The household consumes R and U such that $[\mu_U/\mu_R] = [p_U/p_R]$ where μ is marginal utility. From the production side, the household minimizes cost. This occurs when $[\chi_U/\chi_R] = [p_U/p_R]$ where χ is marginal cost.

The marginal cost in turn is split into the marginal cost of each factor, which is equated with the factor prices $[w_L, w_H]$. The factor price is equated with the marginal product of the factor measured in R.

To generate economic development in a model as simple as this, just a single trick is necessary. Define economic development as a sustained rise in the real wage rate. Assume that physical capital is complementary to human capital (=there is a fixed ratio at which workers are equipped with capital). Include the cost of physical capital in the cost of labor. Then assume that high-skill labor H is more productive than low-skill labor L. Let α be a parameter of skill, and let $H = \alpha L$ such that $\alpha > 1$.

Assume that for unexplained reasons, there is new knowledge that makes labor more productive. This happens as the worker trains to gain a more productive skill and/or makes capital goods that helps him become more productive. Thus by an external shock, let there be a positive change $d\alpha > 0$.

The analytical job is to check the effect of this change $d\alpha > 0$ on all the optimally chosen quantities. The readers may check any standard textbook to see how the general equilibrium model of trade uses first and second order conditions to derive theorems known as Stolper-Samuelson Theorem and Rybczynski Theorem.

The economic interpretation is as follows: The ratio of product prices determine not just the structure of consumption and production given by the ratio U/R, but also the factor proportions (H/L). Let the factor be allocated to R and U such that $[H_R + H_U = H^0]$ and $[L_R + L_U = L^0]$. Here, the subscript shows the sector and the superscript shows the period of endowment.

Now, suppose that the urban good uses H more intensively than it uses L, so that $[(H_U/L_U) > (H_R/L_R)]$. An increase in the skill parameters works its way to change the optimal choices as follows. As the skilled worker's productivity goes up, the value of marginal product of skilled labor goes up. This makes it profitable to increase the output of the urban good relative to the rural good, because the higher factor intensity of H in the production of U means that the U sector gets a greater increase in productivity.

In equilibrium, the real wage is equal to the value of marginal product. As a result, the wage rate of H goes up, $dw_H > 0$. A sustained increase in dw_H means economic development. Notice that the rural sector also experiences productivity growth so far as it also uses H. But it uses H less intensively and hence sees a smaller relative gain in productivity.

The rise in the real wage of H means that in the new equilibrium the household reproduces relatively more H. Since the budget to spend on child raising is fixed, an increase in the size of H must come at the expense of L. Again, due to higher H-intensity of the urban sector, an increase in the U sector increases the demand for H more than proportionately. Because the unit cost of H is higher than that of L, the increase in H means a more than proportionate decrease in L. That is demographic transition.

The end result is that the U sector expands relative to the R sector, $d(U/R) > 0$. This is urbanization. But the urban sector uses H more intensively. This means an increase in human capital (more skilled labor), $d(H/L) > 0$. This also means a migration of labor from the rural to the urban sector.

The new higher real wage is sustained by a simultaneous increase in both labor productivity and the cost of raising labor. The demographic transition occurs because the cost of raising one additional H is more than the cost of raising L, that is, the total number of children per household falls.

This exercise is strictly within neoclassical allocation. Indeed, it is simply an interpretation of the standard textbook model of trade with two goods, two products and two periods. And yet it is quite a puzzle that many authors felt the need to build extremely complex models to explain just a part of the picture. The following comment is therefore methodological: it is about the danger of using partial equilibrium.

First, consider the set up of the model. Parents and children together consume the entire current output. There is no need to worry about the utility the children get from their consumption separately from the utility the parents get. It is the utility of the whole family.

There have been a great number of attempts to figure out the issue of altruism of parents. This is all unnecessary. Parents of course love their children, raise them, and leave bequests. Our model assumes that the consumption of the parents is a part of the cost of raising the children (= parents are just babysitters). The other part is the consumption that goes to the children. But it is not useful to separate them.

Secondly, the parent dies at the end of the period, and the children are the adults of the next period. There is no need to worry about overlapping generations. The simple issue is one of reproduction of labor. It is pointless to worry how children repay their parents, because children do not repay their parents - they raise their own children.

Next, the investment in human capital is not a joke or an accident, as many authors make it out to be. More productive children cannot be raised without increasing the marginal cost of children. Malthusian population theory fails because it just does not study the issue of cost of raising children. The idea that parents raise too many children is simply irrational. Factually, Malthus knew that urban parents raised fewer children than the rural ones. It is a result of cost. Raising H is so costly for urban parents that they simply cannot afford to raise many.

Malthus thought that a shortage of food would lead people to cut down the number of children. In reality, it is the shortage of income. Urban people get incomes from non-food output. Urban parents have no trouble feeding a far larger number of children than they raise. But they are unable to spend the time it takes to raise them and educate them in a proper environment.

Malthus did not see why an increase in arable land led to an increase in the population. The problem is that without a change in technology, there is no change in the factor proportion (H/L) and hence no change in the ratio of marginal costs. If rural parents have more land, they need more workers, because they use the same old technology.

Malthus imagined that the same number of peasants could cultivate a larger amount of land and raise real wage. It is not possible. As the marginal cost of reproduction of labor remains the same, an increase in demand for labor is met with an increased supply of labor, without a change in the real wage rate. If the marginal cost of labor is constant, the price of labor (real wage rate) cannot change

In our model, the higher real wage is sustained by a higher cost of raising skilled workers on the supply side and a higher marginal value product on the demand side.

Malthus did not see the root of hunger. Even today, the world uses less than half of the perfectly cultivable land, which is too much compared to the need. There is overproduction of food to the extent that the real price of food has been falling ever since the beginning of industrial revolution. This means low real wage for farm workers, so low that they cannot retain their food output, because they must buy industrial and service sector goods to survive.

Indeed, 92% of the hungry people are food producers, according to an IFAD Survey of 114 countries. (Jazairy et al 1994). The paradox is that the poor cannot buy the food, while the producers cannot sell it.

The escape lies in going to the cities and producing goods whose demand is rising faster than income. Malthus actually thought of industries as producing frivolous goods. He thought that it is natural for any animal to focus on food production. One can look at the data on the share of agriculture in GDP to realize how completely opposite the reality is. 96% of the well-fed people are not food producers. They produce other goods and especially services to earn enough to buy more than enough food.

The methodological observation is simple. When explaining any economic event, all pertinent factors must be studied together in a general equilibrium framework. Any failure to do so will necessarily generate invalid conclusions.

For example, the Harris-Todaro model of rural to urban migration assumes an artificially high urban wage rate. It is a clear violation of the empirical fact that urban workers are actually more educated and more productive and hence the equilibrium urban wage is higher than the rural wage. Urban workers also enjoy productivity gains from economies of scale and scope of greater concentration of infrastructure

The Harris-Todaro Model leads to a fatal suggestion to stop the process of development, namely, urbanization and greater investment in human capital (See Todaro and Stilkind 1981). Some authors went so far as to suggest that rural people should not be educated, because they crowd the towns in hopes of getting jobs. This is a severe lapse of good judgment.

The adjustment process takes time. There is nothing in economic theory to say that the graduate student must get a job the day after he leaves school. But the educated people do eventually get jobs. Education is the key to higher productivity and higher real wage.

These approaches are not only counter-factual, they are also disrespectful to the long history of serious scholarship. While giants like Keynes were drowning in attempts to explain unemployment, Todaro and Harris simply announce that it is the result of an artificial institutional distortion in the wage rate. And then Shaw and McKinnon come with idea that the urban institutions compel capitalists to lend at too low interest rates.

Nobody seems to notice that the said capitalists are getting richer and richer, and not going to the rural areas which are supposed to be free from distortions. The basic problem is that they ignore almost all relevant causal factors. A labor market model that fails to mention the productivity of labor and the cost of reproduction of labor is scarcely useful.

A failure to remember the optimal factor proportion doomed highly respected economists like Sir Arthur Lewis (1954) and Robert Solow, (1956). The idea of unlimited supply of labor in the model of Lewis fails to see that industrial workers must have greater skill and hence must be more costly to reproduce. There is no ground to suppose that the rural and urban workers are same and hence have the same wage rate. Solow forgets the notion of equilibrium factor proportion. It is determined by technology. One cannot just change the proportion arbitrarily, say by giving workers more capital or more land. To assume exogenous population growth, for example, is to refuse to study the real matter of endogenous growth. It is forgetting the caput in per caput income.

Piecemeal attempts to understand only a part by ignoring everything else leads to patently absurd conclusions. Gary Becker's model of investment in human capital (Becker and Barro 1988) reaches the fantastic conclusion that economic development is an accident. Thus, if by accident Egypt were to invent literacy while Europe lingered in total illiteracy, then Egypt would forever keep investing more in human capital and grow, thanks to the virtuous cycle of more literacy, more income, more literacy. But Europe will forever be caught in the vicious cycle of illiteracy, low income, illiteracy. Is this story told right?

Economic science reaches conclusions that affect the lives of real people. It is profoundly unethical to approach it with such cavalier disregard of pertinent facts. A model that forgets that urban workers are more skilled, work with more capital and enjoy the economies of scale and scope on account of much greater concentration of productive infrastructure offers fatal advice to prevent people from coming to the towns in a desperate attempt to survive. They advice nations to pursue the impossible task of rural development, forgetting the fact that demand for rural output does not increase as much as income and indeed, the real rural wage is declining. There is not one single example of economic development in a rural economy. There is not one single developed country that is not highly urbanized. Yet the partial models continue giving advice to pursue rural development and to prevent urbanization.

The inability to consider pertinent facts led some people to propose forcible sterilization. Malthusians have never built a complete general equilibrium model of the labor market, not to talk of the entire economy. With a model that does not even have a proper supply of labor function, they proposed to coerce people into birth control.

One just wonders why they failed to see why urban people started birth control when it was illegal and deemed highly sinful while rural people always had high fertility (as well as high mortality). Most of all, one wonders why they keep fighting against clear-cut data.

All episodes of economic development through industrial urbanization, without a single exception, began when the population was growing fast. Fertility decline is a consequence of urban-based development, not a cause. The cause is increase in knowledge, so that the things that were useless become useful or things that were less productive are made more productive.

6.4.2.4 Economic Development under Trade

While a strictly subsistence model of allocation can say much about the effect of optimization on structural transformation, it cannot say anything about the effect of the operation of the market process of gainful trade. The main problem lies with the lack of a theory of means of payment. The key is the so-called labor market equilibrium.

Here is the issue. In a post-industrial economy, labor is the principal factor of production. It is better to use the term human capital, because unskilled labor is practically obsolete in such an economy. Though workers are able and willing to produce goods and services, and they are eager to consume the output of labor, the lack of means of payment prevents them from selling labor (or its product). Without access to cash to allow the trading of a greater output, labor is prevented from being employed. The failure of fiat money to circulate may prevent people from accumulating capital. Theory must see this very thoroughly. (See Chapter 7)

Exchange is an entrepreneurial action. It allows people to make deals with strangers for profitable work. Unless one considers the gains from exchange, one cannot fully grasp the process of economic development in a market economy. The optimal output under subsistence is so small compared to the output in a market economy that one must leave out as much as 95% of output unexplained if one does not look at the matters of market prices, means of payment, and actions of entrepreneurs.

One key to a more scientific understanding of the development process lies in recognizing the gains from trade and the consequences of using fiat money as means of payment. Without the use of fiat money, most trades are ruled out. Then people are unable to make use of their productive talents.

The great tragedy of humanity is that it fails to take advantage of the most powerful human invention, namely, fiat money; and endures the totally unnecessary poverty caused by the involuntary unemployment of productive labor. We economists must be held responsible for this most terrible failure. Our carelessness is the root of our powerlessness.

7. PENSATION

7.1 Means of Payments

The task of the theory of payment is to explain how the kind of the object of exchange is determined. This task is supremely important, because it identifies what may or may not serve as an acceptable means of payment. The lack of a means of payment prevents trade. In indirect exchange, a real good fails to be a means of payment.

Prevailing economics studies the *balance of payment*, but not the *means of payment*. Balance of payment means that a buyer must offer to the seller a certain quantity of payment, which must be of equal value of the object bought with it. The term 'balance of payment' is somewhat of a misnomer. A more descriptive term would be 'balance of values' (=equivalence). It is a subject of the theory of value as in Chapter 6, and not of the theory of payment.

In contrast, a means of payment refers to the kind of object which the seller is willing to accept. As mentioned in Chapter 5, acceptance requires the good to have the highest utility from among all goods of equal market value.

The significance of the theory of payment is that it may resolve the unresolved issues of involuntary unemployment, undue instability, and unintended debt. It changes macroeconomics at its roots.

7.2 Analysis of Pensation

The basic concepts for a formal analysis of payment have already been introduced in Chapter 5. They are used here to show how to fit them together in a framework of analysis. The core analytical concept of coincidence is used on the epistemic foundation of circular consistency of social choice.

7.2.1 The Analytical Tools

Consistency analysis of payment uses (1) a graphic payment circuit, (2) an algebraic matrix of payments, and (3) 5 equations of exchange.

The payment circuit shows how circular consistency determines the circulation of money in indirect exchange. It also explains why real goods including stores of value cannot circulate as means of payment. The payment circuit fills a very serious void in economic theory.

A matrix of payments helps decompose aggregate output according to the various means of payment. This is a successor to the Leontief input-output matrix. The decomposition connects the individuals to the groups and unifies micro and macro issues.

The most crucial component of the payment matrix is the Wicksell Matrix. It is a matrix of real goods that cannot directly serve as means of payment. This matrix measures the output that cannot be sold except against money. Its transpose measures the need for money. The decomposition shows how output depends on the means of payment.

7.3 Payment Circuit

An indirect exchange can be represented graphically by a payment circuit to show how real goods and money are offered and accepted as means of payment.
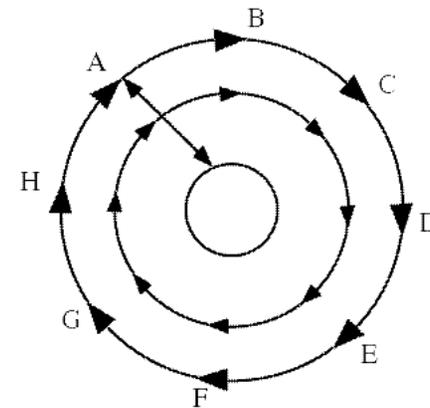

Figure-16: Payment circuit with long circulation

The simplest way to visualize a payment circuit is to look at the circulation path of a dollar from the point of its injection from the source (the

bank at the center) back to the point of its return to the source in Figure-16. It shows what the traditional circular flow of income diagram could not.

Thus suppose that the bank issues one dollar to agent A who buys a real good from agent B, who then buys a real good from agent C. The circulation continues from C, D, E, F, G and H until it comes back to A, who then returns it to the issuer. The real goods move in the opposite direction in the inner polygon. Each of 8 real goods changes hand only once, but a single token of money changes hands 8 times in the example.

7.3.1 Breaking the Payment Circuit

The payment circuit may break down in two ways: either from inside, or from the outside.

A (Keynesian) **endogenous breakdown** occurs if an agent withdraws from the circuit, taking away the demand for one good and the supply of another. There is very little practical possibility of such withdrawal by an agent who decides to give up buying and selling (for a life of a hermit?). But theory must consider this possibility, especially since the Keynesian tradition seemingly relies on it to explain unemployment and depression.

In Figure-16, suppose that agent A withdraws. That means that B cannot sell B's good and hence in turn cannot buy C's good, who then fails to buy D's good and so on. We must notice that all goods produced by C, D, E, F, G and H have both demand and supply. However B's good has no demand and A's good has no supply. Indeed, the Keynesian thinking may allow A to remain a supplier, but cease to demand B's good. Agent A hoards the money rather than spend it to buy B's good. The money goes out of circulation and stops all trades.

The Keynesian term ineffective demand may imply that the goods of C, D, E, F, G and H have demands that cannot be made effective without the means of payment, which is money now hiding under the mattress of A. As explained later, Keynesian multiplier effect works through values while the payment circuit works through payments.

The **exogenous breakdown** may also be called the seigniorial breakdown. It arises from an exogenous decision of the senior not to issue money to any member of the circuit owing to (1) ignorance, (2) exclusion, (3) panic and (4) punishment.

Ignorance: The prospective senior may not discover that it is possible to issue money.

Exclusion: Bankers may exclude peasants and other small producers, thus keeping billions and billions of indirect trades among the poor producers permanently out of operation, by permanent refusal to issue money. The revolution of microcredit program is a small step to activate a few of those payment circuits among the poor.

Panic: Seigniorial breakdown may involve lender panic. Many bankers lend large sums to a few speculators with some history of major profit coups. When a few speculators incur large losses, the bankers shrink in panic, and stop issuing money to actual producers.

Punishment: The problem may be compounded by punishing regulations on loan-loss provisions and reserves regardless of the type of borrower. Thus the ordinary producers who steadily make normal profit and pay off the debt regularly are crowded out by a few large borrowers, whose failures also put the ordinary producers out of access to funds. The regulators punish all borrowers for the failure of a few speculators.

The relative incidence and size of impact of the endogenous and exogenous breakdown of payment circuits is an empirical issue.

The focus of the investigation is the path of circulation, not just an aggregate supply without clue to who got it from whom. One must distinguish between producers and non-producers who get the money to see if it was used to buy products or merely change ownership of existing inventories, stocks, and bonds.

It is important for both theory and policy to separate the use of fiat money to facilitate transfer of current output, from the use of capital and credit to transfer the ownership of existing wealth. The latter may change value without changing productivity.

7.3.2 Building a Payment Circuit

The payment circuit has (1) multiple coincidence in real goods, (2) artificial double coincidence with fiat money, and (3) a length of circulation. These concepts are necessary to build a payment circuit to reflect empirical reality.

7.3.2.1 Presence of Multiple Coincidence

The indirect exchange is a closed set of goods, each of which has offer against one and acceptance against another good in the same set. When each good has single coincidence with other goods in the same set, there is multiple coincidence. Together, these goods pay for each other.

7.3.2.2 Creating Artificial Double Coincidence

The presence of multiple coincidence makes it possible to create an artificial double coincidence by using either a real good or a fiat as a tool to transfer claims and obligations.

In Figure 16, each good is accepted against one good, but is offered against another good, all in the same set. Thus B's good is accepted against A's good, while offered against C's good. There is no double coincidence between any two real goods. The payment problem is that the buyer A cannot pay the seller B with A's good, and hence must find some way to transfer A's obligation to deliver a real good to B. Agent A indirectly lets A's good go to H though G, F, E, D to C so that C gets a real good from D and delivers C's good to B on behalf of A.

The solution of the payment problem lies in the idea of the ROW (rest of the world). For any individual agent, all the other agents in the set collectively constitute the ROW. The ROW has double coincidence with the individual agent. Thus agent A delivers real good to ROW's member H, and receives a real good from ROW's member B. There is something inside ROW such that B can fulfill H's obligation to deliver real goods to A. Figure 17 shows the ROW.
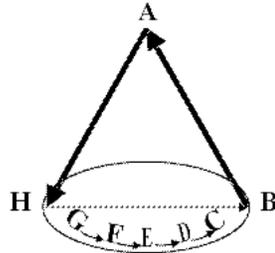
Figure-17: An individual and the ROW

Money is the instrument to allow the transfer of the obligation to pay in real goods. Thus A gives the dollar to B as a token to indicate that B has a claim on real goods worth a dollar. C accepts the token and delivers a real good to B. In turn, C hands over the token to D and so on until it comes to A from H, who delivers the real good to H. Then the process is completed. The key is that A does not care whether A's real good goes to

Artificial double coincidence is created by a trusted senior who manages the transfer of claims and obligations on real goods. It is possible to create artificial double coincidence if multiple coincidence exists to make the payment circuit complete. If any good lacks either offer or acceptance, the circuit breaks down, and it is not possible to transfer the claims and obligations. In Figure 17, the obligation of H to deliver a real good against the purchase of A's good must be transferred through a chain to B. This chain is (H   G   F   E   D   C   B) Any break between H and B will stop the transfer.

The payment circuit is analogous to an electrical circuit. If the circuit is broken, the electron cannot flow back to the source, and does not flow at all.

The core idea of artificial double coincidence is explained easily. It is artificial, because one buys something without an intention to consume it, and then sells something without having produced it. In indirect exchange, $\mathbf{x} = (x_{AB}, x_{BC}, x_{CA})$, imagine that Agent A decides to buy x_{BC} even though it has lower utility than his own good x_{AB}, essentially pretending to prefer x_{BC} to x_{AB}. Then A sells x_{BC} to C and buys x_{CA}, which he really wants. In this case, he pretends to have produced x_{BC}, though he did not do so.

Agent A may do this because of an entrepreneurial discovery that he can use x_{BC} as a tool to transfer the obligation to pay C for x_{CA}. Since he neither produces nor consumes x_{BC}, neither its cost of production nor its utility matters to him. If a fiat would serve the same purpose, A would have no trouble using it. Theory of intermediation shows that lower transaction cost of fiat money makes more costly commodity money obsolete.

7.3.3 The Length of the Payment Circuit

The length of the payment circuit is the number of times a single unit of money is used to complete all trades in the set. It is equal to the number of different goods in the payment circuit. The length has very serious implications on whether or not a producer will have to endure involuntary waiting to get money from buyers rather than from the issuers.

It should be noted that for two or fewer goods, there is no money. In the cited example in Figure-16, the payment circuit has a length of 8. This is a sharper concept than the old idea of velocity of circulation.

7.3.3.1 Long and Short Circulation

A long circulation occurs when a unit of money is used more than once. In figure-16, the unit of money is used 8 times and hence it has long circulation. In contrast, if a unit of money is used only once, it is called short circulation. In effect, short circulation creates a short circuit of payment.

Thus suppose that instead of issuing just 1 dollar to one of 8 agents, and asking them to use it 8 times before it is returned to the issuer, the policy is to issue 1 dollar to each of the 8 agents and require that they can use it only once. The aggregate supply of money is the same, because (1x8) = (8x1), but short circulation avoids Keynesian Depression and the more serious problem of permanent stagnation.

First, a Keynesian depression occurs when the means of payment is withdrawn and hoarded. Even though only one good loses demand and one other good may or may not lose supply, the circuit breaks down and all the other goods which have both demand and supply intact can no longer be traded for lack of acceptable means of payment. Secondly, long circulation imposes entirely unnecessary waiting, which implies the abortion of potential capital accumulation. This involuntary waiting imposes permanent stagnation.

Figure-18 is a replica of Figure-16 except that it has 8 short circuits of payment. (Goods not shown here move in the opposite direction of money.)

Short circulation is essentially as if the senior has become the ROW. It is as if the issuer of money has asked all 8 agents to sell the good to the senior against money, and then buy back all those goods by returning the money. All it does is that it allows each agent to deliver one kind of good and take back a different kind of good. Thus A borrows 1 dollar from the senior and buys the real good from B, who then gives the dollar back to the senior. Likewise, H borrows 1 dollar and gives it to A, who then returns it to the senior.
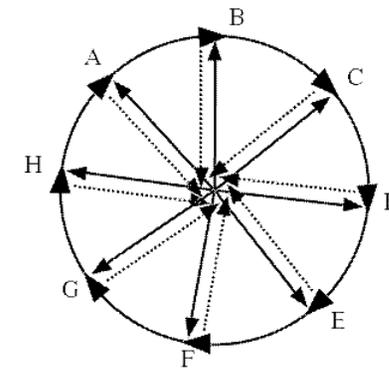
Figure-18: Payment circuit with short circulation

Here, even if one agent leaves the market, the others can carry on trade except that one agent ends up with unsold good and another ends up with unspent money. It overcomes the Keynesian depression.

Short circulation is a monetary solution, while the Keynesian solution is fiscal. Suppose that A is the investor who suddenly decides to stop buying bonds from B and hoards the money, disabling all others from paying for goods with money. Keynes would propose that the government replace A and invest in what A failed to do. Our suggestion is to reform the monetary system by employing short circulation.

More importantly, the short circulation regime puts an end to the unnecessary waiting imposed on agents who must wait to get the money from buyers. The implications are serious, and will be presented after the analysis of decomposition of output.

7.3.3.2 Payment Circuit and Supply of Money

The payment circuit provides a tool to understand how money may travel and affect the output in its path. It is a device to understand the process of inflation (or deflation). Previous notions of supply of money did not visualize how the creators issue it and how it travels and returns to the issuer.

Suppose that for unexplained reasons, A borrows 2 dollars rather than the usual 1, and attempts to buy up more of B's good. One must use the notions of income elasticity of demand, demand elasticity of price, and price elasticity of supply to make sense of whether B will increase the output and also raise the price. At each step along the payment circuit,

these elasticities will determine the changes in real demands, real supplies, and real prices.

There is no *a priori* ground to suppose how the outputs and prices will change. It is an empirical question, not a theoretical one. Theory permits all possible changes. For example, sectors with high price elasticities of supply will increase outputs faster than prices, while other sectors may do the opposite. Higher income may increase demands quite disproportionately. It may even reduce demand for low quality goods.

The most important theme is that the changes in the available means of payment affect real variables. Methodologically, consistent economics must insist that the responses be seen at the individual level. One must gather data on the payment circuit to measure the actual effect of the injection of additional money at each point in the circuit.

