

Indirect Trade Rebuilds Economic Science

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Abstract: *A model of indirect trade reveals the essential causal structure of economic reality. This model unifies all of economics with no separation between micro or macro, or trade theory or monetary theory. It incorporates theory of intermediation involving entrepreneurship, transaction cost, and institutions that were never integrated into previous economics. This unified economics is strictly realistic, and is more exact than physics. It delivers certainty and forbids hypothesis and statistical inference. Its theories are logically irrefutable and factually indisputable. It offers clear guidance to economic policy. Economists may at last get what they have been looking for.*

JEL Classifications

1. Introduction

An increasingly louder chorus of complaints against the mainstream economics denounces it for unrealism of its theories and uselessness in practical problem-solving (See Fullbrook 2006; RWER 2017). A large number of heterodox groups (see) have been desperately trying to find alternatives, but in vain. Here at last is a unified model of all of economics with stunning theoretical realism and practical relevance. It starts with an extremely simple model of indirect trade. It may lead to a more realistic and useful economics.

Bertrand Russell understood how science may make progress. He wrote: “*The point of philosophy is to start with something so simple as not to seem worth stating, but to end with something so paradoxical that no one will believe it.*” (Russell 1918). The model here reveals the obvious facts that were completely ignored. Prevailing economics, mainstream plus the heterodoxy, cultivated the

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universal ignorance with an obstinate refusal to recognize the obvious facts. Following Russell, the job is to see the obvious.

Seeing the obvious must be extraordinarily difficult for minds focused on irrelevant details. Copernicus demonstrated (see) how to see the obvious with a very simple model of the solar system. Putting the sun at the center, and the earth in its orbit around the sun, and the moon in its orbit around the earth, he explained a wide range of astral phenomena which previous generations could never connect together at all. He explained the great diversity of facts relating to alternation between day and night, change of seasons, the zodiac, the length of the solar year, the phases of the moon, the solar eclipse, the lunar eclipse, and the oceanic ebbs and tides. He dispelled the universal illusion that led people to think that the earth is still while the sun moves around it. The Copernican model shattered a wide range of cultivated ignorance and superstition.

The model of indirect trade in economics does something quite similar to what the Copernican model did for astronomy. Nobody would have believed (See Debreu 1991) that it was possible that a single model would explain everything in economics with a stunningly high degree of realism so that there is no chance of factual dispute, and possibility of logical refutation. The model has zero assumptions and puts an absolute ban on hypothesis mongering. Its conclusions are certain, and beyond room for doubt.

How is this possible? It is possible just the way the Copernican model was possible. So here it goes.

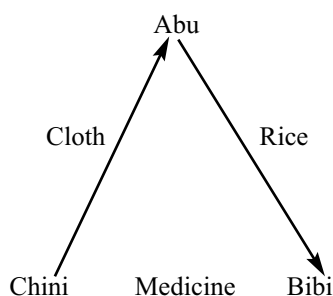


Figure 1: Permanent and Universal Unemployment

The story is pretty simple. Agent Abu has 25 kg of rice to sell at 40 taka/kg, and agent Bibi is eager to buy the same at the quoted price to satisfy her hunger for food. Bibi has 50 capsules of medicine to sell at 20 taka/capsule while Chini is deadly serious to buy the same at the quoted price to treat her sickness. And Chini

has a lungi-punjabi set to sell for 1000 taka/set and Abu is desperate to buy the same at the quoted price to cover his nakedness. Every object has demand equal to supply and every agent has income equal to expenditure. Everybody would expect that this trade will take place because demand is equal to supply and income is equal to expenditure. But none of these goods will be traded ever, unless there is money to allow it. This is the supreme paradox.

This model destroys all of rational choice based microeconomics, macroeconomics, trade theory, monetary theory, and welfare theory. This is just as the Copernican model destroyed the entire range of theories regarding everything that the model explained. The abysmal darkness of ignorance is completely removed by the bright light of science, without any shade of doubt, and without any room for dispute. It leads to an economics so completely new that practically nothing of old economics survives.

The new economics is a unified theory of the economy governed by three institutional rules of exchange. A single equation of reciprocal equivalence operates at four regimes of exchange in three dimensions to cover all issues of economics in a unified model.

2. Theory of unemployment

Figure-1 is a depiction of a potential indirect trade that does not become effective and hence gives rise to permanent and universal unemployment of all factors of production, making trade of all products impossible. Yet demand is equal to supply for each product at the equilibrium price, and ex ante income is equal to ex ante expenditure for each agent who wants to sell something worth 1000 taka to buy something else worth 1000 taka. But no trade is possible unless there is money.

Why? There is a universal institutional law of exchange that says that the buyer must pay the seller and nobody else, and the seller must get a payment from the buyer and from nobody else. This is the law of reciprocity. Abu cannot sell the rice to Bibi, because Bibi can offer medicine that Abu does not want; and Abu wants cloth that Bibi cannot deliver. There is no double coincidence between the objects (Rice, medicine) and no reciprocity between agents (Abu, Bibi). Similarly for every other pair of goods. No barter is possible for lack of double coincidence.