7.3.3.3 Perverse Circulation of Fiat Money

It is an open empirical question whether some sectors receive money in excess of the value of their real output at the same time as other sectors are denied enough money to cover the value of their real output. If such an event occurs, it would be an example of perverse circulation. At the same time, it will inflate prices in some sectors while some others will stagnate and even undergo deflation. Many developing countries seem to create new money for a small elite of large borrowers in fast expanding towns while the vast majority of the people in the stagnant rural sectors have little access to money. This may cause unceasing stagflation. To explain stagflation, one must look at pervert circulation.

7.4 Decomposition of Output

Conventional macroeconomics tries to understand the relation between aggregate demand and aggregate supply without being able to trace them from the decisions at the individual level. The result is that the effects of the various means of payment on the output equilibrium cannot be discussed. The following exercise intends to solve this problem.

The starting point for this exercise in consistency analysis is the idea that every good must be paid for by some kind of means of payment. The distinction is made between a real payment and an artificial payment. If the real payment is a real good in the current payment period, it is called barter. If the real payment is a future real good, it is called a bond.

The peculiarity of the bond is that it is a current promise serving as a current payment. For the sake of completeness, subsistence is regarded as a real means of payment in the sense that the good is its own payment. In contrast, an artificial payment is a tool to transfer claims and obligations in the current period. It may or may not be a fiat.

Consistency analysis uses the ceteris paribus assumption that all conditions of value are fulfilled: all goods have demand equal to supply at the equilibrium prices. The payment problem is to discover how the divergence in subjective utilities leads to one good being offered and another being accepted as payment.

The following exercise is for an indirect exchange with three real goods and three agents. It gets at the crux of the issues of macroeconomics.

Let a Leontief input-output table of order 3 show all the sales and purchases of three different goods (a, b, c) belonging to agents (A, B, C). Numerical examples are used below. An extra row (or column) marked Σ shows the sums of the values of the row (or column) elements. The left upper cell shows the name of the matrix and the bottom right cell shows the amount of aggregate output.

Leontief	A	B	C	Σ
A	1	10	3	*14*
B	2	1	18	*21*
C	12	3	0	*15*
Σ	*15*	*14*	*21*	*50*

*7.4.1 Subsistence Matrix **S**:*

In the next step, the subsistence elements are separated. Keeping all elements of the principal diagonal of the Leontief Matrix **V**, and setting all other cells to zero gives the symmetric subsistence matrix **S**

Subsistence	A	B	C	Σ
A	1	0	0	*1*
B	0	1	0	*1*
C	0	0	0	*0*
Σ	*1*	*1*	*0*	*2*

The remainder after subsistence consists of the traded output in the Trade Matrix **T=**

Trade	A	B	C	Σ
A	0	10	3	*13*
B	2	0	18	*20*
C	12	3	0	*15*
Σ	*14*	*13*	*21*	*48*

7.4.2 Barter Matrix **B:**

Let $\beta_{ab} = \beta_{ba} = \min(v_{ab}, v_{ba})$ be the barter possibility. This is the amount that both agents buy from each other, and hence can be paid by barter. Replacing the outputs by their barter possibilities in the trade matrix, one gets the symmetric Barter Matrix **B** of β_{ab} values :

Batter	A	B	C	Σ
A	0	2	3	*5*
B	2	0	3	*5*
C	3	3	0	*6*
Σ	*5*	*5*	*6*	*16*

7.4.3 Wicksell Matrix **W:**

Define the remainder of the output over its barter possibility as $\omega_{ab}=(v_{ab} - \beta_{ab})$, and $\omega_{ba} =(v_{ba} - \beta_{ba})$. Since ($\beta_{ab} = \beta_{ba}$) is the smaller of ($v_{ab}, v_{ba}$), then $\omega_{ab}>0$ if ($\beta_{ab} = v_{ba}$), and $\omega_{ab} =0$ if ($\beta_{ab}= v_{ab}$). In the pair (ω_{ab}, ω_{ba}), one is zero if the other is positive or zero. The (ω_{ab}, ω_{ba}) elements make the Wicksell **Matrix W:**

Wicksell	A	B	C	Σ
A	0	8	0	*8*
B	0	0	15	*15*
C	9	0	0	*9*
Σ	*9*	*8*	*15*	*32*

---

[1]$\beta_{AB}=\beta_{BA}=\min(2,10)=2$; $\beta_{BC}=\beta_{CB}=\min(18, 3) =3$; $\beta_{AC}=\beta_{CA}=\min (3,12)=3$;

By construction, half of the (ω_{ab}, ω_{ba}) values are zero. Notice that **W** is **not** a symmetric matrix. It shows real output against which there is no reciprocal real output. In this matrix, each of the goods is real, and has demand equal to supply. And yet these cannot serve as means of payment in barter. It measures the value of output which cannot be traded without money.

7.4.3.1 Separating Money from Bond

The Wicksell Matrix shows the real output that must be paid for by money. However, it is important to separate debt from money, because money is required even when the budget in real goods is in balance, and hence requires no genuine debt.

For each seller of real good j = a, b, c, let $[d_{ja} = (\Sigma_j v_{aj} - \Sigma_j v_{ja})$ show the surplus of agent A's sales revenues over purchases. A negative d_{ja} is a deficit.

Augment the Wicksell Matrix by adding a fourth row (Δ) and a fourth column. Put the surpluses and deficits in the fourth row and fill the fourth column with zeros. One might as well fill the fourth column with the surpluses and deficits and the fourth row with zeros. This is the augmented Wicksell Matrix **A.**

Augmented	A	B	C	Δ	Σ
A	0	8	0	0	*8*
B	0	0	15	0	*15*
C	9	0	0	0	*9*
Δ	-1	7	-6	0	*0*
Σ	*8*	*15*	*9*	*0*	*32*

The sum of value of the **A** matrix is the same as that of the **W** matrix, since the sum of surpluses ($d_{ja} >0$) and deficits ($d_{ja} <0$) must add up to zero. The rows and columns showing the sums of sales and purchase are symmetric, implying budget balance for each agent. The matrix still contains only real output. These must be paid for by money and bond.

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[2]$\omega_{ab}=(v_{ab}- \beta_{ab})=(10-2)=8$; $\omega_{ba}=(v_{ab}- \beta_{ab}) = (2-2)=0$; $\omega_{bc}=(v_{bc}- \beta_{bc})=(18-3)=15$;

$\omega_{cb}=(v_{cb}- \beta_{cb})=(3-3)=0$; $\omega_{ac} =(v_{ac}- \beta_{ac}) = (3-3)=0$; $\omega_{ca}=(v_{ca}- \beta_{ca})=(12-3)=9$;

7.4.4 Fund Matrix **F**:

The Fund matrix **F** is just the new row and column of the surpluses and deficits. Keep the (Δ) rows and columns of **A Matrix** intact, and set all other cells to zero to get the Fund Matrix. Its grand sum is zero since surpluses are equal to deficits.

Fund	A	B	C	Δ	Σ
A	0	0	0	0	*0*
B	0	0	0	0	*0*
C	0	0	0	0	*0*
Δ	-1	7	-6	0	*0*
Σ	*-1*	*7*	*-6*	*0*	*0*

7.4.5 Decomposed into 4 Matrices

The Leontief Matrix of output values has been decomposed into four matrices **V= S + B + W + F.** They show four types of payments. The associated values of outputs are for subsistence 2, barter 16, Wicksell 32 and Fund 0 and aggregate output 50. The need for money is 32 and that for bond is 7. Out of 32 units of money, 7 must be lent by surplus sellers.

7.4.6 Features of **W** and **F** Matrices

The two matrices **W** and **F** need special attention. The goods in the **W** Matrix must be paid twice (once against money, then against real good). Those in **F** must be paid thrice (once in bond, once in money, and once in real good), but the value of output remains the same. The important point is that neither money nor bond changes the real values, and yet without them, the output in the Augmented Wicksell Matrix **A** cannot be traded. The message is that real output is dependent on the structure of payment.

7.4.7 Symmetry in Payment Matrices:

Since each traded good must be paid for by something of equal value, every kind of payment must be shown by a symmetric matrix to

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[3]$d_{ja}=(\Sigma_j v_{aj}- \Sigma_j v_{ja})=(8-9)=(-1)$; $d_{jb}=(\Sigma_j v_{bj}- \Sigma_j v_{jb})=(15-8)=7$; $d_{jc}=(\Sigma_j v_{cj}-$
$\Sigma_j v_{jc})=(9-15)=(-6)$;

---

meet the equivalence condition. The subsistence and barter matrices are symmetric, but the Wicksell and Fund Matrices are not. It is however pretty simple to ensure symmetry of the payments by introducing money and bonds.

In honor of Keynes, let the transpose of the augmented Wicksell Matrix **A** be called the **Keynes Matrix K**.

Keynes	A	B	C	Δ	Σ
A	0	0	9	-1	*8*
B	8	0	0	7	*15*
C	0	15	0	-6	*9*
Δ	0	0	0	0	*0*
Σ	*8*	*15*	*9*	*0*	*32*

The transpose simply puts the value of output of the Wicksell Matrix in the place where its reciprocal payment must lie. Here is the money to pay for the real goods of Wicksell. Without the money shown by Keynes, the real output of Wicksell lacks the ability to pay despite the presence of ability to buy. It is important to notice that in the Wicksell Matrix (augmented), the agent's budget is balanced, indicating ability to buy. The lack of double coincidence (=symmetry) in real output indicates the lack of ability to pay.

Perhaps Keynes would say that demand for the real output of Wicksell would be ineffective without money. This matrix remains hidden from view and hence was a veil to the classical observers. If he talks about the hidden **K** matrix, no wonder it would be hard to see what Keynes means.

Since the sum of Wicksell and Keynes **(W+K)** is the sum of real goods and money, it may be called Good Money Matrix. Output is sold twice here, hence the value doubles. There is symmetry in Good Money Matrix, where each good is paid for by money.

Good Money	A	B	C	Δ	Σ
A	0	8	9	-1	*16*
B	8	0	15	7	*30*
C	9	15	0	-6	*18*
Δ	-1	7	-6	0	*0*
Σ	*16*	*30*	*18*	*0*	*64*

7.4.8 Loan Matrix of Bonds

The Fund Matrix **F** shows the (positive or negative) surplus real output. These must be paid for by current promises of equal value in the current period. These promises carry debts that must be redeemed in the future and hence are stores of value for the one who keeps them. The present value of the bond is equal to the current value of the surplus real output, which it pays for. By adding **F** to its negative transpose, one gets the negative symmetric Loan Matrix **L,** analogous to Good Money Matrix:

Loan		A	B	C	Δ	Σ
	A	0	0	0	1	*1*
	B	0	0	0	-7	*-7*
	C	0	0	0	6	*6*
	Δ	-1	7	-6	0	*0*
	Σ	*-1*	*7*	*-6*	*0*	*0*

The negative signs in the Fund and Loan matrices may create a bit of confusion. An alternate presentation may use only absolute values. For this, let the column Δ show the positive sale of bonds by deficit agents, while the row Δ shows the positive purchase of bonds by surplus agents. That is, simply set the negative elements of the Loan matrix to zero and call it Debt Matrix.

Debt		A	B	C	Δ	Σ
	A	0	0	0	1	*1*
	B	0	0	0	0	*0*
	C	0	0	0	6	*6*
	Δ	0	7	0	0	*7*
	Σ	*0*	*7*	*0*	*7*	*14*

By construction, this Debt matrix lacks symmetry, since the seller of the bond is not a buyer of bonds and vice-versa. In contrast, the Good Money matrix is symmetric, as one real good is matched against a money payment. The trouble comes from the aggregation to find the surpluses and deficits. If one could gather disaggregated data on how the debtors allocate the borrowed funds to purchase real goods, and how the creditors allocate revenues between buying and lending, one might get symmetry.

7.4.9 Significance of the Decomposition

The decomposition of aggregate real output into Subsistence, Barter, Wicksell and Fund matrices (**S, B, W, F**) shows how to measure the exact value of output according to its means of payment. The Wicksell and Fund matrices precisely measure the need for money and bonds.

This decomposition changes macroeconomics in two major dimensions. First, it brings the debate on neutrality of money to a conclusion: money is **NOT** neutral. Secondly, interest on real capital affects only the output in the **F** matrix and not the output in the Wicksell Matrix.

It is not hard to translate the decomposed matrices into their corresponding payment circuits. The subsistence matrix collapses the circle to a point for each agent. The Barter matrix becomes a circle with two agents. The most interesting is the payment circuit for a pure Wicksell Matrix (in which there is no bond). A more complex circuit combines bonds and money as in the augmented Wicksell matrix.

Corresponding to the length of the circuit, one can think of the width of the circuit. In the augmented Wicksell matrix, A sells 8 units to B, who sells 15 units to C, who sells 9 units to A, all using money. The width of the circuit is 8 between points A and B, 15 between B and C, and 9 between C and A. This can occur through injections and withdrawals representing bonds. A pure Wicksell circuit has uniform width with no injection or withdrawal.
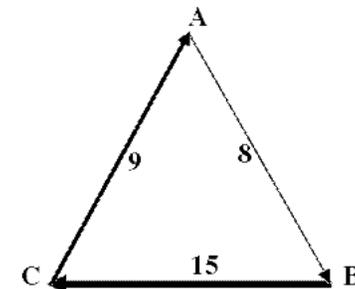
Figure-19:Payment circuit with varying width

The circuit here shows movements of real goods. Money moves in the opposite direction (not shown). Comparing B's sales revenue of 15

and expenses of 8, it is clear that B must withdraw purchasing power of (15-8)=7 units. To enable the goods to be sold to deficit buyers, the withdrawn surplus must be injected back.

In the circuit, A borrows (9-8)=1 unit and C borrows (15-9)=6 units, both borrowing from C. It is possible that C borrows 7 from B and then lends 1 to A. It is noteworthy that B and C could undertake a barter deal in credit worth 7 units while C and A could make a barter deal of credit worth 1 unit. In that case, C's net debt would be 6 units, and A's net debt would be 1 unit, while B's net credit would be 7 units.

The variation in the width of the payment circuit means that the analysis of the effect of savings-investment equilibrium and the multiplier effect will differ significantly from the Keynesian view.

7.4.10 A Keynesian Multiplier

A Keynesian endogenous depression is initiated by an withdrawal of purchasing power in the form of hoarded savings. The Keynesian model wants to articulate a payment problem associated with perverse circulation of money, but it is stuck with a value-theoretic problem of store of value, and it lacks a formal notion of payment circuit. However, the idea of a multiplier effect cannot be grasped without clarifying the circulation of payments.

The breakdown in the bond market means that some agents have withdrawn money from circulation in the form of savings. Without suitable bonds, they fail to inject these funds back into circulation. The goods the investors would buy remain unsold, and in turn the intended purchases of the producers of those unsold investment goods are disabled. At this point, it must be made clear that the problem is one of ability to pay with money, and not the ability to buy with real goods. As the payment circuit shows, goods that have both demand and supply fail to be traded if there is no money to transfer the claims.

The multiplier effect in the value-theoretic format depends on the marginal propensity to save (σ), and the size of the multiplier is given by its reciprocal $\xi=(1/\sigma)$. In a payment circuit, the multiplier effect is measured by the length of the circuit, as adjusted by variation in the width. The distinction between consumption and savings is not relevant in a payment circuit. Perhaps one should distinguish a payment multiplier from a Keynesian one.

7.5 Equations of Exchange

The equations of exchange have been introduced in Chapter 5. These may be repeated here to clarify their implications for the theory of payment. The task is to see how double coincidence relaxes the restriction imposed by the principle of equivalence.

Here are the five equations of exchange.

(1) $v_{AA} = v_{AA}$;   Subsistence
(2) $v_{AB} = v_{BA}$;   Barter
(3) $\Sigma_B v_{AB} = \Sigma_B v_{BA}$;   Money
(4) $\Sigma_A \Sigma_B v_{AB} = \Sigma_A \Sigma_B v_{BA}$ Bond
(5) $\Sigma_h \Sigma_A \Sigma_B v_{AB} = \Sigma_h \Sigma_A \Sigma_B v_{BA}$ Liquidity

7.5.1 Equation of subsistence

This is included for sake of completeness, though subsistence is not exchange. However, subsistence may be formally seen as a special degenerate case of exchange where the buyer is identical with the seller (A=B).

The value of something under subsistence is identical with the quantity of the good produced and consumed by the singular agent. There is no price, but if one wanted to add values of different kinds of items produced by a subsistence agent (who really must produce every kind that he/she wants to consume), one can take a reference good and use the shadow price (ratio of marginal utilities) to convert all goods into units of the reference good. There is no scope for divergence of preferences and hence the shadow price is always equal to the ratio of marginal utilities by definition. There is no payment problem under subsistence.

The equation of subsistence may also be regarded as a natural law of subsistence. The key is the integrity of the identity of the consumer and producer: under subsistence, the consumer must be the producer. Under exchange, the consumer is not the producer. The disintegration of the identity of the producer and consumer under exchange is possible only if there are institutions to allow individuals to produce something for strangers. The key is the institutional arrangements to permit the buyer to pay the seller.

7.5.2 Equation of Barter

Barter $\mathbf{x} = (x_{AB}, x_{BA})$ is the simplest form of exchange between two real goods. We use the term direct exchange in a broader sense. A direct exchange may include the case where one or both objects of exchange may be artificial (money).

In a barter, the values are determined by the equivalence condition given by Equation (2), namely $(v_{AB} = v_{BA})$. The payments are determined by the double coincidence condition

$$\{U^A (x_{AB}) < U^A (x_{BA}); U^B (x_{AB}) > U^B (x_{BA})\}$$

The analyst's job is to see how these two conditions work together.

The double coincidence condition must be fulfilled for any direct exchange generally. For barter, this conditions must be fulfilled in kind by the two real goods $\mathbf{x}=(x_{AB}, x_{BA})$. If this condition is not fulfilled, no barter can occur. In indirect exchange with three or more real goods, it is necessary to undertake a series of direct exchanges between one real and one artificial good.

It is important to clarify why money cannot arise under barter. Suppose that both agents prefer (x_{AB}) to (x_{BA}). B wants to buy (x_{AB}) and pay for it with (x_{BA}) but A refuses to accept (x_{BA}), as it is of lower utility than (x_{AB}). There is no other good that B can offer to A in payment for (x_{AB}). Money cannot be used, because there is no other good which A can claim with the money to get more utility than from (x_{AB}).

However, suppose that there is a third good (x_{CA}) that the owner of (x_{AB}) would accept in payment for (x_{AB}), because it is of greater utility than (x_{AB}). If a money could allow agent A to get hold of (x_{CA}), then that money could serve as a payment. But to bring a third good is to step outside the boundary of barter. In that case, no barter would be possible. The supremely important point: barter and money are mutually exclusive. Barter is impossible if money is possible and vice-versa. Money can offer no advantage at all if barter is possible. Money is no alternative to barter.

7.5.3 Equation of Money

The equation of money is more complex than that of barter, because (1) it involves indirect exchange with at least three goods, (2) it must have multiple coincidence among all the goods in the set, and (3) it must use (commodity or fiat) money.

For the simplest exchange where money is possible, let us write the indirect exchange as $\mathbf{x} =(x_{AB}, x_{BC}, x_{CA})$. The first thing to notice is that the subscripts indicate lack of double coincidence in kind. In a barter $\mathbf{x} = (x_{AB}, x_{BA})$ the subscripts of the two real goods are in opposite order (AB|BA). But in an indirect exchange, the subscripts are not in opposite order for any given pair of real goods. In the indirect exchange, $\mathbf{x} =(x_{AB}, x_{BC}, x_{CA})$, the subscripts for pairs of real goods are (AB|BC), (BC|CA) and (CA|AB). This means that no barter is possible between any pair of real goods.

Indirect exchange is possible if the goods can be arranged such that a complete payment circuit is created, namely, if there is multiple coincidence. By looking at the order of subscripts (AB|BC|CA), we can determine if all agents against any given individual may be collapsed into a ROW (rest of the world) such that there is double coincidence in real goods with the ROW. In the three-good case, we see three alternative ways to form ROWS. First, consider agent A. Then (B, C) together may be regarded as one composite agent where (BC|CA) becomes (BA) by striking off the common subscript (C). In this case B's good (x_{BC}) goes to C, whose good (x_{CA}) goes to A, to pay for A's good (x_{AB}). Collectively, B and C together take a real good (x_{AB}) from A and give a real good (x_{CA}) to A. This is possible because there is one good (x_{BC}) that allows B to compensate C between them. B's good (x_{BC}) can serve as commodity money.

In a similar manner, against individual C, agent (A and B) together can form a ROW with subscript order (AB|BC) collapsed into AC by striking off the common element B. In that case, there is double coincidence between (AC|CA). Here, C's real good (x_{CA}) goes to the ROW formed by A and B. The ROW delivers (x_{BC}) to C as if it were (x_{AC}), while A's god (x_{AB}) goes to B to compensate B for the sacrifice of (x_{BC}). To agent C, (x_{AB}) is money. Likewise, against individual B, agents (A, C) can form a ROW.

There is a simple way to identify which real good is serving as commodity money when a ROW is formed. The good that is transferred within the ROW is the commodity money. Thus if individual C takes the ROW (A, B), then the good transferred between (A, B), namely, (x_{AB}) is the commodity money.

Another way to identify the commodity money would be to take a given individual and look at the subscripts of the two real goods in which the individual is interested as either a buyer or a seller. Thus for agent C,

the relevant goods are (x_{BC}) which he buys and (x_{CA}) which he sells. These goods are real goods to C, because he produces one with real cost and consumes one with real utility. The third good that he must use in order to compensate the seller of what he buys is the commodity money. Thus C uses (x_{AB}) to compensate B. That is, C could actually buy (x_{AB}) against his good (x_{CA}) and then sell it to B to pay for (x_{BC}). Since he neither produces nor consumes (x_{AB}), this good is a commodity money to C.

In a more general case with (n>3) goods, the row will have (n-1) members and will require (n-2) different goods to be successively used as commodity money. Thus in a case of 8 goods shown by the payment circuit in Figure-16, consider agent A against the ROW formed with 7 others (**B, C, D, E, F, G, H**). The two goods of interest to A are then (x_{HA}) which he buys and (x_{AB}) which he sells. Arranging the goods with their subscripts (**BC|CD|DE|EF|FG|GH|HA**), we can successively strike off the common element for any contiguous pair. Thus A will first buy (x_{BC}) from B, then sell it to buy (x_{CD}) from C, then sell it to buy (x_{DE}) from D and so on until he buys (x_{HA}) he wants to consume. In this series of exchanges, he uses 6 goods as commodity money.

It is obvious that this imposes an extremely high transaction cost and this cost would be drastically reduced if a fiat money could be used. The fiat will of course accomplish the same set of transfers of 6 goods within the ROW of 7 agents against A, but A will not have to repeatedly buy the goods and sell them again. The transfer within the ROW will be conducted by the agents inside the ROW, not by A.

The equation of money is a balance of payment equation that combines the equivalence condition and the double coincidence condition. There are several things to notice in this regard.

First, the equivalence condition applies to every pair of goods that directly or indirectly pay for each other. Thus since (x_{AB}) must pay for (x_{CA}), their values must be equal, namely $v_{AB}=v_{CA}$. Again, since (x_{AB}) is paid for by (x_{BC}), their values must also be equal, namely, $v_{AB}=v_{BC}$. Taken together, we must have $v_{AB}=v_{BC}=v_{CA}$. In general, all real goods in an indirect exchange must have the same value.

However, one can add several circuits to make a composite circuit with varying widths. Figure -19 is a composite circuit. There is a pure Wicksell indirect exchange with 8 units of real good from each of 3 agents. Then there is a bond-augmented indirect exchange with A selling 1 unit worth of bond to B, then B selling 1 unit worth of real good to C, and C selling 1 unit of real good to A. Lastly, there is a barter between B

and C. C sells 6 units worth of bonds to B, who sells back 6 units of real goods to C.

Secondly, the balance of payment condition applies to each agent, whose total sales must equal total purchases in value terms. This restriction allows integration of micro and macroeconomics.

Thirdly, it is important to notice why Equation (3) is an equation and not an identity. Mathematically, if Equation (2) holds for each pair of goods, then equation (3) automatically holds by derivation, and hence is an identity. But Equation (3) holds by violating equation (2), and so is not an identity.

To fulfill Equation (2), namely, ($v_{AB}=v_{BA}$), it is necessary that there be double coincidence in real goods. This is absent in indirect exchange. Corresponding to (x_{AB}), there is no real (x_{BA}). Thus although $v_{AB}>0$, we see that $v_{BA}=0$ in real goods. Money is necessary to create equivalence. Thus suppose that artificial goods (m_{BA}), (m_{CB}) and (m_{AC}) exist and they have the values ($v_{AB}=m_{BA}$), ($v_{BC}=m_{CB}$), and ($v_{CA}=m_{AC}$). Then the equivalence condition is met by using artificial goods to pay for real goods.

For the indirect exchange, let us normalize the value of each good to unity. Then we can use the normalized Wicksell **W*** and normalized Keynes **K*** to show how the equation of money works.

W*		A	B	C	Σ
	A	0	1	0	*1*
	B	0	0	1	*1*
	C	1	0	0	*1*
	Σ	*1*	*1*	*1*	*3*

This matrix fulfills Equation (3), which requires each agent to balance the total sales to total purchases. The Equation is fulfilled if the column of row sums and the row of column sums are symmetric (transposes of each other).

It is important to notice that there is no barter, and hence no symmetry in the Wicksell Matrix (disregard the columns and rows for sums, which are not a part of the matrix anyway).

The lack of symmetry reveals the lack of double coincidence in real goods. The presence of symmetry between the column of row sums and row of column sums indicates the presence of multiple coincidence.

The normalized Keynes matrix **K*** corresponding to the normalized Wicksell Matrix **W*** is given below. In it, money is shown with an underline:

K*	A	B	C	Σ
A	0	0	<u>1</u>	*1*
B	<u>1</u>	0	0	*1*
C	0	<u>1</u>	0	*1*
Σ	*1*	*1*	*1*	*3*

By adding the Wicksell and Keynes matrices, we derive the Good Money Matrix that shows the actual direct exchanges, involving both goods and money.

Good Money	A	B	C	Σ
A	0	1	1	*2*
B	<u>1</u>	0	1	*2*
C	1	<u>1</u>	0	*2*
Σ	*2*	*2*	*2*	*6*

This shows three direct exchanges, involving one real and one artificial good.

Direct	A	B
A	0	1
B	<u>1</u>	0

Direct	B	C
B	0	1
C	<u>1</u>	0

Direct	A	C
A	0	<u>1</u>
C	1	0

7.5.3.1 What does money do in the Equation of Money?

In an indirect exchange, the seller of a real good cannot be paid with another real good directly, but must be paid with money directly and with real goods indirectly. The job of money is to fulfill both the equivalence and the double coincidence conditions. It is possible only if an entrepreneur is able to create and issue money, even if the money itself is a commodity. However, an entrepreneur cannot create and issue money unless there is multiple coincidence. The presence of multiple coincidence is expressed by the set of preferences below:

$$U^A(x_{BC}) < U^A(x_{AB}) < U^A(x_{CA});$$
$$U^B(x_{CA}) < U^B(x_{BC}) < U^B(x_{AB});$$
$$U^C(x_{AB}) < U^C(x_{CA}) < U^C(x_{BC}),$$

These preferences reveal circular consistency. Here, the good least preferred by a particular agent can be used as money by that agent. It reverses the idea of money being the most marketable good.

7.5.4 Equation of Bond

The equation of bond requires that aggregate income must be equal to aggregate expenditure, regardless of whether individual agents balance their budgets or not. As such, it looks like the starting point for conventional macroeconomics.

It is important to note that one might take this as an identity. In any matrix, the grand sum of all elements, whether summed row by row or column by column, must be the same. That is, as an accounting identity, it must be the case that the sum of all sales is equal to the sum of all purchases. Classical macroeconomics (Say's Law) is in large part a reflection of the belief in this identity.

The analysis of the decomposition of the matrix reveals why prevailing macroeconomics gets into trouble when it starts with the aggregates. The need is to decompose it back to the individual levels according to the different restrictions on payments.

The Equation of Bond relaxes the restriction of the equation of money by allowing individual agents to incur nonzero deficits or surpluses. It is not derived from Equation (3), which it violates. It imposes a less stringent restriction that all agents collectively must balance aggregate income and expenditure.

Analytically, a bond should be regarded as a real good, which may or may not be traded via barter. There is no a priori reason why the owner of surplus cannot directly sell the surplus to another agent, who pays back with a promised future good (or redeems a past claim). Indeed, the lender must make a barter deal with the borrower, because it is not possible to lend indirectly. An intermediary may borrow from one and lend to another, but this is not indirect lending in any useful sense.

Just as real goods are most frequently paid for with money, bonds are also mostly paid for with money.

The importance of the equation of bond is that in a theory of value, it requires an equality between savings (=surpluses) and investments (=deficits). The interest rate on the bond is determined under the leadership of intermediaries. If the assessment of lender's risk is not based on objective criteria, some lenders may fail to lend. Likewise, if the borrowers assess the prospect of rate of return from investment without an objective basis, they may refuse to borrow some available surpluses. In short, the interest rate may not adequately reflect the risk premium and hence may fail to clear the market.

For the theory of payment, the key point is that a bond is not money. A bond is issued by a debtor, but money is issued by a creditor. Money may circulate as means of payment, but bonds may not circulate as means of payment except at the point of first issue/last redemption. Indeed, the bond itself is paid for with money.

Perhaps the most important issue regarding the equation of bond is that a bond carries real debt while money carries artificial or false debt. When an agent balances his /her budget, he/she still must borrow money in order to acquire the ability to pay.

The fee paid for the use of money is a transaction cost. But when a borrower issues bonds, the borrower acquires real resources and the interest is part of the production cost, not transaction cost.

7.5.5 Equation of Liquidity

Equation (5) may be interpreted as the condition of global exchange equilibrium in a world with H different countries. In that case, Equation (5) may hold even when Equation (4) fails, because each country may incur international surplus or deficit. In that sense, it is a global generalization of the Equation of Bond.

To regard it as an Equation of Liquidity, Equation (4) must hold for each country. Then each country can have its own national currency and the problem of Equation (5) is to study how various national currencies among H different nations may compete. In that sense, it is a generalization of Equation (3). What happens if each individual balances his budget, and yet people must use money? How many kinds of money can be used? What determines which kind of money is more or less generally used?

The answer does not lie in payment theory. It is essentially a matter of intermediation. To see the issues, consider the Keynes Matrix associated with a three-good indirect exchange. There are three instances of money in the Keynes matrix. There is nothing *a priori* to say that these cannot be different kinds of money. Nor can one determine which money is more or less liquid than another money.

Let us consider commodity money first. Agent A may buy B's good and sell it to C to pay for C's real good. Here, B's good is commodity money. If indeed this is used as (commodity) money, all transactions will be completed. That is, in a case of *n* goods (*n-2*) real goods may be used as money. For *n=3*, there is only one good used as money to complete the payment circuit.

Why are there three units of money in the Keynes Matrix for the three-good case, if there can be only one commodity money?

The discrepancy in number of units of money is a result of the distinction between commodity and fiat money. By definition, two goods are excluded from being counted as commodity money: the one being produced and the other being consumed. A sells a real good to B and buys B's real good, which appears as a barter to B. But it is not a barter to A, because A regards B's good as money, and must sell it again as a means of payment. Again, C gets B's real good from A and gives C's real good to A, and hence sees this as a barter. It is not barter to A.

But analytically, any of the three real goods could be regarded as money, depending on who was the entrepreneur. A could use B's good as money, B could use C's good as money and C could use A's good as money.

This last possibility is brought out in the open by resorting to fiat money, which is issued by an outsider, and which circulates until each good is paid for with money. That is, with fiat money, the number of units of money is exactly equal to the number of goods. Thus for *n* goods, there are *n* units of fiat money, but only (*n-2*) units of commodity money.

It is not possible to compare the relative acceptance of commodity money within the limits of Equation (5). The problem is that liquidity is

a competitive quality of alternative money. It does not matter which good is used as commodity money: each works equally well. The issue is: which good will be actually used?

As explained later, if different nations issue different currencies, then which currency will be more widely acceptable internationally depends on who is able to manage the transfer of claims more widely. Thus if one nation has a banking network to transfer funds more widely than another, the one with the wider network will have its currency made more widely circulated. It is of supreme importance to see that the money must be issued.

The critical problem is that any currency is equally acceptable in terms of value, and the difference in liquidity does not rest on difference in acceptability. It rests on difference in availability. If Chinese banks refuse to lend Chinese currency throughout the world compared to American banks, then people will be unable to use Chinese currency even if they wanted to.

The misperception of the character of liquidity arises from a misperception of the character of money. If one thinks of money as a store of value, one must logically make the acceptability of money dependent on the stability of value. A sharper analyst would know that stability of value is pertinent to bonds and not to fiat money, which is not stored, but is spent.

One can look at data on relative stability of various national currencies and surmise that Saudi or Chinese currencies, for example, do not circulate internationally despite being far more stable than US dollar or Euro or Japanese yen. One may commit financial suicide by betting on the greater stability of Chinese or some other stable currency and hence accumulate it instead of accumulating US dollar or Euro or yen.

Inside China, there is a very brisk forex market where US and Chinese currencies are traded. It has nothing to do with stability of value, because people do not invest in currencies in the same way they invest in bonds. People care about the ratings of bonds (i.e. the stability of value), but they do not worry about rating of currencies.

Most currency traders earn their income from a transaction fee and almost never think about making investment in currencies in the hope of appreciation of its value relative to some other currency.

Equation (5) is highly lax, and hence may be met in a very wide variety of ways. To study liquidity, one will need to specify details of the intermediation process. In particular, it is necessary to specify the manner in which money is issued and managed.

7.5.6 Consistency Analysis Again

The core notion of circularly consistent social choice and linearly consistent individual choice together provide the foundation for consistency analysis. It uses payment circuits, equations of exchange, and the decomposition of the output.

It is important to see how the equations of exchange combine micro and macroeconomics in one unified framework. The key is to see how Equation (2) violates Equation (1), and Equation (3) violates Equation (2) and Equation (4) violates Equation (3). Each violation requires entrepreneurship.

Equation (2) breaks the shackles of subsistence by allowing the producer to be different from the consumer, by creating market institutions. Equation (3) breaks the bondage of barter by permitting an artifice to transfer claims on real payments. Lastly, Equation (4) breaks the individual budget constraint. Each step enlarges potential output. Each step connects the individual to others. And each is possible only if there are entrepreneurs.

7.6 Outline of a Theory of Money

This section sums up the basic concepts in the theory of money. It covers definition, need, issue, and circulation of money.

7.6.1 Definition of Money

Definition: Money is an intermediated artificial means of payment.

Discussion: Money belongs to the genus 'payment'. A payment is anything that is accepted by the seller in exchange for the good sold. There are four kinds of payments: subsistence, barter, bond, and money. The degenerate form is subsistence, where a good is its own payment. This is included merely to complete the description of all products even before exchange.

A barter is a real good paying for another real good. A bond is a current promise for a future real good. It is a real payment in the sense that it is costly to make a promise, and the buyer of the promise gets utility from it. It has additional complication of risk unrelated to its function as money. It is also known as a store of value.

Lastly, money is an intermediated payment. The intermediation makes it an artificial good by making its utility and its cost of production

irrelevant. In this discussion, a real good is one that yields utility and has a cost of production. An artificial good has neither utility nor cost of production.

The distinction of money is that it is intermediated. It is something bought without an intention to consume, and sold without having produced it. It cannot be consumed by one who uses it as a means of payment. It cannot be produced by one who buys something with it. It can be used only if an intermediary is present to issue it.

7.6.2 The creation of money:

7.6.2.1 Seniors Create Money

Money is created by and only by an intermediary of special character known as a senior. The senior discovers an opportunity to use a real good belonging to someone else as a tool to transfer claims on real output.

Thus Adam may discover that Beth has some bananas that Cindy will gladly accept in payment for her candy. Adam then buys the bananas by creating an artificial demand (buying without intention to consume) and then sells the bananas by creating an artificial supply (selling without having produced). Thereby, Adam creates an artificial double coincidence. Money cannot arise without this intermediation.

7.6.2.2 Accidental Properties of Money:

The necessary property of money is that it is a means of payment, with the distinction of being intermediated. Money has no necessary relation to being a unit of account (numeraire), a measure of value, or a store of value.

Money need not be a unit of account and a unit of account need not be money. It need not be a measure of value; and the measure of value need not be money. Most critically, money need not be a store of value, and a store of value need not be money. This last distinction is of central importance to clear up much confusion.

A store of value cannot be money. If one uses money as a store of value, it ceases being a means of payment, and hence ceases being money. It compels someone else to accumulate unintended inventory of unsold real good. When it is released from storage and used as a means of payment, it becomes money and ceases being a store of value. It then permits liquidation of unintended inventory. A stored object is not available to be sold, and hence cannot be a payment.

Suppose that Paul issues a bond to John as a payment for current output belonging to John. To John, the bond is a store of value. It can no longer be used to pay for real goods, because John's real good has already been paid for with it. If John sells the bond to someone else, it is no longer a store of value to John.

Suppose that Mark saves some money as a store of value. It then ceases being a means of payment and is not available to pay for any real output. When Mark decides to spend the stored money, it can become money only by ceasing to be a store of value. Mark cannot spend the money and still have it as a store of value.

The universal perception that money is a store of value is akin to the universal sensation of all people that the sun moves around the motionless earth. Money indeed is a token of claim over real output. Ordinarily, this claim is acquired by delivering some real product. The token is a claim on value, but not a store of value.

Surely an agent who has delivered real product to get the money must have the right to get some other real good in exchange. It has nothing to do with storing value at all. People do not take money necessarily because they want to store value, but because they have no other means of paying for real goods.

If one cannot claim real goods with real goods directly through barter, one must use the artifice to do that. Though the presence of the senior is not palpable, it is the senior's ability to organize payments with fiat that allows people to resort to this artifice. It has nothing to do with storing value.

In principle, fiat money is instantly spendable. People hold it momentarily not because they intend to hold it, but because it takes time to do shopping. In a supermarket queue before the sales clerk, people have been heard shouting at someone who wanted to pay a large sum in small coins, making others upset for the time it takes to count the thing. It is not that she loved to keep the money on her for longer as a better store. Many people use cards to pay bills to save time.

There is no doubt that people do use money as a store of value, but only under an extremely pervert regime of long circulation. Money is the worst possible store of value under an ideal regime of short circulation where people can immediately get money against the real output they are ready to deliver.

The extremely long waiting imposed on the producers under the long circulation regime compels many to store money. People may store

money instead of interest bearing bonds or other assets that appreciate in value or at least retain the value. The ostensible reason is that when one needs the cash, it is too hard to get it from selling real goods. It has nothing to do with lack of demand for the real good, but the imposed waiting. It has to do with liquidity premium created under the perverse regime of long circulation with perennial shortage of liquidity. Liquidity crisis may be a better term than liquidity trap to describe this situation.

In Figure-16, A waits for H to come with the money, who waits for G to come with it, who waits for F to come, who waits for E to give the money, who waits for D to find the money, who waits for C, who waits for B, who in turn waits for A. The recitation is deliberately long, to remind the reader that waiting for money is not storing money. People do not sit with unsold goods because they want to store those rather than sell those. If one stores money, the others are forced to store unsold goods. Currency hoarding looks like the paradox of thrift.

Would people store money rather than acquire other stores of value if they had no cash-flow problem, namely, if they could instantly get money against stocks of goods ready for delivery? The answer seems obvious.

There is another possible misperception. When people deposit their income in the bank, they are surely not storing money, but buying with the money some store of value sold and managed by the bank. A savings account is a store of value that a depositor can buy with money. It is an illusion that people are storing money.

The bank actually does not put the cash in a vault and pay an interest to the depositor for the good hassle of having to watch over the vault. It sells the savings account for money and then lends the money. The illusion persists because the bank is able to buy back the savings account when the depositor wants to liquidate the store. If people store money, it must be the cash they keep under the proverbial mattress.

All models of money known to this author are models of stores of value. Even Baumol's model of transaction demand for money (Baumol 1952) ends up with the notion that people hold money as a store of value to meet transaction needs. It would have been helpful if one explained what exactly is the transaction need or why one needs a liquid store of value to meet the transaction need. Why store money instead of just keeping the real output?

The result of thinking of money as a store of value inevitably is that it cannot have any connection to trading of real output, simply because storing is not trading. There is just no way for a store of value to serve as a means of payment, except the perversion of using a means of payment as a store of value.

Perhaps one should ask: if money is a store of value, who is a storing value in it and why? If the only way to use the value stored in it is to buy real goods, why would not one store that good instead of storing money?

As already mentioned, the change of ownership of a bond has no relation to trading of real output even if the bond itself is exchanged against money from one owner to the next. Indeed, the bond as a means of payment has nothing to do with it being a store of value for the lender. As a store of value, it affects the value (quantity and price) and not the payment. And a bond is a store of value for the creditor while it unstores value for the debtor. A bond is a means of payment if it is the opposite of a store of value.

The biggest conceptual stumbling block created by the illusion of money as a store of value is that it treats a fiat as real capital. This is reinforced by the necessity of the issuer of the fiat to insist that it must be issued as a credit and the borrower must repay it, just like capital. But fiat is created out of thin air, and once returned to the creator, it may be destroyed without consequence to any real capital.

A perfect fiat has no physical existence at all. It is created when the issuer enters a credit in the account of the borrower. It is destroyed once the borrower has paid the debt off through a debit in the account. All of these are done merely by book transfers.

The sensation of money as a real capital is thoroughly confounded by the ancient practice of keeping gold or such other reserve assets. It is entirely useless as a basis for fiat, until one needs it to keep the illusion that the value of the money is based on the reserve asset. The fiat works not because there is some gold buried deep into manmade mines, but because there are real products against which the money serves as a means of payment.

The gold reserve or other reserve assets have simply nothing to do with the actual output traded against the money. As long as people can buy the kinds of things they want to buy with the money, they care nothing whether there is some gold buried somewhere. The cessation of convertibility of US dollar into gold since August 15, 1971 did not bother anybody anywhere. The dollar has become a better money by divorcing itself from the gold.

7.6.2.3 Will Gold Return as Money?

The illusion of money as a store of value reaches its most extreme state among a few who earnestly believe that gold and precious metals will come back as the most reliable store of value, if not as actual currency in circulation. This illusion has helped some gold traders, but harmed many more, who saw the price of gold collapsing and being manipulated. However, it is certain that no precious metal will ever again be used as currency due to the high transaction cost to verify the weight and the fineness of the coin every time it changes hands.

Gold and silver coins went out of circulation because merchants were fed up with the hassle of having to pay a hefty fee to the goldsmith-banker to assay the metal and certify it. They begged the goldsmith to keep the already assessed metal in their vaults for a fee. Then they begged the banker to transfer the money through book entries rather than bringing them out of the vault and reassessing them. Goldsmiths may figure out how much it will cost to use gold money compared to using paper money or better still, to using plastic cards for electronic transfer.

There is consumer use of gold and other precious metals. It is odd that the sagacity of Russell or Keynes was not enough to persuade the world to give up the ceremony of putting gold in manmade mines and protecting it at great cost to make sure it cannot be put to actual use. Other than keeping alive a costly and harmful illusion, it serves no purpose.

There is no doubt that given enough time, ordinary people will understand that the monetary authority really manages claims on real output. In this job, the authority must create new fiat money whenever new real output is brought to the market and promptly destroy the money once it has been used to transfer the output to the buyer. Then people can be persuaded to see that keeping the gold in the mines is foolish. The gold may be put to actual use without any harm to the value of money.

Some thinkers wish that the government monopoly on the creation of cash would be ended if gold could return as money. This is a grand illusion. Currently, the government monopoly on creating hard currency affects only a tiny fraction of the money, because most money is transferred via checks and electronic cards.

The private sector is really the major creator of the fiat money through the misnamed process of multiple credit creation. The return of gold coin will create a perverse increase in regulation. First, the government owns the monetary gold that now sits somewhat harmlessly as if it did not even exist. But the return of gold money would suddenly increase the value of the gold stock and increase the monetary power of the government.

Importantly, the government will be compelled to hire a huge army of policemen to run after the counterfeiters. The age of metal money was constantly plagued by counterfeiters. The comeback of metal will simply make it a disaster. Indeed, even paper money is becoming too costly to use in comparison to plastic cards.

7.6.3 Need versus Demand for Money

Money is not a real good and hence it can have no demand. People are compelled to take it because they have an unavoidable need to use it. There is no alternative to money as the only means of payment in indirect trade.

For an analogy, the demand for parking tickets is akin to the demand for fiat money. People do not want parking tickets, but they may risk getting the fine if the cost of the ticket is lower than the loss of not parking illegally. If one wanted to present it as a transaction cost in the light of Coase Theorem, one would do even better. There is a cost of complying with parking regulations and a cost of violating them. One may decide which one is a lower cost.

The decision to take money, even in the extreme case of borrowing it against stocks of goods ready for sale, is based on the comparison of the cost of using money and the cost of not using money. Figuratively, the cost of not using money is the cessation of the dirty business of this world, which the hermit may give up for the solitude of the caves.

The need for money is measured by the Keynes Matrix, which is the transpose of the Wicksell Matrix and hence has the same value. The Wicksell Matrix measures the value of output which must be paid with money. It must be noted that the need is for the total for an exchange. Under a long circulation regime, the token in circulation will be the total need divided by the length of circulation.

7.6.4 Value of Money:

The value of money is determined by the equivalence principle despite its being an artifice. Its value is derived from the value of the real goods between which it is the intermediate payment. Thus it is precisely equal to the value of the good which it pays for. This is also precisely equal to the value of the good which pays for the money.

Thus if Adam buys the bananas with the apples, the value of the bananas is equal to the value of the apples. Again, if Adam pays for the candy with the bananas, the value of the bananas must be equal to the value of the candy.

This happens despite the fact that Adam cares not a bit about either the utility or the cost of the bananas. In place of the bananas, use a perfect fiat and it has the same value. The token's own utility or cost has no relation to its value. Indeed, the intermediation process severs the relation of market value from either marginal utility or marginal cost for any traded good.

7.6.5 Issue, Availability, and Supply of Money

Money is a management tool and can not be produced or supplied as a real good for sale. The key is that its cost of production is identically zero because it cannot be produced. This may be confused with the cost of production of the token, which is the cost of transaction and not a cost of production.

The issuer of money does not decide how much to issue according to how much it costs to print the token notes or mint the token coins. The best way to see this is to recall the example of commodity money. Adam issues bananas to Cindy, but without incurring any cost of production of bananas. Money is issued as a loan and not sold as a good. It cannot be sold by the issuer. Of course the issuer incurs the cost of managing the claims, but that is not the cost of production of money.

The relevant concept is that of availability versus need rather than supply versus demand. The problem is to see the risk the issuer faces in lending.

A bond is issued by a risky borrower and cannot normally circulate as a means of payment. In the bond market, people pay for bonds with money. The lender lends the money to the issuer of the bond. It is the money that serves as the means of payment, as it carries a credit rather than a debt. Anyone who has the money has a credit which the others are willing to redeem because of the known readiness of the original issuer to redeem it instantly upon presentation.

The redemption works by cancellation of the debt of the borrower who borrowed from the issuer of money. In contrast, the bond keeps the borrower indebted regardless of who may own the bond. The bond may be sold to another lender, but it is no longer a means of payment. The key is that the bond may change ownership without affecting trades of real output. The main point is that the bond itself must be paid for with money

To avoid the confusion between credit and debt, one may remember the following: when a producer sells real goods and gets money, he does not incur a debt by holding the money, but actually acquires a credit, which is redeemable against real goods of other producers. In contrast, the borrower who pays with a bond remains indebted to the owner of the bond and is not able to use the bond again to pay for real goods, because it no longer belongs to him.

The special character of the issuer of fiat money must be recognized. If people do not trust the issuer, it is not possible to issue money. The problem is not that the issuer may be a bad borrower, because the issuer of money cannot be a borrower, but must be a lender. The problem of trust is whether the issuer himself will accept the money to settle the debt borrowers owe to him.

Suppose Greenspan declares that he will no longer accept the $20 bills, (for whatever reason). The $20 bills will instantly cease being money, but rather become counterfeit. Again suppose that the Fed declares that it will henceforth take Mexican peso in settlement of any debt to the Fed. It will instantly become US dollar (of some rather odd denomination).

The issuer's job is to manage the claims on real output. The legal notion of legal tender does in fact capture the critical element of the management of claims. This is a law that people abide by eagerly. The presence of laws to make cash legal tender is not the origin of money. Money arose from actions of seigniorial merchants. States legalized what already existed.

7.7 Outline of a Theory of Bonds

A bond is a special kind of bartered real good. A bond is a current promise that serves as a means of payment in the current period. It may also be the reverse, when the original issuer of the bond now redeems it. The matters of lapse of time and the associated risks and interest burdens belong to the theory of value and not to the theory of payment.

In payment theory, a promise may serve as a current means of payment as a subcategory of barter. One cannot borrow or lend indirectly because of the peculiar need to trust the borrower (=issuer of bond). It is impossible to sell bonds in the bond market without the use of money. It would be quite a rare event to see one bond being swapped against another. It is possible

to swap (=barter) stocks, but it is hard to imagine bonds being bartered.

7.7.1 Demand for Bonds:

A bond is a real good. The buyer takes it as a store of value and gets utility from the storing of value. Time preference determines how long one wants to store the value and for how much value. Its demand is analyzed exactly like that of any other real good, with its special dimension of time preference.

7.7.2 Supply of Bonds:

Primary agents may produce and supply bonds. It is a genuine real good and one must incur a cost of production of the bond. The decision to get some good now and pay for it in a real good later is based on time preference. The cost is the interest burden one must incur. The borrower is risking his or her reputation, which is a genuine capital.

7.7.2.1 Moral Hazard and Risk

These are matters of value theory. These have no impact on how bonds serve as means of payment. If a saver fails to lend, he suffers from excessive thrift.

The more serious practical problem is the presence of reckless lenders in a position to lend other people's capital under their control. One may find many examples where the brokers lent large sums to favored borrowers and failed to recover the same, while they ignored the honest little borrowers. Whether the moral hazard from the lender's side is the much greater source of instability remains an open empirical issue. The idea is that the risk of the borrower's failure puts the burden of prudence on the lender.

7.7.3 Circulation of Bonds

Can bonds circulate as means of payment just like money can? To see the possibility, one must think of an economy where there is no money at all, including commodity money of any sort. The question of the relation between money and a store of value then comes back.

Suppose that Paul borrows some nuts from John and signs a piece of paper acknowledging the debt. This is a token of the bond. Further, suppose that it is a bearer bond, since Paul promises to honor any bearer who presents the token for redemption. To make it even more optimistic, suppose that Paul is a saint and everybody trusts him. Can the bond circulate as a payment?

The first obstacle is that John is supposed to have stored value. If he sells the bond, his store will be gone. Why would he do that? If he wanted to store it for a little while, why would he not keep the nuts rather than keep a promise against the nuts? If his goal is to earn interest by holding it, why would he sell it?

The second obstacle is the demand for bonds. If Paul is the preferred borrower, why would people buy Paul's bond from John rather than directly from Paul? Suppose that Matt wants to buy the bond from John. Now, Matt's barley goes to John. John's nuts and Matt's barley are gone, while Paul remains indebted to Matt. If Matt wants a store of value, the bond stays with him and ceases to circulate. Why would Tim now buy the bond from Matt rather than directly from Paul? Indeed, why would Tim want a bond? Cannot he just keep the wheat as a store of value if that is what he is after? Or why can he not sell the wheat to Matt? Why would not Matt himself just sell the barley to John?

If the bond has changed hands, than it has served as a means of payment, and not as a store of value. John really does not want to store value, but simply to sell his nuts and buy barley. Likewise, Matt does not really want to store value, but wants to sell his barley and buy wheat from Tim. If there is real demand for a store of value, the bond cannot circulate. But if in fact the bond has circulated as a means of payment, it has simply exploited Paul's reputation to become a fiat. Nobody apparently worries about Paul failing to redeem the debt, because nobody is really lending anything.

The problem now is to see how a bond of a reputable borrower becomes money, but only by ceasing to be a store of value. Supposing that everybody accepts Paul's bond, it becomes money only if people do not store it, but spend it. The trouble now is to find out the balance between the demand for and supply of bonds (= Keynesian savings-investment equilibrium).

Suppose that Paul is the only borrower and agrees to borrow 1 dollar's worth of nuts. Suppose that Paul agrees to redeem the debt in Paul's own product: sacramental water. As long as nobody cares about having to take sacramental water in future, it works as a perfect basis to turn the bond into a fiat. But if there is someone who wants the water, and hence hangs onto the bond, it ceases being a means of payment.

Of course the whole reason Paul borrowed from John is that he could

not have produced the water in the current period. If he could, he would have no reason to borrow rather than pay with the water.

It is essentially the same problem in international money under the Bretton Woods system. If the only way other nations can get international money is for the USA to incur a trade deficit, and if the USA refuses to incur more than certain amount of deficit, the world cannot have enough dollars. There is no presumption that the only trusted borrower must borrow all that the willing lenders want to lend. What if a number of people collectively want to lend their surplus valued at five dollars, while Paul is willing to borrow no more than one dollar?

A Keynesian breakdown in the savings investment equilibrium process would become inevitable if the trusted borrower refuses to borrow beyond a certain amount regardless of the interest rate. Nobody can possibly remain trustworthy by agreeing to borrow without a plan to use the credit in feasible projects. But the monetarist model can work if and only if the issuer of the bond agrees to issue all the bond others want to buy, not unlike throwing bonds from the helicopter.

More importantly, is there anything the bond can do to meet the need for money as a means of payment apart from the need for stores of value? If people need money to pay for goods they want to buy now, how can a store of value possibly help them? Even more strangely, if money is a store of value, why would people borrow it? Does anybody truly save by borrowing?

The upshot is that a bond cannot circulate as a store of value simply by definition: a store is not sold. If it circulates, it is a fiat by another name. The bond market of course shows that bonds are traded, but as stores of value, after considerable time lying in storage. Most importantly, the bonds themselves are paid for with money. One can just imagine that there is no money and then figure out how bonds will be traded.

Perhaps a house is a good analogy to see bond as a store of value. The ownership of the house may circulate(?), but not without money. It is possible for a house to become money (as in Yap island where immobile rocks served as money), if the owners agree to circulate themselves, as if in a musical chair, each taking a turn to proclaim ownership (=claim) and then redeem it for some real good.

7.7.3.1 Myth of Money as Debt

The myth that money is in origin a store of value and a debt of some reputable borrower may have a palpable illusion in the history of banking. Let us imagine that mythical Sir Gresham is a the very incarnation of a trustee, the most reliable safe keeper of gold and silver coins on Lombard Street, proudly displaying the grasshopper on the door as a symbol of trust and wealth.

Suppose that merchants have kept 100 (million) golden pounds with him, the only safe keeper in all London. There is no doubt that Gresham himself is an elite rich man, because it is unlikely that rich men would keep their money with a pauper. The trust in him must have been present before the merchants asked him for the safekeeping of their metal pounds, say, because his family has been trusted for a several centuries. It simply announces that if Gresham wants to borrow, all London rushes to lend.

That is the myth, because Gresham does not borrow. He lends. He is a safe keeper and of course he acknowledges his liability to give back things kept under his care and custody. He has not borrowed the money, and indeed, he charges a fee worthy of a first class gentleman for safekeeping. The 100 pounds belong to others and Gresham watches over them.

It is necessary to see why people keep money with Gresham rather than right in their own pockets or under their own mattresses. The lesser reason is that people can hardly trust themselves to keep the money safely. Gresham has a well-secured vault which others do not have, ostensibly because others never had enough money to justify making a vault strong enough to withstand greedy armies of robbers and even of pitiful kings!

The biggest reason is that people actually must spend the money and that requires transfers, which are far more costly to do without the help of the safe keeper whose more important job is to make transfers from one account to the other. Every time metal coins leave the vault, they cannot come back without a fresh but costly assessment of their purity and true weight. Every time it goes out, it is at risk of being robbed, lost or even squandered.

Imagine how it would be for business if the banks today refused to take deposits or checks and refused to collect money from other banks on behalf of the customers. Imagine if there were no such thing as a checking account and hence there was no way to pay bills or send checks by mail. It is clear that the banker as a common manager of claims is important to

cut down the cost of paying and receiving payments in money.

For various reasons of transaction costs, people keep money in banks rather than at homes or shops. The safekeeping is not a necessary basis for creation of money out of thin air. If a bank is just a safe keeper of other peoples money, it cannot create fiat. All it does then is to keep the money safe and give it back to the owners. The idea that bankers lend other people's money is a myth: they safe keep other people's money and create fiat money to lend. That lending is possible if they act as claims managers, not just safe keepers. They do not lend other people's money. Those who do are called brokers or investment agents. They take other people's money (=wealth) and lend it out on their behalf for a fee and there is no more to be lent.

Suppose that Sir Gresham the safe keeper has found from very long experience that people leave most of the money for safekeeping with him. He judges that it will be prudent to keep no more than 20 coins out of the 100. Everyday, people will take coins out through one window and deposit them back through another, in the end, rarely changing the amount of coins in custody. For reasons of transaction cost, most merchants prefer to send checks to acknowledge obligations to pay the bearer and Gresham, being the banker of the claimant, simply transfers the claim by bookkeeping. It is as claims manager, not safekeeper that Sir Gresham clears the checks.

In another capacity, Gresham has always been a lender, indeed, the most eminent lender of all. Suppose that some merchants petition him for a loan. He agrees to lend them 80 pounds, thinking that these many coins are never being used and will not be missed by anybody. Whose money is he lending?

It is an illusion that he is lending other people's money, because the other people still have all their money, all the 100 pounds still belong to the original depositors. The original depositors can write checks for the full 100 pounds, but the coins will still stay with Gresham, the common keeper of money for all London. Gresham is able to lend 80 pounds that physically do not exist, because all he has to do is pretend to safe keep them and transfer them by book entries.

The new borrowers also deposit their cash with Gresham. It would be silly, for reason of transaction cost, for the new borrowers to actually take out 80 gold coins, then return them by paying a fee to assess them. It would be generally silly for goldsmiths to issue stamped coins which they would accept without checking for purity and weight, because that

would simply ruin their source of income from assessment. Thus the borrower gets the claim on 80 pounds, although the coins that do not physically exist are alleged to be safely kept by Sir Gresham. The borrower can go ahead and buy 80 pounds worth of goods, but the coins that did not exist will still be safe with Sir Gresham, who will simply make book transfers to settle the claims. This will work even if people actually took out the coins and deposited them back.

On the presumption that some 20% of the deposit needs to be kept ready for delivery, all Gresham needs to do is set aside 16 of the 80 coins in reserve. The bank now has a total deposit of 180 pounds, and may physically possess no less than 64 coins, supposing that 20+16 coins have gone out. These 64 coins are not going to be needed ever and indeed need not even exist at all. The need is for the reserve of 36 pounds against a deposit of 180 pounds. By so-called multiple credit creation with a reserve ratio of 1/5, Gresham can increase the deposits 5 times, even though the physical number of coins remains just 100 pounds. The 400 pounds of new deposit are fiat. They serve the same purpose that the gold coins do, but they do it better (= at lower transaction cost).

To see the problem more clearly, we may separate the three functions of lending, safekeeping, and claim management. Suppose that Mr. Thorchilde has 80 gold coins to lend. He lends it to Lord Hazard, who then drowns with his ship and gold. This surely is no longer available to be lent by other people such as Sir Gresham. However, suppose that Lord Hazard was smart enough to keep the coins safely with Sir Gresham. Even though he and his ship disappear in the sea, the coins remain and are available to his heirs.

Suppose that Hazard's heirs keep the coins under Sir Gresham's custody, but Sir Gresham refuses to make any transfers, insisting that only the owners are allowed to take the coins and nobody is allowed to deposit it back except the Hazards. The Hazards now have only one option: keep the coins in custody or take them out to make payments. But when the coins go to other people, Sir Gresham refuses to be their safe-keeper.

Imagine that the recipients of the coins find another safe keeper, but Sir Gresham would not accept any coins from them. This is patently absurd, but if this happens, there is no way to create fiat. Sir Gresham, without being the claims manager (who makes transfers through book entries) could not create the fiat and hence could not lend it.

Indeed, if he refused to manage the claims, people would not keep

the money with him. Then there would be little bearded fellows sitting on benches with their instruments and chemicals to assay and weigh the coins every time they changed hands and the merchants would feel like retiring from business and live like Van Gogh.

Indeed, safekeeping is only an incidental job. The real job is managing the claims through book transfers, to avoid the cost of transferring the metal itself. Thus imagine that France decides not to take paper dollars, but wants the real gold, say worth a billion dollars. America promptly agrees to deliver the gold, but France discovers that it is risky and costly to ship this. She requests America to keep it safe. This time, America charges a hefty fee to keep it safe. Else France must take it and keep it safe herself, by building a strong fort and manning it, just to make sure this gold is never used.

But if the banker is the manager of claims, he never really needs any reserve coin in even the first place, as soon as he has the trust of the merchants to serve their purpose. Historically, banking arose first as a specialist job of assaying coins, then as safekeeping and claim managing to cut down the cost of assaying. Even when coins were standardized by royal minting to avoid the cost of assaying, it was still too costly to pay with coins than through a claims manager. The banker as claims manager cuts down transaction cost, for example, by avoiding the cost of making a trip to the bank. Even paper money is too costly to transfer without the help of the bank. It is less costly to make transfers with plastic cards and automated teller machines.

7.7.3.2 Why is Money Not a Store of Value?

The main theoretical problem of regarding money as a store of value carrying a debt of the issuer is that it misses the function of money as a means of payment. It inevitably worries about issues of capital and credit and hence cannot deal with the issues of payment. Instead, it creates myths.

While the real world suffers from severe shortage of liquid means of payment and hence is stagnant and unemployed, the notion of a store of value worries about the general acceptability of money as a debt of the issuer. It puts the reality on its head. The trouble is that the creators of fiat refuse to issue enough fiat because the borrowers are risky. The problem is availability, not acceptability. This reversal of the function of money needs more clarification.

7.7.3.3 Is Money Generally Acceptable?

This question is akin to asking: is the earth lying still? One who has not already learnt and accepted the Copernican theory, the obvious answer is that the earth is definitely lying still, as it always has been perceived, as testified by all witnesses. How would Copernicus convince the people that the earth actually rotates on its axis and moves in its orbit around the sun, at speeds far beyond any possible human experience? He cannot possibly give the people a palpable sensation of the earth's motion. How can he present a counter-intuitive proposition?

Common people have always thought of money as a generally acceptable means of payment. In their view, money is something that everybody accepts. It is the very character of money that it will pass from one to another and keep circulating. Many curious people have written their names on a few paper bills to see if these would come back. Most never saw them again. This is because even though each payment circuit is finite, each agent is involved in a very large number of circuits.

Conceivably, every different vendor and customer for the same agent belongs to a different circuit. It becomes difficult to believe that the money actually comes back. And yet it does. People had no idea how the sun returned to the east at sunrise after having set in the west the previous evening. It seemed to present an unsolved puzzle, but it did return.

Perhaps one can plead that money is actually a tool to transfer claims. Thus in Figure 18, let agent A get a dollar from the issuer and promptly buy B's good. This enables B to sell the real good and to earn the dollar, which B can return to the issuer. But by the same policy, H would also have a dollar directly from the issuer, and H would promptly buy A's good, so that A could return the money to the issuer. A would not see the same dollar bill again, because it will go to B and then to the issuer, who will simply destroy it.

The process uses the same aggregate amount of money, 8 dollars in total to allow transfer of 8 dollars worth of real output, but instead of using 1 dollar 8 times, it uses 8 dollars 1 time each. The difference is that A does not have to wait for the money to pass through the hands of all other agents in the circuit to return to him.

A short circulation policy will cut down the time it takes for the producer to get money from buyers. It will cut short the payment period

and hence appear as a very brisk increase in demand for the output for the usual length of payment period. Thus Suppose that where it took 8 days for an agent to get the money back after it circulated through the long circuit, it now takes only 1 day. It then seems like an 8-fold increase in demand over 8 days. It seems that the money supply has increased 8 times. This creates a perception of inflation as discussed later.

The reply to the notion of general acceptability of money is that under a short circulation regime, the policy must deliberately restrict the circulation by making the money not generally acceptable. Indeed, the proposal is to abolish the use of bearer cash altogether and replace it with single use checks or coupons or better still, with electronic transfers.

The idea of money as a generally acceptable means of payment is an illusion, just like the earth lying still is an illusion. Suppose that the US dollar is accepted everywhere on earth except a small island of Swandip, where the tiny population of shipwrecked sailors use ceremonially painted coconut shells as money. This shell money is accepted nowhere else. Yet it is the case that the shell is money in Swandip while the dollar is not. It is entirely irrelevant whether other people accept the money, as long as the one and only agent whose acceptance is needed to buy the desired good is ready to accept it. The recipient does not have to accept it because he knows others in turn will accept it: he can do so if the society's senior will accept it.

It is not the general acceptability to the public, but the assured acceptance by the issuer that keeps the fiat money in circulation. As In the short circulation regime, a producer will receive a check from long as the issuer accepts it, people have no problem accepting it. the buyer, and this check will not be acceptable to anybody except the very issuer of money. If the bank accepts the check to settle the producer's debt to the bank, there is simply no reason for the producer to care about what others think of the check. Indeed, the producer would feel safer to have the check rather than bearer cash, because he knows that it will not be stolen or robbed. Its acceptance to the rest of the world is entirely pointless for him.

It is a grand illusion that people accept cash only because they think that they can pass it off to others. The illusion can be dispelled once one thinks about genuine cash and counterfeit. The government does not accept counterfeit notes or coins and instead punishes the counterfeiter. Suppose that the government declared that it will no longer accept the

(genuine) notes. The money in circulation will instantly become worthless and unacceptable.

The idea of money as a store of value reinforces the illusion that it is generally acceptable and creates the further illusion that somehow, the money must be a superior good to enjoy such universal acceptance. The notion of offer shows that money must be the least acceptable of all commodities. People give up money (or the real good which was sold to get the money) in order to get real goods precisely because the money is not preferred to the good which the owner of money wants to consume. If money is more acceptable because it is superior to other goods, why do people spend it rather than enjoy the money itself? It is acceptable; because it serves a necessary function, not because it has utility.

7.8 Outline of a Theory of Liquidity

The task of the theory of liquidity is to explain the competitive acceptance of various monetary currencies or commodity currencies. Cash is more liquid than a real good in the sense that one can pay for anything with cash, but not with a real good. The explanation uses an example of international money. It is provided by the fifth equation of exchange. Let each country balance its exports and imports. Let there be h nations and let the global equilibrium be denoted by

$$\Sigma_h \Sigma_A \Sigma_B v_{AB} = \Sigma_h \Sigma_A \Sigma_B v_{BA} \ [\text{for } \Sigma_A \Sigma_B v_{AB} = \Sigma_A \Sigma_B v_{BA}]$$

Suppose that each nations has its own national currency. This allows anybody to pay for any good found in that nation. The problem of liquidity is to see which currency can pay for goods from a greater number of nations. It is just the same as if many individuals have different kinds of good, but not all of them are equally acceptable as means of payment.

To find out the competition among national currencies in international trade, the key is to look at the crucial job of the international seigneur as the manager of international claims. Suppose that Italian bankers have established several banks all belonging to the same network. The banks operate globally in the major centers of international trade. The presence of a global network allows merchants to transfer payments from one city to another through Italian banks at a much lower cost than through other banks who lack those networks.

If the Italian banks prefer the Italian gold coin, that becomes the *de*

facto international coin. The Sultan of Turkey may have gold coins which are materially no worse, but he may not have a network to settle the payments between merchants of different countries. The purity of the gold is not at all relevant: the readiness of the Italian international banker to accept it is all that matters.

Or suppose that there is a Bank of England, which serves as the global clearing house of a network of London-based banks. The London network can arrange payments across the oceans at a much lower cost than the Indians can, because Indians have no banks outside India (and indeed even inside India, circa 1790 AD). Indian silver has no fault versus the gold coins of European nations. The trouble is that Indian silver has no manager to circulate them around the globe. It is obvious that Indian silver will not be internationally liquid, but English coins will.

Or suppose that both England and the Netherlands have introduced paper money convertible into gold. Suppose that the Netherlands issues 8 paper units for every gold coin in reserve while England issues 50 paper units for each gold coin. However, the Netherlands have no global banking network to allow settlement of payments while England has a network. Then English paper money will circulate internationally far more widely than the Dutch ones.

Or suppose that the New York Fed suddenly decided not to serve as the clearing house of the nations of the world anymore, while His Majesty the King of Nepal picked up the job. Then Nepalese currency will be international money while the US dollar would cease to be one. More realistically, suppose that a new world organization called World Money Bureau (WoMB) is set up to serve as the world's clearing house. Its currency EDR (Equitable Drawing Rights) will then be the only international money.

It all depends on who can manage a greater volume of payments. It has nothing to do with the intrinsic worth of the metal or the strength of the economy. Whose money is more acceptable depends on whose management is more cost-efficient. Transaction cost is the key to liquidity. Whoever can arrange payments at the lowest cost will be able to issue money more readily acceptable than others whose transaction costs are higher. The issuer himself (or the organization) will try to reduce the cost of managing the claims. ATM machines were not demanded by customers, although they found it more convenient and hence readily agreed to use it. The banks were desperate to use ATM machines to cut cost. Competition was key.

The theoretical problem with liquidity is that under a long circulation regime, there is perpetual shortage of liquid means of payment. In desperation, many people store money rather than acquire interest-bearing assets. This is a perversion of investment.

The private sector can do something to create limited-liquidity coupons to overcome some of the shortage of liquid means of payment. See Chapter 9 on Industrial Clearing House.

The nations of the world can set up an international agency to issue a fiat international money to manage international claims. No token need be used, and the fee for using such a money may be kept under one-half of one percent, thus eliminating the immense burden of fiat debt. See Chapter 9 on World Money Bureau.

7.9 Basic Theorems of Pensation

The most important theorem to derive from analysis of payment is that real output depends on the means of payment. Money matters very, very, very much. The payment circuit yields three more theorems on the effects of long circulation of money. These are about involuntary unemployment, unintended debt and abortion of real capital.

7.9.1 Theorem on means of payment

Theorem: The volume of output depends on the means of payment.

Proof: The decomposition of aggregate output in the Leontief matrix into four component matrices of Subsistence, Barter, Wicksell and Fund show that money is necessary to allow the trading of the output in the Wicksell matrix, while bonds are necessary to allow the output in the Fund matrix. Money cannot be neutral if it is a necessary means of payment. Nor can bonds be neutral if they serve to transfer surplus output to deficit buyers.

Discussion: The key insight from the theory of payment is that real goods may fail to serve as means of payment. In that case, artificial means of payment are required to allow indirect exchange. Without these means of payment, output cannot be sustained.

The previous literature could not discuss the means of payment because there was no tool to formalize the preference over goods of different kinds of the same market value. Classical quantity theory did not see money as a means of payment. It saw money as just a unit of account. It had no idea how money circulated as a means of payment. It

had no idea how money was issued. It had no genuine supplier of money. It talked about money supply without ever identifying a supplier and giving reasons to supply money. It gave reason why people would take money, but not why they would give it.

The monetarist version of quantity theory also does not see how money circulates. It pretends that suppliers just drop money from a helicopter, thus turning it into a mere unit of account. The short run effect of money on output due to money illusion or mistake of workers is not a tenable proposition. It would help if one took a payment circuit to explain how the recipient of new money agreed to borrow it and decided to spend it. It would help explain why one would pay a higher nominal price for a good.

The rational expectation model's claim of super-neutrality of money fails. It does not see money as a means of payment. It does not recognize the existence of institutional constraints. Primary agents have constraints which they cannot control. Mr. Greenspan as a senior has the ability to affect the constraint. He can raise the cost of using money and rational people must respond rationally to a higher cost of using money by reducing borrowing. No amount of rational expectation can help them to actually prevent the cost of using money from being raised by Greenspan. Indeed, the reason Greenspan raises the seigniorage fee on fiat money is that he is able to manipulate the constraints.

Monetary policy has effect precisely because policy can manipulate constraints and not because people are irrational. No policy can work if it relies on fooling people. Smart theory does not allow foolish people. The presumption that monetary authorities employ policies to defraud the people is untenable.

Keynesian theory of money does claim that money affects output and employment. The exposition is not fully convincing, because money is seen as a store of value. It is now possible to clear up the distinction between ability to buy and ability to pay. Money as a means of payment must affect the volume of trade. It cannot have the same effect as a store of value (=bond).

7.9.2 Theorem on Involuntary unemployment

Theorem: Lack of money is the cause of involuntary unemployment. It is both necessary and sufficient to give rise to involuntary unemployment.

Proof: The Wicksell Matrix clearly shows the real goods for each of which demand is equal to supply and at the market clearing prices. If there is money, there is nothing to prevent the trades and hence the employment.

If there is no money, these goods cannot be exchanged, and hence the factors are involuntarily unemployed.

Discussion: In a modern monetized economy, bankers do not as a rule lend fiat money to all producers who have real goods against which money must be used as means of payment. Only a few producers are able to borrow money from the issuers, while the rest must wait to get it by selling goods. The lack of money simply means the extremely long waiting for the money. Unemployment during the waiting period is involuntary.

One may feel that there is no evident shortage of money. One feels that there is rather an ever present danger of inflation from excessive supply of money. Intuitively, one sees that the problem may be low real demand and not the slow flow of money to make the demand effective.

The abstract notion of the payment circuit may be filled with a bit of concreteness to make it easier to grasp. In real life, a producer may sell goods to a very large number of customers, each of whom may be a member of a different payment circuit.

Figure-20: Many payment circuits
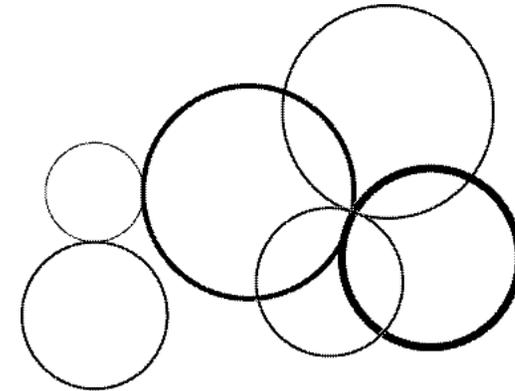
One agents also have many circuits, so that the money may leave one circuit and enter another without completing any particular circuit. The result is that one may now and then manage to sell a few units of output. But on the whole, the waiting is long. During this period of waiting, the producer cannot produce, although producers do keep an optimal inventory ready for sale. It is necessary to study the issue of optimal inventory in the light of the flow of means of payment from the buyers.
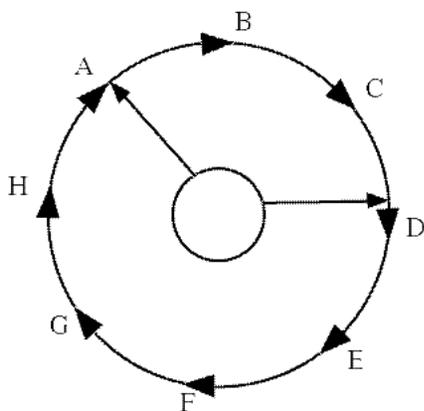
It is **Figure-21 : Payment circuit with semi-long circulation**me of whom are able to borrow money while others are not allowed to borrow.

In Figure 21, agents A and D are able to borrow money while others are not. Some agents have to wait longer than others to get money from selling.

Since the Wicksell Matrix measures the need for money, one can compare the actual availability of money against the output in the Wicksell Matrix to find the shortage of money. Gross measures of financial depth will not serve the purpose, because the money available against existing stores of value has no relevance to trade. Similarly, money used by merchants to buy inventories from other merchants would not be relevant. The relevant measure is the money available directly to producers. It excludes the money given to intermediaries and speculators who buy and sell existing stores of value or existing durable assets. One must see that the trade in existing inventories or stocks or bonds must use capital, even though the capital itself must monetized.

Conceptually, the relevant benchmark is the short circulation regime under which producers get money instantly upon production of the output. To define a payment period, one allows the institutional features to determine the time it takes for a buyer to spend the cash already in possession. One may get a rough measure of the average length of time cash is held before spending. This length than roughly measures the length of the payment period for the given structure of output for which the length was measured. One then calculates the value of the output at full capacity during this period.

This will assume that all unemployed people and unused capacity would be working at full capacity during this period alongside the actually working people and other factors. The lack of cash is found by subtracting the actual sale from the value of full-capacity output for the same length of time. Even if one does not measure the length of the average payment period, one gets a rough measure of the lack of money by simply comparing the value of full capacity output and the actual value of output sold for any given period of time.

If one sees that such a measure is creating shortage of money by definition, one would be right. There is no earthly reason why the available money would be any smaller or larger than the value of full capacity output. There is simply no reason why the producer should not be able to buy real goods instantly upon producing the real good that ultimately pays for other goods. One must use Wicksell Matrix to ensure that demand equals supply for each good.

Classical economics, including the monetarist and Lucasian versions, does not recognize the need for means of payment. Say's Law presumes that as soon as the equivalence condition is satisfied (each buyer has the ability to buy, as given by the value of the good the buyer proposes to supply), there is nothing to prevent the trades from taking place. But the whole trouble is that indirect trade lacks real double coincidence. Money is necessary to create the artificial double coincidence to allow trades, since barter is impossible.

Keynesian economics provides a rather unclear explanation of involuntary unemployment due to a confusion between means of payment and stores of value. The clarification has two dimensions. The first requires the distinction between ability to buy and ability to pay. The second needs the distinction between fiat money and real stores of value.

Some interpretations of Keynesian theory of unemployment seem to require some kind of market imperfection, be it wage stickiness or money illusion or liquidity trap or outright disequilibrium in the labor market. Such an explanation contradicts the premise that the market tends to achieve equilibrium. The root of the trouble is the notion of equilibrium itself. The market equilibrium requires not just equivalence, but also double coincidence.

The proper equilibrium concept must include the conditions for payment: the buyer must have the ability to pay with the right means of

payment. For indirect exchange, money must be present to serve as the means of payment.

The other interpretation in terms of the IS-LM analysis is more difficult to articulate. The investment-savings equation deals with a store of value. The most fundamental distinction between fiat money and a store of value (bond) is that the bond cannot circulate as a generally acceptable means of payment and hence cannot have a multiplier effect to lead to depression.

What is a store of value? It is a real good carried forward from the current period to the future. If the owner stores it, such as when a farmer stores seeds or a producer builds an inventory, it is a part of subsistence output in the current payment period. Let this be called an asset.

A debtor cannot borrow anonymously. If the owner of a current surplus decides to lend it, it must be a barter deal between the lender and the borrower, because the obligation of the borrower cannot be transferred. An anonymous borrower cannot pay with bonds at all, and certainly an anonymously issued bond can not circulate as a means of payment. In contrast, the issuer of money is not a debtor, but a lender who must insist that the money be returned.

Real output may be directly bartered between the real good and the bond. But in most cases, the bond itself must be sold against money. It does not matter whether the producer of the real output sells the good and lends the money earned against it, or whether the borrower takes the real good and sells it to get money. If the lender can directly lend the real good to the borrower, this should be treated as barter. There can be no problem of unemployment if such a barter in debt is possible.

The trouble can come only if the borrower needs a real good that the lender does not produce, so that money must be used to meet the need of the borrower. Such a bond may be called a liquid bond. A Keynesian depression may occur if the liquid bond loses its demand as the prospective buyer of the bond hoards the cash. It is the cash that creates the troublesome multiplier effect, not the bond itself.

A liquid bond is not only not money, but cannot exist unless fiat money allows it to come into existence. This is a very important point. One must look into the practices of the banking sector or the financial intermediaries to see the problem clearly.

Suppose that John produces cabbages and wants to build up a liquid store of value. He does not want to store cabbages. Can he go to the banker and deposit some cabbages, whereafter the banker lends those cabbages that keep circulating as means of payment, until John gets the cabbages back? No. John must first get money for the cabbages and instead of exercising his claim on the current output for his own current consumption, he can save the money and then lend it to the borrower, with or without the intermediation of the banker.

Suppose that Paul issues bonds and John buys them with the money. No matter where the money goes, Paul remains liable to John the lender. When Paul pays with a bond, he remains indebted to John, but when he pays Tim with the borrowed money, he is not indebted to Tim.

Consider the various scenarios of what happens to the real output and the money and the liquid bond. First, consider the Keynesian depression. Suppose that initially, the economy is in steady state full employment equilibrium. Period after period, the correct quantity of money circulates in the payment circuit, and all goods are traded. Each period, Paul issues the bond and John buys it.

But for unexplained reasons, John decides not to buy the bonds in a certain payment period. Now, the sole means of payment for all indirectly traded goods is missing and henceforth all trades stop, despite the presence of demand and supply at equilibrium prices.

There is real disequilibrium in the bond market, not the labor market or the market of any other factor or product. The stoppage continues until the money comes back into circulation. If the government undertakes a fiscal policy and injects cash into circulation, the trades begin and employment is restored.

It is not necessary to repair the bond market. There is no harm putting Paul out of his misery as long as the goods that Paul used to buy are bought by the government. In effect, fiscal policy may repair the breakdown in the payment circuit by replacing both John and Paul from the market. According to value theory, Paul may learn to issue the proper kind of bond or real good to persuade John to buy them.

The danger in the fiscal policy is that John may come back in the next period and try to buy up real goods with the money now released from the hoard. It will then increase the money in circulation, because the government already injected the missing money. The job for the government would be to withdraw the money it injected to allow John to inject them now. It is a political issue of whether John should be punished for creating havoc by withdrawing the market's sole means of payment. Perhaps a political program may find some justice in

compelling cash hoarders to lend the money to the government. As an institutional matter, the government may find it hard to dismantle the projects it undertook in order to pump money into circulation.

Could a Keynesian depression occur unless the bond in question was a liquid bond? The answer is negative. The prospective lender (of real good, not money) would sit with unsold goods and the prospective borrower would fail to get those goods. All other goods would still be bought and sold. It could not have a multiplier effect. In that case, Keynes would have nothing to add to the classical view that individual sectors could have unsold supplies at the same time as some other buyers would have unmet demands. Such a situation would be temporary, because the sellers and buyers would want to reconsider other options to produce and consume.

The Keynesian depression could not occur until the bond itself was sold for money in the first place. That is, the liquid bond could not even exist if there was no money to begin with. Certainly, a store of value can in no way serve as a circulating means of payment, only money can.

This last statement requires clarification. Suppose that there is no fiat money. John lends some real good to Paul. Paul has issued a bond to John. Can Paul now go to Bob and buy real good against his liability to John? Is the debtor's liability transferable? If it is not, how can it circulate as a means of payment or become a money?

Consider the alternative. John has the bond issued by Paul, and thinks that Paul is a reputable debtor. What is the likelihood that John can resell the bond to Ben who then resells it to somebody else? The crux of the problem is to see what will pay for the bond if it is sold. First, we must show good cause why John would disinvest his store of value? Is he planning to spend the money to buy real output? Next, we must see where the new owner gets his money from. If Matt buys the bond form John, then Matt must have cut down his demand for current output by exactly the same amount as John has increased his demand for current output. In short, the demand for current output must remain the same even when the ownership of the bond (or the identity of the lender) changes within a given payment period. Nor must we get carried away by fantasy: we must have empirical data to tell us about the rate at which people switch between buying bond and buying current output. It can hardly be large enough to give rise to instability. Although the Keynesian concept of marginal propensity to consume is not a greatly defensible idea for the priests of high theory, one must not forget the generally

observed stability of this propensity. In short, the empirical data on the magnitude of the switch between savings and consumption within a given payment period does not support the switch as a source of instability.

Now suppose that the economy has money and Paul issues a bond to borrow money. Paul of course remains liable as a debtor to John or anybody who John may empower through a transfer of ownership. Paul gives the money to Bob to buy real goods. Is Bob liable as a debtor to John or to Paul? Certainly not. Bob has sold a real good for money and has the full claim on the money. He is not indebted. He can buy goods from Dan with the money and the money can keep circulating. It circulates as a payment, not as a debt. It implies that a store of value cannot cause involuntary unemployment.

There seems to be a general misreading of the idea of money as debt. The Fed as the issuer of the dollar is the lender. The bankers who get the freshly created (hard) cash from the Fed are debtors to the Fed, and not the other way round. The Fed is surely not indebted to the general public. In fact, the Fed owns the gold reserve or other reserve assets against which the dollar is issued. In effect, the Fed lends the gold to the public.

It creates a moment of disorientation, because one may at first glimpse suppose that the Fed has a liability to the public to discharge its debt in its reserve assets. But if one spends just a few more seconds to think about it, one sees that the Fed owns the gold and is indeed giving the public a right over it. It is the general public that are indebted to the Fed for the right over the reserve gold or assets. The Fed insists that the bank (including the government's banker) who originally borrowed the dollar must return it plus the interest to the Fed.

Fiat money is obtained through purchase only against real goods ready for delivery, just as a tool to transfer claims over real output against real goods already delivered. At the point of injection, it is issued against stocks of goods ready for delivery. There is simply no need for any real resource other than the real goods to be moved by the money. But by historical accident, issuers of money do insist on keeping entirely irrelevant stocks of gold and other reserve assets. This is a subject of intermediation theory.

The first glimpses of commodity money arose when alert individuals saw seigniorial opportunities. As already explained, such an opportunity exists when one can readily buy some good even when its is not desired for consumption, but which is known to be sought by someone who is

selling a desirable good. The use of the commodity as a money is in no way a debt. Thus if Adam sold apples and bought bananas, and then sold bananas to pay for candles, he used the bananas as commodity money. But it surely was not a debt. Nor did the recipient of the bananas take the bananas as a debt obligation. Even though the banana is a real good to the producer and the consumer, it is a fiat to Adam who neither produces nor consumes it.

For a social senior who deals as a merchant to many people, it is necessary that the senior must issue some kind of real good as a token of the holder's claim on other real goods sold by the merchant. In this case, it was a bond of high liquidity, since the alleged borrower was ready to give any kind of good as soon as it was available. But as time went on and people had greater and greater trust on the issuer, they would accept tokens with lower and lower concern for the token's real worth. Over a long period of time, competing issuers of money would try to reduce the transaction cost of the token, ending in paper money and then in e-money.

There is one other major stumbling block. The idea of demand for money would make no sense if the money is a fiat. This happened because there was no theory of intermediation to explain why it is rational for secondary agent to buy things without an intention to consume and therefore regardless of the intrinsic worth of the good. Indeed, there is no such thing as a demand for money, because money is not a real good. People do not take it as a substitute of some other good. They are compelled to take it as the only option to pay for the desired kind of good which they cannot pay with barter. There is a need for money, but no demand.

Another misreading of the character of money as a store of value is the notion of liquidity, which Hahn (1984) knows not to have ever been articulated. Consistent economics thinks of liquidity as the competitive quality of alternative currencies. A more liquid currency gives access to a greater variety of goods within any given instant of time. In contrast, real goods are far less readily acceptable as means of payment. It all comes down to the length of time it takes to get one kind of real good against another.

For example, in Figure-16, agent A could avoid using paper money and instead buy 7 goods in succession to ultimately buy the most desired good (B's good). Thus he could sell A's good to H, then sell H's good to G, then sell G's good to F and so on until he sold D's good to C and lastly

C's good to B and received B's good. The transaction cost would be forbiddingly high.

People of course normally take a bit of time to spend the cash. But it has nothing to do with a store of value. People do not get money to build up a store of value: they actually sell money to buy stores of value from banks or other sellers of stores of value. One can sell money to the bank and buy a savings account as a store of value. One can buy real assets or bonds as stores of value.

It is a perversion of the long circulation regime that there is unnecessarily and intolerably long waiting for money to circulate through the payment circuits. This perversion creates the liquidity trap. Exasperated people suffering from perennial cash-flow problems may optimally choose to hold cash as a store of value rather than hold interest-earning assets or bonds.

Instead of the unclear notion of transaction motive of holding cash, one may use a clearer notion of transaction cost. A buyer has to incur a cost of buying (say for visiting the shop) and a cost of paying (by converting the buyer's ability to buy in real good into ability to pay in money). One can then optimize the cash inventory in terms of minimizing this transaction cost.

To sum up the issue of distinction between means of payment and stores of value, it is found that a store of value cannot serve as money, but money may very well be used as a store of value under a perverse regime of long circulation. A mismatch of investment and saving may very well occur, but it cannot be permanent. However, the lack of money can be permanent and hence be the cause of permanent involuntary unemployment, namely, until money is put into circulation. This is discussed under the theorem on abortion of real capital later.

7.9.3 Theorem on Unintended Debt

Theorem: Fiat money must be borrowed by one agent in each payment circuit despite any need or intention to borrow. The borrower is compelled to incur the transaction cost of seigniorage fee for the use of fiat money.

Proof: The payment circuit in Figure-16 and the Wicksell Matrix shows that every agent intends to buy exactly as much as one intends to sell. Hence there is just no reason to borrow. Indeed, the augmented Wicksell matrix already contains any debts that any one needs. Yet one of

the agents must borrow the money from the issuer. The debt to the issuer of fiat money is unintended (but unavoidable).

Discussion: The whole matter of fiat money seems to abound with paradoxes. First, people buy something without any intention to consume it. Second, they sell something without having produced it. Third, they borrow something without any real need. Fourth, a senior lends fiat created out of thin air but cannot lend real goods. Each of these paradoxes must be clarified to understand the unintended but unavoidable debt.

The first paradox is that one cannot use one's one product as money. The whole boondoggle starts with the lack of double coincidence in real goods. In Figure-16, agent A is very much ready to deliver his real output to B to pay for B's good, but B firmly refuses to take it. Ultimately, A delivers it to H without getting any real good back from H. Had it been a commodity money, B would have accepted A's good even though it gave less utility, because he would not have consumed it and hence its utility would have no consequence to B. He would have sold it to C without having produced it.

This does mean that one cannot use one's own product as money. The issuer may lend but not sell his real good as commodity money.

The second paradox is that money is used as a means of payment by one who could not have produced it. One must either borrow it or buy it, but one cannot produce it. This is linked to the fourth paradox. The issuer of money can be a lender but not a buyer. If the Fed were to issue new dollars just to buy up real goods, then the money would have been counterfeit from the beginning. The whole game of the Fed is to act as the financial guardian of society, to manage the claims and obligations in real output. The Fed uses the dollar as a tool to let people deliver one kind of good and get any other kind of good in exchange. If the USA buys foreign goods with some US dollars, but the foreigners never buy US goods with those dollars, the money has been lent at 100% securitization.

The users of money are compelled to use it not because they want to use it, but because there is no alternative. Jevons was mistaken to suppose that money overcame the inconvenience of barter. If barter is possible, there is no inconvenience at all. If Adam is dying to eat bananas and wants to pay with apples, while Beth is crazy for apples and wants to pay with bananas, what inconvenience of buying bananas with apples can there be?

Indeed, it would be irrational if in this case, Adam proposed first to pay for the bananas with money, and then accept the same money back for the apples. Why would anybody undertake the hassle (transaction cost) of using an entirely unnecessary giving and taking back of useless artifice? Jevons actually mistook commodity money for barter and must have been thinking about the relative convenience of using paper money or metal discs instead of live chicken and painted shells.

Then came the analogy of money as a lubricant, something that somehow made it more convenient to conduct trades. The analogy of a lubricant has indeed made it impossible to see the true function of money. It is not a good idea to use analogy in science. If one badly wants an analogy, it would be money as electricity: electrons moving in a circuit and energizing the moving of goods from sellers to buyers. Any break in the circuit stops all motion.

The problem of unintended debt arises because one of the agents in every payment circuit must borrow the money from the creators of the fiat. It cannot be bought from the creator, but must be borrowed.

The price of using money is the seigniorage fee, a term that differs from the common concept of seigniorage. The common idea of seigniorage is the difference between the full face value of the fiat and the cost of its production. This is consistent with the idea of money as a capital (store of value), but not as a tool to manage claims. The actual burden on the users of money is the so-called interest they pay for the fiat. This fee must be distinguished from the interest on real capital. In this monograph, the term seigniorage fee is used to refer to the fee for the use of fiat money, while the term 'interest rate' refers only to real capital

Granted that the ordinary mortals must pay a price to use the money, the political debate will arise on the proper seigniorage fee for the fiat. This will become a major issue for international fiat money. The feeling is that this is excessively high.

7.9.4 Theorem on Stagnation

Theorem: Long circulation of fiat money imposes unnecessary waiting on the producers and thereby aborts the potential real capital that could be produced during the waiting period. (This is a long-term version of the theorem of involuntary unemployment.)

Proof: Figure-16 illustrates how the long circulation regime compels producers to wait to get the fiat during which they must suspend production that could build real capital. Figure-18 shows how the waiting can be eliminated.

Discussion: The basic theme is rather simple. First, society can

create fiat money virtually costlessly, especially with the use of modern electronic transfer technology. Yet this fiat is a necessary device to permit indirect trade, which covers almost all actual trades. Hence there is no good reason to economize on the use of this fiat.

Secondly, waiting for the fiat to arrive imposes a real cost. The true source of capital is waiting. The forced waiting period during which producers are disabled from production aborts the formation of real capital. Hence the rational course of action for the society is to resort to short circulation money to avoid the costly abortion of real capital. This will stop the permanent stagnation.

It requires a new perspective to see money as a tool to transfer claims on real output. This tool can work if and only if there is someone responsible to manage the transfer of claims, and ensure the stability of the value. Perhaps the best way to see this to imagine what happens if there are no bankers and no government agencies to accept coins in payment of taxes and no laws about legal tender. One can then imagine how the means of payment will work.

7.9.5 Comment on Undue Instability

The study of business cycle has exasperated economists for several centuries. It should have been clear that such instability does not happen in subsistence or barter economies. The job for the theoretician is to see how money may be injected into and withdrawn from circulation by the creators of money, without any regard to the actual output and the need for money. Seniors enjoy arbitrary powers to issue money to whoever they favor as borrowers and to deny access to money to whoever they dislike. When they allow speculators to borrow money without regard to the real output of the borrower, and let them gamble in the stock markets, they permit undue motion in the stock market. When speculators fail, seniors shrink the supply of money and impose depression. All these are statements of fact. The theorists need to assemble the details of the instability and see what the seniors were doing before they can offer explanations.

7.10 Pensation and Macroeconomics

Let this concluding comments on payment begin by honoring the

memory of Wassily Leontief. This author was lucky to learn from Leontief the inviolable necessity of having the data before there is any attempt at theory. His advice would mean the following: Take an input-output matrix to describe an economy. Decompose it according to means of payment. Look at each cell to establish the presence of agreement on kinds and quantities. Follow the circulation path of fiat money. After that, think about how to explain the observations.

If one followed this, there would be no need for macroeconomics. The Leontief Matrix does describe the observed actions of individual households, firms, or sectors. There is just no trouble seeing how the aggregates arise from the individual levels. Everything can be traced back to the individual.

Is there a macro issue that cannot be handled by the exchange matrix? Can the observed data be presented, before analysis, in a way that defines them as economic data? Can it be economic if it has nothing to do with either or both of allocation and exchange? If it is economic, who are the optimizers and entrepreneurs? What do they want? How do they participate in allocation and exchange? Who do they interact with? How do they make individual and social choices? Raised in this fashion, the issues unify micro and macro matters inseparably.

It would seem that an exchange matrix and its associated payment circuits and exchange equations can deal with macro issues without losing track of the micro foundations. There is then little need to fall back on the old style of debates.

With the exchange matrix, aggregation is almost a trivial task. The payment circuit clarifies issues that the old diagram of circular flow of income could not even articulate. It allows one to look into the circulation of money, by identifying issuers and users, without failing to link the individual to the aggregate. Economy wide matters are all easy to handle with it. In short, there is just no need to explain any aggregate with the help of any other aggregate: all aggregates can be explained without doing macro. The only job is to grasp the agreements.

The paradox is that the fun and profit lies in disagreeing. If one could not disagree, how could one write another article?

8. INTERMEDIATION

8.1 Purpose and Background

The task of the theory of intermediation is to explain why and how intermediation occurs in indirect exchange. This is a virgin landscape for exploration in consistent economics. We are unable to offer a formal theory as yet, but we can raise a number of questions and think about a few possible lines of inquiry.

A theory of intermediation must deal with issues of entrepreneurship, transaction cost, competition, and institutions. There are scattered bits and pieces relevant to these elements in the previous literature. Much of these are outside the mainstream traditions of classical and neoclassical economics.

The classical concept of the market as a self-regulating mechanism forbids the idea of intermediation. Then again, the neoclassical idea of optimization is incompatible with intermediation. It cannot allow buying without consumption, and selling without production.

It is not possible to visualize the existence of intermediation without changing the worldview of classical and neoclassical economics. This may be the hardest challenge before economics.

8.2 A Tentative Analysis

To raise pertinent questions, we need to take a few steps to weave together the diverse elements of intermediation. For this, we may attempt to build a tentative framework of analysis.

1. Recognize the methodological need for linking institutions to individual actions;
2. Recognize that entrepreneurship is the other side of transaction cost;
3. Recognize the market as an institution;
4. Recognize state and culture as other social institutions;
5. Recognize the need for a notion of institutional equilibrium

8.2.1 Methodological Prerequisite

Consistent economics must strictly insist on methodological individualism and subjectivism in any theory related to human action. The individual's perception of what the social rules may or may not be determines the individual's actions with regard to them. The perception may be mistaken, but these are what the individual takes into account.

A society cannot exist unless the individual intends to abide by its rules. In the extreme case, an individual can commit suicide or go to the wilderness to avoid social rules. But it must be possible for individuals to insist on changing the rules or creating new rules. Otherwise the occurrence of social change cannot be explained.

Institutions are not fixed features of nature: these are created and changed by humans. As such, they must be seen from the viewpoint of the individual. Creation and purpose-driven change must be seen with subjectivism.

It is possible to mistake purposeless biological evolution with spontaneous emergence of social institutions. Biological mutation is not a conscious action: no organism can wish to improve its biological apparatus. Mutations may occur that prove to be harmful or beneficial to the organism under the conditions of the habitat. Natural selection plays the other side of mutation.

This analogy is not useful for social institutions. Somebody must consciously and purposefully design and engineer an institution. Islam cannot arise without Mohammad, and the internet cannot come into being without some people actively designing ways of communication and promoting certain hardware and software as its tools.

Institutions do not evolve naturally. They are created and destroyed, changed and challenged, all purposefully. It involves a sort of cease-fire, an agreement to follow certain rules until one party becomes strong enough to repudiate the old rules.

The creation and modification of institutions has two theoretical problems. The first is new knowledge behind the change. The other is the

disproportionate influence of some individuals.

(1) Entrepreneurship in economics, leadership in politics, and charisma in culture may denote disproportionate influence of some individuals. A pharaoh, a prophet, a Hitler, or Stalin may have far more power than other individuals, and their deeds may be undone with as much vehemence by others. An active pursuit of acquisition of power and a conscious process of empowerment may be important elements in a theory of intermediation.

(2) The explanation must refer to new knowledge as the basis of power of some individuals but not of others. Without new ideas about opportunities to make changes, change could not occur.

The idea of needs, rights, and institutions as introduced in Chapter 2 may be a bit useful in thinking about ways to articulate the relation between individuals and institutions. There are certain unavoidable needs which compel people to find ways of working together. They must figure out certain agreed manners of meeting the needs. Those manners create rights. But then those rights must be secured. Institutions must be created to secure those rights.

8.2.2 Entrepreneurship & Transaction Cost

The appearance of self-appointed arbiters and seniors in the exchange process is only one side of the phenomenon of intermediation, akin to the supply of it. The other side needs something akin to a demand for the services of the middlemen.

We recognize that the middlemen somehow cut down transaction costs so that others voluntarily rely on them. This enables one to integrate formerly isolated notions together. It also means that the theory of entrepreneurship must undergo a fundamental change in perspective: the entrepreneur must be seen as a vehicle for the reduction of transaction cost.

On the other side, the theory of transaction cost must also undergo fundamental rethinking: the social problem is to reduce the transaction cost and the entrepreneurs are required to do this. Middlemen perform necessary and useful functions. The notion of transaction cost must be set in the context of a social decision involving an economic, political, or cultural transaction.

8.2.3 The market as an institution

A theory of intermediation must recognize the market as a social institution. This recognition has two aspects: methodological institutionalism and institutional theory.

8.2.3.1 Methodological Institutionalism

The concept of institution has an epistemic connotation for the use of teleology (rational choice) to explain social events. The term institution then replaces the term mechanism. Mechanisms in natural sciences lead to equilibrium, while institutions in social sciences lead to agreements.

In nature, inert objects have immutable properties for determinate patterns of behavior. In society, alert individuals have the reasons to choose creative actions without compulsion. The patterns of human action are governed by rational choice, according to what Mises (1949) would call praxeology or logic of action.

Methodological institutionalism is consistent with methodological individualism. It is hard to make the distinctions clear. Methodological individualism is the idea that the logic of action is understood only from the perspective of individuals. However, the action is not itself necessarily an individual action. It may be a social action which an individual is able to grasp as rational choice. It is necessary to adopt the notion of circular consistency to understand agreements.

One way to see methodological institutionalism is to link it to social agreements rather than isolated individual action. Methodological institutionalism requires that market actions be seen to rest on agreements, while methodological individualism means that in must be understood from an individual's point of view. In a sense, institutionalism look at individualism in a wider context of interaction with other individuals.

The idea of an isolated individual acting rationally is somewhat solipsistic and does not tell the full story. The notion of institution brings into focus the set of agreeable options open to the individual.

8.2.3.2 Institutional Theory

In contrast to methodology, a theory is a lower level proposition

subject to methodological dicta. It is open to tests of empirical and logical validity. A methodology is a doctrine of how to think, and as a such is not liable to empirical tests. It prescribes how to conduct the empirical test.

But a theory is a statement about an empirical entity. A theory of institution must think of an institution as an entity whose existence is open to public observation. All theoretical statements about the institution must be tested for empirical and logical validity. Even though the explanation relies on subjective perceptions, there must be objective actions, procedures, and outcomes of actions.

Theory of institution must articulate the specific character of the agreement for each different institution such as the subject of agreement, the outcome of the agreement, and the process of making the agreement. In economics, the relevance of institutional theory is that it will provide a causal explanation of an observable economic event such as intermediation.

8.2.3.3 Other Social Institutions

The complexity of the notion of institution is that the market is not the only institution. There are at least two other institutions of society: the state and culture, the latter being rather amorphous. Economics cannot overlook the issue of interaction between the three institutions of society. The market coexists with these other institutions and interacts with them. This must be seen from the viewpoint of an individual, who is a member of all three institutions, even though they may be instruments to pursue different and sometimes conflicting goals.

The coexistence of social institutions may be seen from the coexistence of three different motives of the same individual. The same person may go to the market and brutally pursue self-interest, but risk his life to protect a neighbor under attack from thugs. This person also may make great sacrifices for love, religion, art, and other elements of culture. Any aggregation will be fatal to theory: one must be able to trace the origin of human institutions in human intentions.

Institutions define the character of society

Individuals make a society by participating in certain manners of making agreements on economic, political, and cultural actions. Society in itself is not a useful concept at all: it cannot even exist independently of individuals. If all individuals leave, there can be no society.

The term 'society' may be useful only as a methodological tool to describe joint action. A society must be seen as something that performs a definite social action. The participants collectively constitute the society. There is nothing to know about society other than its actions and the institutions governing the actions.

8.2.3.4 Institutional Equilibrium

Some notion of an institutional equilibrium must be used to grapple with the question of how the various institutions interact. This social equilibrium has to be a notion of meta-agreement, for example, issues of how to make rules to agree or not to agree. Even a disagreement needs to be understood in terms of a higher level notion of more abstract agreement.

For a theoretician, the task is to articulate a concept of social change as a complex event in which the various economic, political, and cultural objectives concur. It may involve situations of discontent where some of the agreements are waiting to be abandoned.

This may require some concept of power to disavow earlier agreements and to insist on new ones. In the end, the perception of power may resemble the notion of constraint. Only the powerless may refrain from asking for change, and the only way they can be powerless is that they are ignorant of how to bring about change.

History is full of examples of how a formerly insignificant person changed the course of history, while the heirs of mighty empires had no idea how to retain the power. Once again, it is subjective. Some new knowledge empowers the powerless to become powerful enough to change the rules of social action.

8.2.4 The Absence of Formal Model

A major challenge for economic rhetoric is that the theory of intermediation is not yet cast in formal shape. As yet, it is not understood how to formalize the notion of equilibrium of intermediation. It is not a problem of allocation. The institution is not even a part of exchange. It is rather a meta-economic phenomenon that affects the exchange process without being affected by it. It is still an exogenous factor.

In other words, it is not helpful to think of a demand for and supply of intermediation. It is not possible to measure its need or availability. This is because it involves creative elements of innovation of things that

did not exist before or of some discovery that eliminates error. For now, it is limited to describing the environment of exchange. Like tastes, technologies, and endowments, institutions are exogenous determinants of economic actions.

8.2.5 Structure of Intermediation Theory

The theory of intermediation may be divided into three parts: transaction costs, entrepreneurship, and institutions. The first is to recognize the existence of transaction costs in organizing exchanges. The next is to study why self-appointed secondary agents bother to provide services to settle prices and payments. The third part is to ask about the origin, evolution, and functions of the institutional elements of the market as a facilitator of peaceful agreements between buyers and sellers.

8.3 Transaction Costs

A transaction cost is the cost of organizing a transaction. This is beyond the cost of production, and hence is not subject to optimization. Producers and consumers are unable to control this cost: it is a constraint for them. However, entrepreneurs can cut down transaction costs, and thereby insert themselves into the market. Primary agents rely on secondary agents for lowering the transaction cost. An exchange model cannot overlook this cost, but an allocation model cannot see it.

Chapter 5 introduced four different kinds of transaction costs. This section looks at the theoretical issues associated with each type of transaction cost.

8.3.1 The cost of Illegitimacy

As explained in Chapter 5, nature permits predators (from another species) and cannibals (from the same species) to hunt down the weak, kill, and eat it. Exchange is unnatural; and hence the cost of legitimizing it must be very great indeed. The strong captured the weak and made them into slaves. The strong suppressed the weak and turned them into serfs, subjects, and servants. Asking for a payment was illegitimate. Humanity struggled long and hard to legitimize exchange.

This perception is inconsistent with the idea of spontaneous origin of any institution, including the market. Slavery was not spontaneous, nor

was its abolition. Alexander did not buy other kingdoms: he took them by force. Neither his invasion nor the downfall of his kingdom was spontaneous. What one made illegitimate the other made legitimate. Therefore, the notion of legitimizing trade must be acknowledged to understand the cost of transaction.

This cost is subjective. When an individual thinks that he cannot do a profitable work because it is illegal, improper, unethical or something like that, he forgoes an opportunity to make pure profit. This may prevent an otherwise profitable transaction from taking place.

For example, the alleged illegitimacy of interest on loans prevented many Muslims from embarking on normal banking. Some of them ended up depositing many billions of dollars with (non-Muslim) banks whose capital base was smaller than 20% of their deposits.

It does not matter whether there is an actual law in some book of law or a really enforceable custom or code. It is enough that the individual thinks that there is such a barrier. There may be others who do not recognize a barrier even if there are actual law-enforcement organs or social opposition.

The rise of commerce is in the main a story of the determined effort of merchants to legitimize what was proclaimed illegitimate by kings, priests, and assorted moralizers. To a cynic, a king was a cannibal of the wealth of others, who took things belonging to others by force and refused to pay. He opposed merchants because they demanded payment.

Priests were usually parasites who used sweet words to bag charity, and they opposed merchants on account of their alleged greed. And both the noble king and the saintly priest succumbed to greed. When merchants offered taxes and other supports, and built temples and such things, opposition to their profiteering diminished. In the end, nobles themselves became merchants or gradually faded out of noble existence.

Politics and culture require discrimination between people. Politicians discriminate between friends and foes, while gurus of culture discriminate between good and bad. Merchants do not discriminate: they sell to the saint and the sinner with equal greed, they sell to the patriot and the traitor at the same price. They promote that idea of democracy in which the wise man has the same number of votes as the starkest idiot or the most vicious bigot.

Merchants are the great equalizers. They disregard the noble and the savage, the pious and the sinner equally; they support the refined and the vulgar equally. They moderate, they tolerate. The problem for theory is

to stay dispassionate about this: a very tall order indeed. One may only describe what people do with respect to defining legitimacy and abiding by some notion of proper conduct.

8.3.2 The Cost of Ignorance

The theoretical problem of ignorance as a source of transaction cost is this. An individual may simply not know of the existence of an opportunity for profitable business, so that the cost of organizing it is infinite from his view. There is no escape from ignorance, unless one happens to accidentally discover a hitherto unknown opportunity.

According to Kirzner (1973, 1979), this discovery occurs by virtue of alertness of entrepreneurial humans, but without prior planning or preparation. He says that one cannot search for information on opportunities whose existence is unknown. One should not confuse this with the sale of so-called information products. Discovery means the finding of something that was not known to exist before.

One cannot order a discovery, just as one cannot order a book that has not been written. Buying information product is like buying a book that has already been written and advertised. It is no longer a discovery.

This last statement means that it is not useful to formulate models of information and search to understand any effect of intermediation, such as on prices and means of payments.

The proper link to the concept of search is competition and not intermediation. To compete, one tries to learn what the others already know. It is imitation, not innovation. Logically, if there is search, then there can be no undiscovered opportunities left. The idea is that an alert agent does not overlook what happens to come into view, but he does not look for them, because they are not known to exist.

The fundamental problem is that an economic opportunity is not a publicly observable object. Whether there is an opportunity or not is a subjective judgment of the individual. This judgment is itself liable to be erroneous: many entrepreneurs run after mirages and incur loss.

New knowledge is the original source of power. The ability of some humans to discover new knowledge allows the reduction of cost and makes hitherto impossible things easy to do. A command economy cannot accomplish this: ignorance cannot be eliminated by military command. Swords cannot write words.

8.3.3 The Cost of Being Traditional

Innovators break traditions and make it cheaper to produce something, or to improve quality without increasing cost or make possible what was deemed impossible. They reduce the transaction cost of being traditional. In Schumpeter's view, the innovators are a major force behind economic progress. They make tradition obsolete by creative destruction. Even traditional theories become obsolete.

> Alertness means that if one sees an opportunity to bring gainful changes, one will act. The trouble is that one may not think that there is an opportunity.

The theoretical task is to devise methods of assessing the impact of innovation on prices and means of payments. It also calls for a devise to measure how competition is affected by innovation.

A theory of economic development cannot overlook innovation. Chapter Six has argued that every transition to a sustained higher level of real income is based on innovation. Theory of intermediation may expand this to cover the innovations to create institutions.

8.3.4 The Cost of Being Unorganized

The Coasian perspective (Coase 1933, 1988) is to think of the firm as an organization, which therefore is by definition an intermediary. Such a firm internalizes externalities to grab economies of scale and scope, which are major sources of cost reduction in industrial development. (Chandler 1990).

The creation of mercantile organizations is a very important way to reduce transaction costs and expand the volume of trade. The theoretical task is to assess its impact on prices and payments and the process of competition.

8.4 Entrepreneurship

The notion of entrepreneurship in economics, leadership in politics and charisma in culture all share some sense of creativity. By some as yet unexplained process, some individuals are able to discover hitherto unnoticed opportunities and exploit them to make advances (Kirzner 1973, 1985).

A doctrinal notion of civil society might see the advance as the reduction of transaction cost or discovery of pure gain in economics, or the promotion of competition in the market.

In politics, the progress may involve a step towards greater security (=individual freedom and greater democracy).

In culture, the advancement may be defined as a step towards greater freedom of self-expression.

But who knows how those advances are made? Who knows how the leaders are able to change the rules of the game? Who knows why some people can persuade great many others while some others cannot persuade many, sometimes even themselves?

8.4.1 Entrepreneurs as Producers

Entrepreneurs may be producers or intermediaries. As producers, they discover ways of producing new goods or cutting down production cost. As intermediaries, they act as arbiters to settle prices, and seniors to arrange payments.

The common perception of the entrepreneur is that of a producer who sets inspiring examples for others by spectacular successes. It is also understood that they take risks and many actually fail spectacularly. This view however may hide the more important role they play. As Lachmann (1977) reminds us, the market permits resources to pass from those who value them less highly to those who value them more highly.

As the proverbial movers and shakers, entrepreneurs are mainly responsible for sponsoring the transfer of resources to those who expect to make better use of them. Rarely would a budding entrepreneur become a mover and shaker by using his own capital. In general, he must act as an intermediary to help others find ways of making more productive use of their resources.

An analyst is in danger of missing the core of intermediation theory if the entrepreneur is not seen as an intermediary. This is because when regarded as a producer, economic analysis must throw away the entrepreneurship from the entrepreneur and look only at the allocation actions of an optimizer. To make theoretical progress in this regard, one must gather data on activities of entrepreneurs in putting resources to new uses, introducing new technologies, and in expanding to new markets. Seen in the broader context of a whole market, one may take the entrepreneur out from the confines of a self-absorbed individual and make him into a social organizer.

8.4.2 Entrepreneurs as Arbitrageurs

Theory of price must acknowledge arbitrage as the process underlying price determination. This is necessary to see how the consistent theory of price leaves room for gains for both buyers and sellers.

8.4.3 Entrepreneurs as Seigneurs

Theory of money must acknowledge seigniorage operations behind the creation and circulation of fiat money. One of the major issues in this regard is the impact on transaction costs. To assess financial innovations, one must look at how seniors manage to cut down transaction costs and permit hitherto impossible financial deals to take place.

A major area of research is to assess whether intermediaries have arbitrary powers over prices and means of payments. The issues of competition and monopoly are pertinent to such research. There is good reason to believe that the creation and issue of fiat money is highly monopolized by a few banks and financial institutions.

The issue is the ability of a few to exclude others from offering competitive access to fiat money. Only a few nations now control international fiat and charge usurious fees, imposing false burdens of debt, and denying enough liquidity.

Chapter Six explained why poverty is a creation of the senior's refusal to issue enough money. It may be a source of inspiration for young people that they still have much work left to do: they can embark on creating a world monetary authority that will issue fiat international money at seigniorage fee of less than one-half of one percent. Economic engineers may create fiat means of payment to allow the nations to engage in gainful trade far in excess of the current volume.

If indeed some individuals have disproportionate power to settle prices and circulate means of payments, then there must also be ways to compete with them. Once rescued from the idea that institutions fell from the sky all by themselves, the new generation may begin to engineer ways to counter-balance the powers of some intermediaries.

A political philosopher may wonder whether the cultural pursuit of knowledge in science is subservient to a political pursuit of power. Armed with the knowledge of how to create and issue fiat money, the powerless may rise up and empower themselves by creating new rules about issuing money.

8.5 Institutions

Why must a theory of intermediation deal with institutions? The problem is that in settling the prices and the means of payments, the concerned agents must be able to voluntarily make agreements and fulfill the terms of the agreement. This fulfillment cannot occur in the void. The most critical element is the notion of payment, that the buyer must pay the seller with something that is both of the correct value and of the correct kind. Without an institution to permit, facilitate, and enforce the agreements, it is not possible to think of agreements as real events.

8.5.1 What is an Institution?

Who knows? We suppose tentatively that an institution is a set of rules to facilitate and enforce agreements.

8.5.2 The Enforcement Issue

The challenge comes from the enforcement issue. The celebrated Coase Theorem denies a genuine role for enforcement, supposing that people can reach agreements without any outsider threatening to enforce the agreement. This theorem contradicts the notion of payment, which of course did not exist in the previous literature.

Here is how the Coase Theorem sees the issue. Suppose that one individual sets up a factory. It belches harmful smoke that drifts over to the neighboring resident, hurting the latter. The gist of the theorem is that the factory owner and the neighbor can negotiate a deal to resolve the conflict. The factory owner can offer a compensation to the neighbor who then lets the factory generate its pollution without protest. In the other case, the neighbor can compensate the factory owner to stop the pollution.

Superficially, it seems like an exchange between clean and polluted air: the neighbor prefers clean air to polluted air while the factory owner prefers polluted air to clean air. The factory owner can buy clean air and pollute it, or the neighbor can buy the polluted air and clean it. The problem is that this is not a true exchange. The resident does not harm the polluter, who alone harms the other party. The resident does not want to buy polluted air: he is simply burdened with it against his will. It is plunder, not trade.

The trouble with Coase Theorem is that it does not recognize the history of the strong plundering the weak by force and refusing to pay

compensation. Alexander simply takes over the land of Purus by force. He does not pay Purus for all his massacres and plunders. Nor is Purus in a position to insist on a payment. It is out of question for Purus to offer something to dissuade Alexander from simply vanquishing him.

No polluter willingly pays a compensation to the neighbors: it is irrational for a stronger party to pay the weaker in the absence of rules to pay the weak. And a rule requires a ruler.

Coase Theorem seems to be more well-known to lawyers than to economists. It is somewhat ironic that lawyers engineer out-of-court settlements as inspired by the theorem, never forgetting the power of the court to enforce the agreement. But the economist is left with the faith in the invisible hand ceaselessly bringing the parties to peaceful settlements. He has no doubt about the self-regulation of the market.

8.5.3 The Spontaneity Issue

Enforcement also implies that institutions cannot arise spontaneously. It is certain that the goats and tigers will never see a spontaneous market where the goat will sell its own flesh to the tiger, who will pay the goat with a bite of something to chew.

One must remember that slavery did not arise spontaneously, nor did it disappear spontaneously. States did not come into being spontaneously, nor did any religion or any other aspect of culture. The caste system in India was not spontaneous: it needed the unspeakable atrocity of Ballal Sen and the likes who enslaved the weak and cast them into subservient untouchables and other lowly groups. Nor will it go away automatically, since the heirs of strength continue to suppress the heirs of weakness. Everyday, millions of low caste Hindus are oppressed by the millions of thugs of the high caste.

More importantly, rational choice means that people act intentionally and not spontaneously. Even mob violence is orchestrated carefully. People may seem to spontaneously applaud a winning athlete or display outrage at some despicable act, but this has nothing to do with creating institutions. Somebody must organize and lead the efforts to create anything approaching an institution. A spontaneous outburst of emotion occurs, but that is not the origin of an institution. To turn something into an institution, it is necessary for organizers to set the rules of the game explicitly.

Some authors suppose that people somehow follow the examples of

others and end up creating an institution. Common behavior through imitation is not a source of institutions: it must be agreed upon and made enforceable. There must be some organized manner of enforcing the rules.

Some undergraduates are liable to mistake the rationality of agreeing to agreeble proposals for spontaneity. Since it is rational to agree to agreeble proposals, so one may suppose, the people agree spontaneously. But this is not so. Someone must initiate the proposal and undertake a campaign to persuade the others. Readers of the Quran know that even God Himself tries relentlessly to persuade His creatures to recognize and obey Him. A statistician may retort that so far, God has not convinced some 80% of humans to agree to the entirely agreeble proposal.

Advertisers know that persuading people to agree to the agreeble is indeed a very hard job. Lawyers know that articulaitng an agreement is the toughest social engineering anybody will ever encounter.

8.6 Doctrine of Social Institutions

To be able to pass off the market as an institution, it is necessary to agree on the notion of an institution as an empirical entity. Sadly, this author is not aware of a concept of institution amenable to empirical tests. Since we have no help to formulate a theory, let us at least get a bit of doctrine. A doctrine has value judgments. This is a warning and a desperate plea for help.

8.6.1 Three Institutions of Society

Let us suppose the following:
- all individuals have some basic needs,
- when others acknowledge, needs become rights,
- those rights are established with institutions.

	Need	right	institution
Economic	Self-sustenance	Gainful trade	market
Political	Self-defense	Just protection	state
Cultural	Self-reproduction	self-expression	culture

The idea is that a human individual must be able to (1) secure means of self-sustenance to stay alive, (2) build self-defense against predators

and cannibals, and (3) promote self-reproduction. These three needs are fulfilled within a social context if these needs are recognized by others as rights. The right to secure self-sustenance through self-employment limits the individual's choices by forbidding eating other people, stealing or robbing or cheating and so on. In a market economy, individuals are given the right to engage in gainful trade.

The right of self-defense normally requires membership in a group for collective self-defense, which prohibits aggression against the group itself or against its members. It imposes the duty to bear costs of defense.

The right of self-reproduction is recognized through the right to express oneself to attract mates and other companions in certain ways. Each different group can have their own cultures about permissible modes of self-expression.

The idea of an institution then is something that recognizes and enforces the rights and associated duties. This is where it becomes doctrinal rather than theoretical. This author sees no way to formalize the empirical notion of such an entity. A civil society would fit this as a description, but a savage group of thugs ruling innocents would not.

A doctrinal depiction of society may regard it as a bunch of individuals who have implicitly or explicitly agreed to acknowledge a set of rights and to abide by a set of duties. Methodologically, any definition of institution that does not rest on agreement is suspect. If one is coerced into doing something, that is not an institution, but a crime.

The term 'institution of slavery' is therefore a crime-ridden term. The term 'the crime of slavery' would be a better description. Likewise, the term 'the institution of marriage' is meaningless- it would be more descriptive to call it 'the practice of marriage'. The term 'caste system' is less descriptive than the term 'the crime syndicate of the upper caste'.

To link rights to institutions, one tentative approach is to think of the market as the institution that upholds the right of securing self-sustenance through gainful exchange. To make sense of agreement, one must be able to identify the agenda of agreement in the market. Further, one must be able to state the rules of agreement. This is because the task of the institution is to uphold those rules.

Theory of exchange thinks of the market as a device to make agreements on what and how much to exchange, and under what 'rules of exchange agreements' (= three laws of the market). The market is an institution in that sense.

The right of self-defense is allegedly recognized and enforced by the institution of the state. Who knows what a state is? Who does it defend and on what basis in agreements? What rules of self-defense does it recognize and enforce? Some notion of political rationality is necessary to grasp the idea of the state as an institution to permit collective self-defense. The constraint of power, and the innovations leading to empowerment may be instrumental in such theory.

Culture is even more amorphous. It might originate in the quest for self-reproduction through the search for mates. Anything that attracts others is a virtue. A bird may sing or display its feathers to attract a mate. A bull may fight off competitors rather than attract the female and hence may give rise to the crime of rape rather than the culture of mating.

In humans, the individual may attract not just mates, but others such as siblings, superiors, and so on so that others do not kill and eat or banish or abandon him or her. People may try to attract others through singing, dancing, feeding, dressing, housing, telling stories, lecturing on truth or propriety and so on and so forth. It is creative. Nobody has any idea how the various modes of self-expression may evolve.

People have practiced all conceivable modes of disposing of the dead (like eating, feeding it to animals, burning or burying), finding a mate, celebrating a birth, initiating into adulthood and so on. Philosophy, religion, science, art, technology, music, sculpture, architecture, cuisine, costume and such other things have evolved in wild variation. Who can reduce all these diversity into a single notion of some need, some right, and some institution?

8.6.2 Institutions and Organizations

It may be useful to distinguish an institution from an organization. An institution upholds some right for all members of society, but an organization creates privileges not available to the general public, but only to approved members. The state is an institution, but a political party is an organization. The market is an institution, but the syndicate of some merchants is an organization.

The trouble with the market is that the right of participation in gainful trade is enforced by the government, which itself is an organization A government is essentially a contractor to carry out the business of the state, with the unhelpful situation that the business of the state is not very well defined. A government may actually suppress the market by allowing some favorite supporter of the government to monopolize some businesses and thereby deny the right of the others to take part in gainful trade. It may also deny the basic political right of self-defense to some people. Many governments are weapons of bigots for a variety of crazed cultural norms.

This is a bad problem for theory. It leaves open a crack through which ideology can sneak in. It is an open question whether the enforcement of the right of gainful trade or of free self-expression may be left to the state as the sole social agency of enforcement. One may say that an institution has to protect certain rights, but it may not itself enforce them.

8.6.2.1 Three Types of Organization

Perhaps it will be useful to think of three basic types of organizations. The government, the NGO (non-government organization), and the private sector may be linked to the state, the culture, and the market respectively.

The government is an organization that exercises the sovereign authority of the state for a limited time and within some unclear boundaries set by written or unwritten constitutions. The constitutions themselves have usually been the product of a few powerful individuals, many of whom are dead. As a doctrinal matter of value judgment, it may be said that the living people of today have the right to 'institute' a fresh constitution based on universal referendum, especially as modern technology permits hundreds of millions of people to take part in a referendum process from home.

Ambitious politicians want the government to do everything. The doctrine of civil society may assign limits to what it may do: defend the people but not engage in production or culture.

The modern phenomenon of NGO has ancient roots, but the scale and the scope of activities of modern NGOs have no parallel in history. No theory of social institution can disregard this phenomenon. A non-government organization performs social functions that often were previously performed by the government and seldom by the private sector.

It is hard to believe that BRAC in Bangladesh runs more than 35,000 schools and runs a wide variety of organized activity to help the rural poor. It also runs some of the best managed businesses. The Ford Foundation started as a private organization for philanthropic activity of Henry Ford and his descendants, but has by now become the world's

largest charitable organization. Some of the NGOs have gained immense power and have empowered a great number of people.

How to think about an NGO? It is perhaps best to think of it as essentially a cultural organization. It is something that allows like minded people to pursue some kind of virtuous action, but always under the guidance of some charismatic leader. There would be no Grameen Trust, now operating in many countries, without Muhammad Yunus. Some day, it is not unthinkable that an NGO will change the way markets use money.

Environmental NGOs see virtue in protecting the environment, beautifying the neighborhoods, preserving habitats and so on. Charitable NGOs seek the virtue of charity in all conceivable fields of operation. Many professional organizations pursue the promotion of science, art, literature, music, sports, entertainment and on. And above all, religious organizations of every description seek to cultivate piety of some sort.

Lastly, the private sector is defined by the exclusive ownership of some individuals or companies. It almost always pursues the economic activity of the market.

The institution and the organization are not synonymous. An institution is somewhat an abstract entity, liable to be mistaken as an ideal. An organization is a concrete entity. An organization may not only be imperfect, but may be consciously engaged in undermining the institution.

The private sector is not necessarily committed to protect the right of other privates to compete in the market. Many NGOs are not benign organizations. Indeed, a great many organizations are run by racists and bigots who want to suppress others.

The caste system in India, for example, is not at all an institution, but a collection of organizations of some privileged people who suppress the low caste people. Many religious NGOs are run by fanatics bent on destroying human rights. Human rights violation by governments, various political parties, and hate groups are sadly quite frequent. There is no sign of self-regulation in any type of organization.

Hence there is a problem of theory and ideology getting mixed up in a doctrinal view. A dispassionate description and analysis of social institutions and organizations is scarcely possible. But science demands dispassionate description.

8.6.3 Institutional Equilibrium

Though it is not possible to do it yet, one needs a theory of institutions and to articulate a notion of institutional equilibrium of society. How does the market, the state, and the elements of culture interact? In particular, how do merchants interact with statesmen, and how do they deal with the state's appetite for regulation and tax? How do statesmen handle the market's tendency to submit to monopolizers, counterfeiters, cheats, smugglers and such?

Perhaps one can postulate a process where organizations try to take over the institution and change the rules of the game. Leadership in organizations exercise disproportionate influence and may be able to bring many changes. The issue than becomes one of struggles between competing organizations. To be sure, no hope exists for the spontaneous arrival of a benign organization that fulfills the ideals of the institution. The vision, courage, and charisma of some extraordinary individuals may reorganize society for better or for worse. The powerless may day-dream about the coming of a messiah, but may end up with a Hitler. It sort of turns into a matter of cynical faith in the accident of fate.

Perhaps an abstract of economic transitions can illustrate the issue of institutional equilibrium. This is not a theory, but a tentative way of looking for concepts that may become useful. The reader may recognize that such concepts may also become stumbling blocks. We must remain skeptical.

Consider the first transition from the natural forager economy to the pastoral. A student of economics may promptly jump to the conclusion that since the invention of pastoral technology produces a permanent increase in real income, people have no reason to go back to pure foraging. They will not give up the art of raising cattle and poultry. This would not be a bad conclusion.

The trouble is that the creation of new wealth from pastoral pursuits also creates new problems. One of the first is the demographic consequence. With an increased and more stable supply of protein-rich meat, milk, and egg, the health condition is likely to improve, leading to a faster population growth through reduced mortality.

In a forager economy, the equilibrium size of a clan is approximately 25 individuals. If the group were to have many more members, it would split, because the means of livelihood would not be within the usual ranging distance for a much larger number of hungry mouths. If the band somehow became much smaller, it would risk extinction and would survive by joining another band. In short, there are environmental

limitations on the size of a forager band.

But once the pastoral technology is at hand, this limit is changed rather drastically. Now the people are semi-nomadic, since they have to move slowly with their grazing herds and actually live on the grasslands. It is now possible for the clan to have a much larger population. Imagine that a clan can expand into a tribe of as many as 2500 individuals.

This raises major problems of management. It is no longer possible for the clan's patriarch or matriarch to provide leadership through intimate knowledge of the likely loyalty of the members. It is now necessary to establish a new political authority, such as a tribal council, with something like a chieftain.

One of the first economic novelties is the idea of private property. The individual or core family which invested labor in raising the cattle may insist on a primary ownership. While a forager band does not leave much scope for individual difference in productivity, a pastoral clan sees unequal efforts in raising and shepherding the cattle and may resort of some form of semi-private ownership as an incentive. Complete privatization becomes only a matter of time.

The foragers who have not become pastorals of course have no conception of property. It is unnatural in a natural economy to prevent anyone from foraging. Bands are nomadic and they do not linger in one place to defend the territory or claim ownership over it. The notion of primitive man as a vicious fighter may be very much the opposite of reality.

It is simple animal instinct that a newcomer does not enter a place already occupied by others unless there is no other place to go. Forager societies had extremely thin populations and extremely large open areas.

The political problem is now to defend the cattle against the marauding hunters. The shepherds must be consciously organized for continued defense. True plunder now becomes a common affair. The beginning of organized armed defense and offense is seen here.

The cultural landscape also must face new challenges. One is the practice of marriage. In a forager band, marriages are fluid unions based on love, which depends on the personal charm of the companion. But pastoral economy adds the wealth of cattle to the attraction of the suitor. The new demand for bride-wealth and the insistence on the status of wife as a permanent companion with rights over the shepherd's cattle may arise now.

One may see the emergence of specialization of economic, political,

and cultural functions as a result of increased population and wealth. In a small forager band, the patriarch or matriarch may guide economic, political, and cultural activities without making clear separation.

With a much larger population in close proximity, but belonging to different clans and families, keeping law and order becomes a full-time occupation of some elders. The defense of the cattle and the people against marauders may become a full-time preoccupation of some other people.

The cultural activities such as dancing and singing, of honoring the spirits of the animals or celebrating the marriage, or the funerary rituals and especially the worship of deities and deified ancestors may now become elaborate and complex. It may require the special abilities of certain individuals to organize them. The distinction between a priest, a judge, and a commander may become clear.

Instead of a clan chief who leads the clan almost by default and without any prolonged opposition, the tribal council must establish a hierarchy and assign special responsibilities through a process of consultation. The need to rest on a consciously articulated agreement becomes clear.

The reader may well imagine what may happen with successive transitions to agriculture, than to industry, and lastly to the information economy. With each transition, the economy becomes more diversified, entails a great variety of new professions, has a much larger population, and encounters a fresh set of problems which must be solved. A historical account of the transitions will reveal an immense variety of social experiments and solutions. It may not be an easy task to capture the essential elements of the institutional equilibrium. How does a society manage to stay together through the many changes in economic, political, and cultural pursuits? Or does it disintegrate and reform?

For economists, the working concept of the market as an institution is based on the articulation of the laws of the market. These are not mechanical laws of nature, but principles to reach agreements through rational choice. These agreements are circumscribed by the political and cultural processes. Using some notion of institutional equilibrium, the economist will have to see the evolution of the market itself.

8.6.4 The Market and Other Institutions

It serves no purpose to pretend that the state does not exist and does not care about crimes in the market like monopolization, fraud, counterfeiting, discrimination, deprivation, and so on. Economists must be able to figure out the interactions between the state as the defender of weak and the innocent against the oppression of the strong and the criminal.

It is more honest to distinguish a political argument from an economic one, rather than hide under the guise of spontaneous markets and the invisible self-regulatory mechanism. It is ultimately futile to hide politics under the guise of economics. It is not credible that criminals will not monopolize, discriminate, deprive, rob, steal and defraud others in the absence of regulations.

No institution is self-regulated. The private sector organizations are not committed to enforce some kind of self-regulation. The governments are not necessarily devoted to defend the weak against the strong. And cultural organizations and NGOs do not necessarily undertake self-discipline to uphold the right of freedom of association and expression.

No institution is spontaneous. A theorist of course looks for essential elements which give a rationale for the existence of an institution. If institutions do not rest on intelligible agreements, and if they have no intelligible reason for existence, a theory cannot be formulated. But the identification of the reason for the existence of the institution is not in itself a guarantee that the organization performs its obligations automatically.

Ultimately, an institution is not an entity with a mind and power of its own. It is not an individual. It is more a principle to guide social decisions, than an entity with its own power to act. Today, 'the propensity to truck, barter, and exchange' may seem natural. We cannot imagine how humanity can do without trade. It is comfortable to suppose that we have always been like this. But the fact is otherwise.

This sense of spontaneous origin of social institutions logically implies a somewhat divinely granted permanent institutional structure. Such a concept is a denial of social change. The economy of today is unlike that of yesterday and of tomorrow. Tomorrow's people will do things differently. It is not a business of science to predict anything, but the knowledge of causation gives a reliable sense of the direction of change.

Even though we do not have a theory of institutional equilibrium, we still have some sense of value and payment. Tomorrow's world may overcome the liquidity crisis by resorting to short circulation money. It may reduce unemployment and poverty and inequity. But nobody can tell.

Here is where theory and ideology clash. It is as yet not possible to describe and explain institutions as observable agents with observable actions. As such, a theory of institution would be no different from a piece of superstition., which claims the existence of invisible agents with invisible actions leading to visible outcomes.

The trouble is that organizations are very much empirical entities whose existence, and activities can be described and may be even explained. But these descriptions leave one with a sense of frustration, because actual observed behavior of organizations do not conform to any theoretically defensible pattern of conduct. One ends up with a bewildering mountain of data with no clear causal pattern.

On the other hand, the institutions seem like analytical concepts without empirical reality. Analytical concepts are *a priori* arguments one accepts or rejects dogmatically. That is why a doctrine is not a theory: it is ultimately mere wishful thinking.

8.7 The Challenge Ahead

Dreams of ideal society animated humans from the beginning of civilization. It is not simple matter of wishing what it ought to be, and asking people to act accordingly. The root problem is the natural inclination of the strong to suppress the weak. Endless ideas of ideal society came and went. Endless experiments have been done. A theory of institution cannot be simply framed from this greatly diverse and often contradictory ideals and practices.

Perhaps we may start with an analytical mind, but not fully detached like that of a scientist, nor fully attached like that of a passionate artist. The doctrinal notion of a civil society and a rigorous description of social organizations may allow us to make some progress.

Just as science cannot say what the truth is, but can say what is not true, it is possible to say what may not happen in a civil society. We suppose that there are three 'no's for a civil society. First, its individuals are not insolvent. Second, its citizens are not insecure. Third, its people are not intolerant.

The economic feature of 'not insolvent' is based on the theme that means of liquid payment (=solvency) must exist to permit individuals to take part in gainful trade. It means that such a society must institute a market with assured access to liquidity, which is socially costless fiat money.

The political theme is that a civil society will make sure that no individual is insecure from the harms of external and internal enemies. It also means that there would be no injustice; once harm is done, there will be assured justice.

The cultural theme is that there would be no intolerance against creative self-expression. By definition, an expression is aimed to attract others, not coerce them.

This notion of a civil society is doctrinal. It is wishful thinking. The other part of the challenge is to look for ways of reaching this through creative organizations. Who knows who will be able to come up with an idea to put an end to insolvency, insecurity, and intolerance. But a serious study of organizations may begin to reveal models that reach the goal of ideal society more successfully than other models. We have proposed a number of actions in respect to reduce insolvency in Chapter 9.

9 ECONOMIC POLICY

9.1 Future Economic Policy

The study of economic policy is the daily job of most practicing economists. It is economic policy about which economists are bound to recognize their own political identity, and hence participate in the debates with strong emotions and opinions. It is hard to maintain the calm for science in an environment of policy-making.

The economist who is eager to save the world from its follies and failures may recognize a few essential elements of economic policy. These include the institutional context, the polemic front, and the scientific merit of proposed policies.

9.1.1 The institutional context

Economic policy, even when it is a policy of no action, is implemented by the government. Any policy is political. The doctrine of social institutions sees any policy as necessarily resting on some agreement of the members of the society as defined by the political process. No honest economist can pretend that economic policy is not political.

Let us make clear what we wish to mean by doctrine as opposed to theory. A theory is a statement of fact; and in itself, theory does not carry an opinion as to its usefulness or desirability. A doctrine is a justified opinion, but an opinion nonetheless. A doctrine is less forceful than a theory. People need to be persuaded by their sentiments to support a doctrine. Theory however needs no persuasion. Sane people just cannot fail to accept science.

The doctrinal element of agreement is that no society of today exists in a political void. There are agreements that might have been originally sanctioned by just a few powerful individuals while the rest were unable to disagree. But the point of referring to agreement is that people alive today are not in any way bound by the powers and intentions of the dead. It means that there is no reason to ask what the founding fathers of a certain nation might have in mind. Their successors have their own minds to decide what they want today.

If there is a need to change the agreements, that need must be made clear. If there are people alive today who disagree with the way in which economic policy works, it is for them to stand up and insist on the changes. An economist must be able to show firm opinions about the agreements or disagreements on economic policy.

This author wants to make it clear that the politics of the future economic policy proposed below takes the side of the ordinary people who are able and willing to produce and consume real products through participation in the market. This author makes the political demand that all individuals be allowed to take part in gainful (=profitable) trade.

This allowance includes the socially guaranteed access to fiat means of payment against the stock of products. It also includes calls for a prohibition on the use of borrowed funds to compel individuals to become servants of others.

The political aim of economic policy supported by this author is the liberation of the masses from the allegedly excessive power of financial sector. This author perceives that the a few powerful individuals deny the masses fair access to fiat money and to socially mobilized real capital.

It is important to recognize that the prevailing system has its own logic. Lenders have legitimate reasons to deny credit (be it fiat money or real capital) to those who seem to present more risk than the lenders are willing to bear. Small producers and self-employed individuals are often unable to meet the lender's risk criteria to borrow. Lenders may rationally prefer a few large borrowers than a great number of small borrowers, because the cost of managing is much higher for the same amount of credit when it is given to a large number of borrowers than to a small number.

The economic argument is that the borrowers must agree to bear the higher cost (per dollar of loan) of managing smaller loans. The small borrowers may be given loans of fiat money against the stock of their

output under a guarantee of the state. The state may impose a reasonable insurance premium to cover the cost of the loan guarantee.

The political argument is that no individual should be denied the right to engage in gainful trade. This is not possible without unhampered access to fiat money and sometimes, real capital. The state as the institutionalized defender of the common people has a duty to defend them against the denial of access to necessary fiat money.

Since the state is already the monopoly creator of hard cash, it may simply extend its monopoly over the issue and management of fiat money in both hard and soft forms through the introduction of a universal state-sponsored payment card system. This will combine a credit and a debit card. It will differ from the prevailing system in two fundamental ways.

First, it will be universal, for the rich and the poor alike.

Second, the seigniorage fee will be minimal, say no more than 3%.

The intent of this card is to allow all individual producers (and workers) to get fiat money directly from the issuer rather than from the buyer of the product. Then the producer can buy whatever the producer wants to buy against the pledge of the product. The borrower remains liable to sell the output, and return the money to the state lender.

The credit limit will be set according to the value of output of the individual. The issuer may charge a service fee to cover the cost of managing the issue and recovery of the fiat. The fee may include a risk premium.

9.1.2 The Polemic Front

To save humanity from the tragedies of impure knowledge, the economist committed to pure theory will use rhetoric appropriate to an honest and candid presentation of the political views of the economist. The economist will stand on the firm ground of empiricism and essentialism, and use vocabulary appropriate for pure theory. Such an economist will denounce statistical regression and other forms of unobserved entities in policy arguments. The arguments will use accurate data and apply rigorous logic of causality.

Consistent economics may offer a third view in between the two prevailing extreme views about the role of economic policy in regulating the market. This third view may please neither the libertarians who oppose any regulation, nor the socialists who want to see society's

overriding interest being served by tight regulations. The new debate boils down to the issue of the character of the institutions of the market and the state.

Consistent economics stands on the core theme that different individuals with divergent preferences may nevertheless come to mutually beneficial agreements. This idea may be extended to include agreements on political matters of collective security and cultural matters of voluntary cooperation. It ends logically in the idea that a social institution is created and sustained by agreements.

The idea of agreement as the basis of institutions repudiates the libertarian notion of spontaneous origin of social institutions. It also denies the presence of any 'social interest' apart from the ones the individuals articulate through agreements. In short, there is no such thing as a social action apart from what the individuals voluntarily agree to do together.

It must be stressed that there is absolutely no factual evidence of spontaneous origin of any institution, and there is indisputable universal evidence that all institutions are created by humans. There is certainly no evidence that any institution is self-regulated, and there is an abundance of evidence that all institutions are humanly regulated. The problem is to rescue oneself from the illusions created by ideological biases which tend to overlook what exists and to see what does not.

Here is a brief recounting of the human engineering behind institutions. First, consider the primitive biological imperative of reproduction. Adult males and females are biologically urged to seek mates, which leads to the formation of family. But although the urge is natural, a persistent bond between the mates is still a matter of agreement, because the mates are free to divorce or just abandon each other. The human family does not arise spontaneously, but animal families do. Again, it is natural for adults to reproduce children, but it is still a matter of choice, because the parents may abort the child or abandon it or refuse to rear it.

The primitive form of the state and society is the family. Children are naturally born into it, and are not able to take part in agreements to be a member of the family. But it really does not matter when it comes to institutions. The child grows into an adult and has the freedom to leave the native family. If the adult remains with the ancestral family, it is because the individual agrees to stay within it.

To a child, a family is not an institution, but a mechanism with its inviolable rules. To an adult, the rules are not inviolable and the family is an institution resting on agreements.

The basic question of institution is one of enforcement of the obligations and the rights. The member stays with the family and is granted certain rights. These rights also come with associated duties. The rights and duties are organized in clearly understood rules. These rules are based on agreement. If one does not like the rules, one can always withdraw from the family, in the extreme case by committing suicide.

The market is not at all natural and could not have arisen without explicit recognition of economic rights. First, the individual must be granted the right of ownership or property over what he or she produces or rightfully inherits. Secondly, the seller must be granted the right to ask for and get a pensation from the buyer. The seller also must have the right to compete to sell the product. Thirdly, the buyer must have the right to buy. Fourthly, intermediaries must have the right to buy something to sell it again, and to sell something they bought from elsewhere. None of these are spontaneous. In fact, the world still does not have a complete market: it lacks a global money, and it lacks the institution to compel various states to allow foreigners to compete to sell and buy within the particular state's boundaries.

The idea that the market is self-regulated has no shred of evidence. It cannot be, because the market does not exist either as an organism or as a mechanism. The place where the goods are bought and sold is not the market. The goods bought and sold are not the market. The agents who buy and sell are not the market. The market is an arrangement or a set of rules, an articulate idea in the minds of the people who want to buy and sell. The market has market laws only in the sense that the participants know that the seller must be given a value and a pensation, and that the prices and pensations must be agreed upon.

The market exists in the minds of men as a set of rules of the game. It is instituted by agreement, and it is kept alive by agreement.

The state likewise is not the government that runs it, or the people who are its citizens and subjects. Nor the land in which the state has its military authority is itself the state. It once again is an articulated idea about the rules of participation in collective security.

The members of the state are subject to laws which they must obey, and these laws must ultimately be based on agreements. The members

know that they have rights and state must protect those rights through the government. The government executes the state's duties, and people know the rules according to which the government is supposed to conduct the business of the state.

The state does not exist except as an idea in the mind of the people. If people do not like a government, they are free to overthrow it. It surely requires military power to overthrow something with military power, but that is not the issue. The issue is that the state does not arise spontaneously and does not operate in a self-regulating manner. Nor does the market arise spontaneously and operate automatically.

What may confuse beginners is that some individuals have disproportionate influence over others by virtue of entrepreneurship in the market, leadership in the state, and charisma in culture. Somehow Mohammad is able to start a new religion which many others are not able to do. Somehow Lincoln becomes the President or Gandhi becomes the popular leader or Mandela wins respect. Somehow Bill Gates achieves high growth in income and dominates an industry. But it still remains the case that institutions still rest on agreements. The key is that some people may be unable to disagree, but the institution still must rest on agreement.

No matter how influential one prophet is, he cannot hope that all humans will accept his religion. No matter how great a singer Michael Jackson may be, not everybody is going to be influenced by him. And no matter how powerful George W. Bush may be, he is still not God. At the end of the day, small individuals will have their say. But it does not mean that small individuals have no influence and hence the institutions works spontaneously as if individuals do not matter.

Social interest: The idea of a social interest has no defensible basis. There no such organism or mechanism that can be called a society. It is really an idea in the minds of people who agree to belong to a certain group. There is no such thing as a national interest except as explicitly articulated through an agreement. A large number of people may make an agreement known as a referendum. There may be various creative manners to express the agreement.

No matter how good an individual or a group may be, its own idea about what constitutes society's interest is not acceptable, nor is it accepted. Every Hitler justifies his own personal madness in the name of national interest or society's greater good. No such interest or good

exists. The search for a national interest or a social welfare function is a search for a ghost. It is shooting an Arrow in the Dark.

The policies proposed below are not intended to serve any social interest. These intend to empower the ordinary at the expense of the extra-ordinary.

The idea that the state has a right to regulate the market is mistaken, because the state cannot be a person and can have no right. The citizens of the state may agree that they will do certain things. The current generation of citizens may do something that the next generation may discard or reverse. Dictatorial political powers may try to suppress some individuals or groups, but in the end, the suppression must be overthrown.

But we see that humans have by overwhelming choice decided to live in society and deal with other people. It is not possible to deal with other people without some clear articulation of what to expect from such deals. One must have a clear notion of economic, political, and cultural deals to get at the crux of the issue of regulation. That is where the concept of three basic needs and three social rights may shed some light.

The individual wants to make a net gain or profit from an economic deal. The idea of circular consistency of choice means that it is possible for different individuals to ascribe different utilities to the same goods and thereby find a source of mutual gain by exchange. The problem for the state is to provide an environment in which such deals can be made without fear of being plundered or cheated. It also involves the state's duty to enable individuals to participate in gainful trade. It does not see any room for the state to mandate the agreements themselves.

That is, the state has absolutely no reason to set a quota on quantity or set a price. The individuals must be free to do so. There can be no such thing as a socially optimal price or quantity.

Put in simpler terms, the state is created by individuals who agree to build a collective system of security and protection. In respect of the market, the problem of security is to secure free access to the market. This means a prohibition on monopoly or other means of exclusion. Of course all forms of crime to property, reputation, limb, and life must be prevented and punished as a part of the security. The state must protect people who are unable to save themselves. This includes economic assistance to those who will starve without assistance.

A clear separation between economic and political motive will make it easier to analyze the merit of economic policies. Redistribution of income from the rich to the poor is a political imperative to fulfill the obligation to provide economic security. It is important to remember that the starving people may get organized and revert to the essentially natural act of plunder if the manmade process of exchange is not helpful to them. The poor naturally retain the power to plunder the rich, if they can find someone to organize them. The rich may use state sponsored charity to the poor to prevent such an event. The consideration is once again a matter of security from possible anarchy with a relapse into plunder.

In short, one needs no economic argument such as promotion of growth or stabilization to support a program of income redistribution. Stability is a political goal, and needs no economic justification. The market as such has no inherent stability and needs no stability to function. Economic instability poses a risk for political instability. The political need for stability may justify actions to assure economic stability.

9.1.3 The Scientific Merit of Policies

All proposed economic policy must rest on rigorous analysis of the causality to explain why the policy will work. Thus there can be no policy which lacks empirical basis in a properly conducted process of abstraction. The economist as scientist will make sure that the frivolous claims are falsified and that only those claims that cannot be falsified are confirmed to produce the desired effect. The politics comes in choosing what to desire.

For new policies, pilot projects may be carried out to see how things work in reality. For example, economic science can tell that when a regime of long circulation operates, there is more waiting compared to a short circulation regime. This must be shown with actual observed data, which will precisely measure the waiting and the loss accompanying the waiting.

The idea that it is desirable to eliminate the waiting through the use of short circulation is a political opinion. There may be people who desire to keep the waiting the way it is. It may not be very popular to admit such a desire openly, but that is a political judgment.

The economic argument should be clearly distinguished from the political. The idea of honest politics is of course idealistic. But if a scientist is truly committed to purity of theory, since only pure theory provides empowering knowledge, there is nothing wrong with an honest

admission of political desire. A scientist can have political doctrines like anyone else.

9.2 Market Liberation

The two policies proposed below may be collectively called the policy of market liberation. The first is universal access to fiat money. The second is a priority of credit for self-employment.

9.2.1 The politics of market liberation

The political stance must be candidly admitted. The view is that the market as it exists today is not liberated. It is being suppressed by a few powerful monopolizers with the power to deny the masses fair access to its institutional facilities. The market is not free, and it must be freed. The common people's economic rights (of access to money and capital) must be established.

9.2.2 The Rhetoric of Market Liberation

The term to use is 'market liberation' rather than free market, because the term 'free market' or free enterprise has been used to deny the state any right to insist on the liberty of the masses to take part in the market. The idea of free market arose when some people were free to take others as slaves. It wants freedom of a few to disable the many. It does not allow the victim to ask for economic justice.

A market left to its whims is clearly unwilling to assure political justice, simply because it is none of the business of the market to worry about justice. By its very nature, the market wants to meet the demand by creating supply, but it does not care about meeting the needs. A hungry man may die because his need for food is not met. The market can do nothing about unmet need, because the hungry man has no demand for food backed by purchasing power.

Likewise, when there is demand for drugs, or for the services of children as camel jockey, there will be people who will supply the drug and the jockey. The supplier cannot be bothered by matters of social concern, because his only concern is the opportunity for profit. Children are being kidnapped from poor countries and put on the backs of camels in some middle-eastern countries, often resulting in crippling injuries and even death, because there is profit to be made from supplying child jockeys. A free market cannot avoid being what it is.

Market liberation requires liberation, which is a political action. Liberation is the act of giving the liberty to those who did not have the liberty. The key to market liberation is that it enables some people without disabling others. It is not a zero-sum game to permit the small producers to have the same liberty that the large ones have. Giving the ordinary people access to fiat money and real capital would not take way the right from those who enjoy it now. It will simply enlarge the access.

The economic rhetoric for the struggle for market liberation will focus on the individual's freedom to engage in gainful trade. It will protest against the evil of monopolization because it restricts the freedom of the common people to compete.

The concept of economic freedom is that an individual has an original birth right to remain free to earn a living without having to be a slave, a serf, a subject, or a servant of anyone else. To establish this right, the individual must have a priority right to borrow capital for self-employment.

Society also must ban the use of socially mobilized capital (=bank deposits) to a few people who use it to hire others as servants. The capital must go to the prospective employees, who may from a company to subscribe the capital. However, one still remains free to invest one's own capital to hire others.

Let us remember that the market is a manmade institution. So far, we have been able to find three laws of the market. These laws do not include a provision for competition. We do not see the presence of an institutional set of rules to ensure that all people have the liberty and the facility to enter the market and compete. The market is incomplete as a social institution and we need to think about making it complete. The long list of complaints against market failure is a reminder that the market institution is not perfect in the sense of having clear rules of conduct regarding justice in access to the market. The idea that the market fails to do bring about desirable outcomes means that the market needs to reinstituted to serve as an instrument to bring about the desired outcomes. We are trying to articulate a sense of what is desirable.

9.3 Access to Fiat Money

The most important aspect of market liberation is to grant and enforce the economic right of every individual producer to have access to fiat money. A producer will have the right to borrow fiat money

against the product, and use it only once to pay for any kind of product. The lender of the fiat must insist that the borrower must return the money.

The aim of this policy is to prevent involuntary unemployment and stagnation. The task of the applied economist is to provide empirical proof of the working of the policy. Mountains of data on micro-credit may show how access to liquidity reduces involuntary unemployment and prevents undue indebtedness. But it may be better to conduct pilot projects to observe how soft currency works.

Every producer, big and small, must get fiat money directly from the issuer. It is just a short circulation regime of fiat money. The issuer takes up the task of managing the claims. It is the responsibility of the issuer to make sure that no producer gets any money in excess of the verified market value of the output. The borrower of money is responsible to repay it as soon as the product is sold for money.

The implementation of this policy means the abolition of the long circulation regime. This means that there would be no fiat money that can change hands more than once. It means that monetary tokens must be made generally unacceptable. One cannot pass on a token to another who can pass it once again. Instead, the fiat will be a check which the recipient is bound to give back to the issuer. Instead of prevailing hard currency, there will be soft currency (=single use checks).

Incidentally, the abolition of hard cash will make it much harder for crime syndicates to gather black money and transfer them or hide them. It will also make counterfeiting much harder. Theft and robbery of cash will be made more difficult.

It is feasible to keep a very small number of low denomination coins in long circulation to allow people to make small purchases where the use of checks is more costly than the use of coins. This may be determined by a thorough empirical analysis of small purchases.

Under the new currency regime, the issuer will serve as the manager of claims and record the transfer of claims. The state's sovereign power will be used to enforce the claims and obligations.

In comparison to micro-credit, the proposed policy universalizes it. All individuals, rich or poor, are automatically granted loans in fiat money (not real capital) against the verified supply of output of the producer. This is a fiat credit. To reduce transaction costs, the policy may introduce a universal payment card in nations where the technology of electronic transfer is well developed. For nations where this technology

is not yet well developed, producers may be given the option to use pre-printed coupons which will act like money orders or verified bank drafts. The key is to use the token only once.

Let us clarify the doctrinal aspects of this proposal. The doctrine of social institutions claims that society installs institutions to permit and facilitate the fulfillment of needs of individual members. The economic need is to procure the means of sustenance. Society agrees to certain rules, including a recognition of rights, to permit and facilitate individuals to procure the means of sustenance. Ideally, the market is the institution which allows individuals to engage in gainful trade to earn livelihoods. Until now, the market has not met this objective fully.

A good thing about a doctrine is that it dreams about better possibilities. The doctrine of social institutions dreams of a civil society in which the economy will be free from insolvency, the polity will be free from insecurity, and culture will be free from intolerance. The essential job of economic policy is to create a new economy in which individuals will be solvent, that is, facilitated with ready access to liquid means of payment against the output. The theoretical description of a market as it exists cannot find the presence of this facility. Economic policy can create it, and then the theory of the future economy will include a fourth law of the market in which the institutional rule will be stated as the Law of Solvency: that the producers are able to translate the value of output into solvent or liquid means of payment.

9.3.1 Mints for Fiat Money

The creation of solvency requires the creation of access to both money and capital. It is important to separate fiat money from real capital. The policy may engage one type of monetary organization (say mints or money bureaus) to create, issue, and manage fiat money. To manage the transfer of real capital through bonds (=credit instruments), a different type of financial organizations (say banks or credit bureaus) is required. This separation is a critical part of the financial reform. Here is a brief outline of how this may be done.

Suppose that the monetary institution responsible to create, issue, and manage fiat money is called a money bureau or mint to emphasize the goal of managing money as a means of payment, but not as a store of value. Suppose that a farmer has produced $10,000 worth of goods, and comes to the money bureau for money. The bureau makes sure that the

farmer indeed has the goods in stock ready for delivery whose value at prevailing prices and patterns of demand is indeed $10,000. It then creates out of thin air $10,000 against the stock of goods. The money is entered as a credit to the farmer, who is now allowed to write checks against the same.

The farmer remains liable to deliver the real goods to the buyers against checks from buyers. The farmer must return the money by surrendering the checks received from the buyers. The bureau then extinguishes the money simply by canceling the farmer's debt.

For physical imagery, imagine that the checks collected by the farmer from his customers are given to the money bureau, which, after duly recording the transfer of goods, burns down the checks. The money has vanished into thin air, as it has served its purpose. It is no longer available for circulation. If the farmer has another newly produced stock of goods, he can again get a newly created stock of money against that good, which has no connection to his previous stock.

This goes for all producers. The money bureau may use the Wicksell matrix to calculate the exact need for fiat money. But it is easily done by estimating the value of output of all producers.

9.3.2 Credit Bureaus for Real Capital

Suppose that real capital (=store of value) is transferred between lenders and borrowers by a financial institution called a credit bureau or bank. It is allowed only to borrow and lend real capital by issuing bonds and redeeming them.

The credit bureau is not allowed to create fiat money by way of so-called multiple credit creation. It is not allowed to accept any deposits from the public for checking accounts, since checking accounts are a monopoly of the money bureau. It is not allowed to carry out transaction through checks, money orders, bank drafts or any other method of transfer of money itself.

The money bureau is not allowed to issue bonds or accept savings deposits or any kind of store of value.

Let us suppose that the farmer has an output of $10000, but a savings of $1000. For example, he writes checks worth $9000 to pay for what he buys for production and consumption and writes a check for $1000 to purchase bonds issued by a credit bureau. The farmer, having sold $10000 worth of goods, is entitled and responsible to take delivery of goods worth $10000. If he buys only $9000, somewhere there must be $1000 worth of goods waiting for delivery. The credit bureau has obtained the right to claim that $1000 worth of goods.

The credit bureau is a producer of bonds. It can ask the money bureau to open a special type of account (say, bond account) without creating money. When a bond is sold, the buyer of the bond, who must be a producer, will write a check for the money. The credit bureau will acquire money by selling bonds, unlike producers who will get money as credit before selling the goods.

This means that the credit bureau will not be allowed to get credit against bonds. Once the credit bureau has money in the money bureau, it can lend it to ordinary borrowers. It will write checks payable to the borrower out of its bond account at the money bureau. This effectively means that it can lend only as much capital as it has, but it cannot create multiple credit.

The borrower may keep the borrowed funds in the money bureau, but that does not allow the credit bureau to create any more credit out of the deposits. Indeed, nobody is allowed to lend out of deposits. The farmer must designate what is available to lend by purchasing bonds. The credit bureau may restrict the farmer from redeeming the bond before its date of maturity. A bond market of course allows one owner of bond to sell it to another.

Just as the credit bureau is not allowed to create fiat money, the money bureau is not allowed to create any bonds. It must not be allowed to pay any interest on unspent funds, but must charge a fee for any money not used by the producer. This is because if a producer does not spend the money, there must be someone else who is compelled to sit with unsold goods. The whole purpose of creating fiat money is defeated if it is not spent.

If one wants to build a store of value, one must buy bonds from the credit bureaus. The other option is to buy real goods as assets. Money must not be usable as a store of value. The seller must be liable to buy as much he sells. If one does not buy real goods, the only other option is to surrender the claim on real goods embodied in the fiat money to those who want to use it. Otherwise, there will be Keynesian depression. One may easily lend the money directly or through the credit bureau. But one should not be allowed to just let it sit idle in an account with the money bureau.

The money bureau should charge a fee for any unspent money in the account. It will also charge a fee on the unpaid debt.

Under the soft-money scheme, there is no way to do multiple credit creation on the basis of stocks of hard currency, because there is no hard currency. The credit bureau as an intermediary may lend the money to someone against a back-to-back bond as follows. The borrower of the credit bureau is allowed to use the money to lay claim on real goods. Originally, these claim belonged to the original producer, the farmer. Now, the credit bureau sold a bond to the farmer to buy the money from the farmer. It then sells the money to its borrower against a personal or corporate bond of the borrower. The debtor is enabled to use the money to lay claim on real goods. The credit bureau is not allowed to buy bonds from others any more than what it itself has obtained through sales of bonds.

The difference with prevailing practice of multiple credit creation will look as follows: The prevailing practice is for a saver to deposit physical tokens (hard currency) say $1000 with the banks, who are allowed by law to lend $900 out of it (assuming 10% reserve requirement). The banks give the physical tokens to its borrower, who again deposits the tokens with the banks, creating a new deposit of $900. The banks can again create new credit of $810 dollars and the process continues until a total deposit of $10000 is created on the basis of $1000 of hard currency.

The new policy will allow the credit bureau to lend all $1000, but not allow it to accept deposits of money, nor to lend any deposits at all. All money will remain with the money bureau, which will just record the transfers of claims on goods in stock. A credit bureau will transfer ownership of money, but not the money itself.

The reason for this proposal is to stop irresponsible creation of false credit. Imagine that IBM has produced 1,000 computers worth $1,000,000 and wants to lend the same. This is real capital. Responsible policy will allow the issue of money to lay claim on this 1000 computers, no more, no less. Under the proposed new policy, IBM will buy bonds for $1 million from a credit bureau, with the money lent to it by the money bureau aginats th eoutput. The credit bureau now has $1 million, and will buy bonds of the same value from people who will use the money to get the computers. But under the prevailing practices of multiple credit creation, IBM will deposit $1 million with the banks, who will first lend $900,000 and then lend $810,000 and so on until total lending stands at $10,000,000 against a reserve of currency worth $1,000,000. Since there would be no computers over the $1 million, $9

million of money would be created against no real good. More ominously, IBM may have no money at all despite producing the real good, because the banks do not necessarily issue money against goods. Some one who has no real good may be able to acquire the money and then make it the base of multiple credit creation.

The fundamental abuse of the multiple credit creation system of issuing money is that it allows some favored borrowers to get money without showing real stocks of goods to be delivered against the money, while neglected real producers may fail to get money.

The separation of fiat money from real capital will allow producers to borrow fiat at low service fees (= seigniorage fees), say at or below 3%. However, the interest rate on real capital will be based on the demands, supplies and the arbitrage functions. This rate may be much higher than the seigniorage rate to reflect the scarcity and productivity of capital. It will no longer be possible to lend fiat money at the same interest rate as that of real capital or seek rent from liquidity crisis by recirculating fiat.

9.3.3 World Money Bureau (WoMB?)

The most interesting application of the theory of money may help the world create an international fiat money instead of a relying on the national currencies of a few nations. It will greatly increase the liquidity and promote world trade. It will also abolish the source of excess international debt.

Since there is no world government with the legal right to issue world money, let the nations join to form a monetary authority of the world as follows. Let it be called World Money Bureau (WoMB). Its job is to create, issue and manage an international fiat money according to the laws of the market.

First, each member nation will be allowed to get a revolving credit in fiat money to the extent of the estimated value of one year's worth of export. There must be an agreement on the methodology to estimate the value of exports. Each nation will be allowed to order imports from any other member nation out of this credit at the WoMB.

Secondly, each nation must surrender its export earnings to the WoMB to repay the debt. This will happen instantly because the importer will pay the exporter out of the importer's credit with the WoMB.

This book transfer will occur without the use of any token at all. The

WoMB organizational rules will dictate how each nation will document its order for imports and its claims on export revenues. A look at the Wicksell Matrix of the member nations will show that as long as each nation balances its exports with imports, all payments are made merely by book transfers.

However, if any nation wants to accumulate international surplus or lend capital to foreign countries, then a separate organization such as an Financial Union of Nations (FUN) may be created. That organization will serve as a common intermediary of international credit. The WoMB will work like the money bureau of nations while the FUN will work like a credit bureau of the world.

Under this scenario, the debt of the developing nations will become a matter of the past except for real credit. More than 100% of the outstanding debt of the developing nations is the result of seigniorage fee for the use of fiat currency, as anybody can check by looking at the data on international debt.

The key is to see that loans of maturity less than one year cannot possibly be for any real capital, but only fiat to transfer claims. Developing countries are not able to pay other nations with their real goods. They must borrow a few internationally circulating national currencies at exorbitant seigniorage rates while their real goods lie unsold. Once the WoMB creates fiat against the stock of deliverable real products (whose values is estimated by an agreed methodology), no nation will have to borrow fiat. This will take away the principal source of international debt.

It is still the case that some nations may import more than what they export. That is genuine debt, and that should be handled by a separate agency like the FUN. There is no doubt (once the reader looks at the data) that the volume of real credit is a very tiny fraction of the total debt.

9.3.4 Industrial Clearing Houses

Manufacturers can produce real goods, but cannot produce money. They are the worst losers in terms of size of loss under the long circulation regime of suffocation by the financial sector. They can use the Wicksell and Keynes Matrices to create a private sector program for creation and use of fiat money. The goal is to avoid the high cost of using excessively liquid money and use optimal liquidity to totally eliminate the cash-flow problem.

Suppose that a committee has been formed by IBM, GM and Hyatt Hotels to use a new kind of money called POP (producer's option to pay).

Any member firm has the option to pay for products of other members with a POP. This POP carries an irrevocable promise of the issuer to redeem the claim in its own products. Thus General Motors may issue a POP (say for 10 million dollars) to pay for IBM computers. IBM may not necessarily want to buy motor vehicles. It can simply pass the POP onto another member who may want to redeem it. Thus imagine that IBM gets $10m of hotel services from Hyatt and pays with the POP issued by GM. Hyatt can now get $10 of vehicles from GM. As more members join the clearing arrangement, the POP becomes more and more liquid, allowing a greater and greater variety of products to be paid for with it.

As long as the fundamental factors of demand and supply fulfill the equivalence, the clearing house can assure the double coincidence. The general effect is to avoid the immense burdens of interest imposed on the producers for the use of cash and the even more astounding loss of business due to unnecessary waiting. It is easier for any producer to pay with real products than with money. The creation of industrial clearing houses will increase employment and real capital. Only the likes of Carl Icahn and Mike Milken will no longer be able to exploit the real manufacturers.

There are immense organizational problems of actually creating an industrial clearing house. Since every nation already has a monetary authority with the legal monopoly to create fiat money, it can simply become a national clearing house by giving automatic membership to all producers. The POP then becomes the national fiat money. It is not a hard currency, but a soft currency like checks. In developed nations, the money is transferred electronically by way of payment cards.

One may expect stiff resistance from the big banks and financial organizations, because the proposal to create fiat money for all producers (that includes all workers) and to ban multiple credit creation robs the monopolizers from making unduly large profits by punishing real producers and getting scarcity rent from the permanent liquidity crisis.

Manufacturers may create industrial clearing houses to reduce dependence on prevailing banks until the day the government chooses to take the side of the real producers and employers. The producers will gain from easier cash-flow situation and the increase in output.

The creation and use of POP by real producers will vastly increase real output and employment and will put a permanent end to stagnation.

Various financial innovations in developed economies already create means of payment with limited liquidity. Graduate students ready for the financial sector may develop creative schemes to use POP to curtail the use of national currency. The publisher will gladly forward any queries about this to the author, who will be most thrilled to work with the student.

9.4 Credit for Self-employment

The second element of market liberation is the policy of credit priority for self-employment. The political basis of this policy is the concept of a civil society in which all individuals are free from servitude. Economic science cannot find the necessity of one person working as a slave, serf, subject or servant of another. All persons can be self-employed, although most must join others in some firm owned and operated by them jointly.

Consider the case of a restaurant. Several workers are needed to operate it. Under the prevailing system, one person or company owns the physical and financial capital of the restaurant and may provide management. The others provide the human capital. However, the providers of human capital are dependent on the whims of the providers of physical capital for the terms of employment and the security of the job.

The issue is: why would it not be possible to let the workers become the owners as well as operators of the restaurant? In most cases, the workers can collectively raise the equity for the restaurant. They may have to borrow some real capital. The idea of credit priority for self-employment is that credit should be made available first to unemployed people who need it to employ themselves, and next to people who need it to attain job security through participation in ownership of physical capital. The goal is to make an individual independent in matters of earning a living.

Coupled with universal access to fiat money, the policy of credit priority will liberate the masses from the politically unjust servitude of the masses. The basic political desire for economic justice is the same that prompted the communist struggle around the world. But the method of achieving economic independence of the common people is the reverse of communism: it is fair capitalism with universal access to capital guaranteed to all individuals, rather than the monopolization of all capital in the hands of dictatorial party bosses.

If old capitalism exploited the laborers because they did not have the physical capital and hence could not use their human capital, the solution lies in giving the physical capital to the workers, not taking it away from all individuals.

The economist's job is to carefully design pilot projects to show through precise observations how such a policy works to liberate the formerly servile masses. There are plenty of data on job creation by small businesses versus big businesses. There is no doubt that owner operators are more dedicated to work and are generally more productive. The political argument is that even if owner operators are less productive than servile employees, it is still desirable to grant them the freedom to work independently. Economic science however can show that self-employed workers are really more productive than those who are servants of others.

Credit priority can be established only for lenders who lend capital mobilized from the public. A private individual must not be under any obligation to lend to anybody for any purpose. A private individual must remain free to lend the capital to anybody for any purpose. It also must be the case that a private owner of capital must be allowed to hire others. The restriction on priority lending can be imposed only on the organizations that are custodians of public capital, namely, capital stored by the general public and or the government.

There is no doubt that the political desire for economic independence is very strong among the masses. It is however not strong enough compared to the desire to stay alive. People will reluctantly accept servile positions in order to stay alive, if there is no alternative. The aim of the credit priority policy is to offer an alternative to servitude.

Under this policy, a great number of people will try to start small businesses, mostly with family support for work. Friends and relatives may also combine to form a new kind of company which is owned as well as operated by a group. Such a company may be created freshly or reconstituted from existing companies by reforming the structure of ownership. It is possible to break down large corporations into thousands of small work teams under a system of contracts and to gradually transfer the ownership to the team's workers and managers. Let physical capital belong to the owner of the human capital.

9.5 Fighting Instability

The stiffest opposition to market liberation will come from the fear of inflation and business failure. Let us start with the issue of inflation.

Chapter 7 shows why the aggregate supply of money under the long and short circulation is the same. Instead of issuing one unit of hard currency to circulate *n* times, the short circulation regime will issue *n* units of soft currency each to change hand just once. How can there be inflation then?

9.5.1 Waiting Period and Velocity

Short circulation will speed up the time of payment by eliminating the waiting. This will appear as an increase in effective demand per unit of calendar time. Thus suppose that it normally takes one day for a person to spend the money. Then in a circuit of length *n*, it will take *n* days to clear the market of *n* goods. In contrast, the short circulation regime will issue *n* units of currency and all goods will be sold in one day rather than *n* days. It will therefore seem like an *n*-fold increase in spending per calendar day.

This increase in effective demand will have the effect of any increase in demand. Is it likely to increase the prices? The built-in check on the inflationary pressure of demand now made effective is that the money will always be equal to the value of the stock of available goods. If one can sell the output in one day, but cannot produce the same in one day, then one cannot get fresh money to keep the pressure of demand.

Thus suppose that under the prevailing conditions of long circulation, it takes four days to produce the output, but eight days to sell it. Short circulation allows it to be sold in one day. However, the money bureau cannot issue any new money until there is new output. Thus the producers will have to wait three days before they can go back to the money bureau to ask for more money.

This is something that must be determined by careful and detailed study of the observed facts. The logic is that since there will be no fiat money unless there is output, there is no danger of inflation.

9.5.2 Structural Adjustment of Prices

Economic science can demonstrate that when effective demand increases per period of time, the pressure of increased demand leads to price adjustments.

It is well known that the income elasticity of demand for different kinds of goods is not the same. Engle's Law shows that the demand for services increases at the fastest rates, while the demand for manufactured goods increases faster, but the demand for agricultural products and other natural resources does not grow fast. The share of services in GDP grows while that of agriculture and natural resources decline.

The process of structural adjustment works through the elasticities of demands and supplies. For goods whose supply cannot increase as fast as that of demand, relative prices increase. For example, the demand for health and education grows fast, but the long period needed to produce the skilled manpower leaves a long period of persistent and even widening gap between demand and supply, pushing the real price higher and higher. This of course serves as signals to investors. It leads to greater urbanization and investment in human capital through expansion of education and health services. But it does not occur fast enough to keep the rising price in check.

The main reasons for a general upward pressure on prices is that transaction cost of renegotiating prices downward is too high. It is less costly to achieve a change in relative price through increases in nominal prices at various rates. Such inflation is necessary and unavoidable. It is necessary to permit reallocation of resources to the expanding sectors from the shrinking ones, and to direct new investments in the creation of productive capacity.

Rate of return on capital is ultimately derived from the utility reflected in demand. When people with increasing incomes find more utility from services than from food, the rate of return from investment in service projects goes up relative to that in food production. If this works by way of a structural inflation, it cannot be avoided without preventing growth itself.

All data suggest that developed countries have in fact seen very large increases in nominal prices compared to the days before industrialization.

Structural inflation is not a harmful event except where people are prevented from accumulating productive stores of value, and are forced to accumulate hard currency whose value keeps falling. The option is to prevent the use of hard currency as a store of value. People should be left

with no alternative but to invest their stores of value. If the capital and bond markets are watched carefully to prevent fraud, it should be possible for ordinary people to rely on professional investment advisors to help them invest wisely.

This last comment is a challenge for future economics regarding undue instability created by wild speculation in the financial sector, especially in the stock and bond markets. Bankers with unused deposits have reason to lend to whoever wants to take them according to borrower qualifications. Some people or firms with good reputation are able to borrow large amounts and then invest these in the stock and bond markets.

The speculative investments severe any relation between the price of the stock and the underlying net asset value or profitability. Spectacular failures of such speculators may cause the lender bank to fail, which also cuts down the flow of funds to genuine producers of real products. This can and does cause instability.

Research can show the data how instability is created by speculation and nothing else. People's tastes and technologies and endowments do not change abruptly. A company's profitability, or productivity or viability also cannot change fast. Yet the whole game of speculation is to blow any hint of change out of proportion. It is fundamentally a game of bluff or fraud. There is good logical reason to suppose that if speculation is stopped, the stock and bond market will stabilize.

The policy in respect of stabilization of the capital market may be quite simple. Ban speculation with borrowed funds. For example, impose the rule that any investor whose stock market investment is in excess of one year's income of the investor from sources other than the stocks themselves, shall not be permitted to sell the stocks any earlier than six months after purchase. Exception may be made to those who can prove that they must disinvest in order to consume the proceeds. This rule will stop much of speculation dead on its tracks.

The more potent weapon against speculation is the rule that nobody shall be allowed to invest in stocks and bonds with borrowed funds. If one wants to speculate with his or her own capital, let it be so. But not when it is borrowed. This will leave credit bureaus with unused funds. They will be forced to look for real producers who can use the funds to expand production capacity. With the cessation of speculation, all undue instability will stop. It will prevent the defrauding of the small investors.

9.6 Economic Research

Consistent economics must do much to prove itself as an alternative way of looking at the economy.

The first set of issues concern basic axioms. Here is a short list: (1) Is trade gainful? (2) Is market price higher than marginal cost, but lower than consumer's marginal benefit? (3) Do merchants buy cheap and sell dear and dominate the price setting? (4) Do bankers create fiat money and issue it only selectively? (5) Are there effective laws to enforce pensation obligations? (6) What proportion of money is consciously stored in hard currency?

The next set of questions about policy can be answered through pilot projects. Here is a short list:

(1) Does access to fiat money under short circulation reduce waiting? (2) What is the proportion of fiat credit as opposed to credit of real capital? (3) How does an industrial clearing house affect the liquidity position, the volume of demand, output, employment, capacity utilization and capacity expansion? (4) How does money circulate? How does an increased flow of money affect the demands, supplies and prices? (5) How does access to liquidity affect employment generation and capital formation? (6) Does speculation affect stability? Does it affect prices and quantities of stocks, bonds, goods, labor and capital?

Through research and experiment, mankind may learn the secret of economic prosperity with equity and stability. Let the people gain economic power.

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