There is no possibility of intertemporal trade with bond. Bond is possible if an agent has a current surplus to lend or deficit to borrow. Since income is equal to expenditure, there is no budget imbalance and no question of debt and credit financing of the purchases.

Lastly, there is no subsistence or autarky. Naked Abu needs cloth, but produces rice that he will not eat (but will give up against the cloth). He does this because he defeats optimal choice in order to become an enterprising human above the rational animals. Optimally, a rational animal produces what he wants to consume, and the production occurs at the lowest marginal cost. But an enterprising human can do much better. He can abort the production of what he wants to consume, because he can find a stranger who will give it to him at a purchase price much lower the consumer's minimum cost of production. Abu wants to trade because he makes gains from trade. He cannot substitute the production of rice in favor of cloth, because he will get very little cloth compared to what he could get by exchanging the rice for the cloth from Chini.

Among four possible regimes of trade, the model has ruled out autarky (subsistence, no trade), direct trade, and intertemporal trade. The only remaining option is indirect trade. That can occur only with money and with nothing else. It means that money is necessary to allow indirect trade. Without money, no indirect trade is possible. And necessity of money means non-neutrality of money. Money cannot fail to affect the goods that must be paid for with nothing but money.

Sufficiency of money is easily proved. If Abu happens to have 1000 taka in money, he can give it to Chini and get the cloth. Chini can give this money to Bibi to get the medicine, which she could never get by giving cloth to hungry Bibi who wanted to eat rice and never wished to eat cloth. And Bibi could give the money to Abu to buy the food that she could never buy against medicine as Abu could not cover his shame with medicine rather than cloth. So if there is money, indirect trade occurs.

This theory of unemployment destroys classical economics beyond redemption. The classics claimed that if demand is equal to supply, trade takes place (see). This is clearly false. Equality of demand and supply is a necessary condition of trade, but certainly not sufficient.

Keynesian macroeconomics (see) has been finished. Keynes claimed that if income is equal to expenditure, there is full employment (See). The model shows that this is false. There is nothing in macroeconomics that survives this demolition.

What Keynes did not see is that the equality of income and expenditure in the aggregate fulfills equivalence but does not fulfill reciprocity. Abu has the rice of the correct value to buy the cloth: he has the ability to buy. But rice is not the correct kind of good to pay for cloth, medicine is. So Abu lacks the ability to pay.

The potential aggregate expenditure in terms of real goods gives the ability to buy. Money converts this into ability to pay, by fulfilling the reciprocity requirement. Abu can pay for the cloth only with money and with nothing else. Money has nothing to do with storing value except by perverse accident. Bonds and assets store value, not money.

Along with all of macroeconomics, all of trade theory is also finished. Prevailing economics never saw that the four regimes of trade are mutually exclusive. Indirect trade can occur if no other form of trade is possible. If direct trade is possible, money is impossible. No economist ever built a formal model of indirect trade (but see Mises 1949 for a chapter on indirect exchange), because there was no proper model of trade at all. Ricardo (1934) did provide half a theory of trade (failing to consider the matter of preference order, and of payment, and of intermediation), which Samuelson sabotaged down into a model of allocation (See Gani 1995).

3. Indirection with transfer of value

Indirect trade has indirectness. It involves a great audacity of the human, that one stranger is able to meet the obligation of an unknown stranger through delivery of a real good without getting a real good. Thus Chini gives the cloth to Abu on behalf of Bibi even as Chini is a stranger to Bibi, and Chini gets no real good from Abu. Bibi has an obligation to pay Abu in real terms with a real good worth 1000 taka against her receipt of the rice worth 1000 taka. But Abu does not want medicine, but wants cloth, and Chini gives the cloth. That is why the trade is indirect.

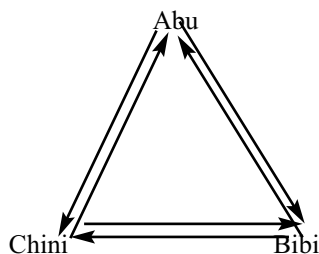


Figure-2: Money transfers value to allow indirect trade

This is possible because money is the device to transfer claims and obligations between perfect strangers. Abu earns a claim on Bibi worth 1000 taka against the food he gives to Bibi. He can of course take medicine that Bibi sells, but he wants to transfer his claim from medicine to cloth, transferring it from Bibi to Chini. To

do this, he takes money rather than medicine from Bibi. Again, Abu has an obligation to Chini against the cloth he gets from Chini. But he transfers his obligation by giving the rice to Bibi rather than to Chini. To discharge his obligation to Chini, he gives money rather than food to Chini. Thus money is a device to transfer value, which is the transfer of claims and obligations of specified value of real goods. Money is not a real good, but a container of claims. As such, it requires a social proof of claim, and need have no physical existence at all.

To serve as money, the instrument must first discharge claims and then discharge obligations. So that it must be bought (earned) against sale of real good but must not be consumed: it must be sold (spent) again to exercise claims on other real goods. Money therefore cannot produced or consumed by one who uses it as a device first to redeem claims and then to redeem obligations. It is a tool to manage claims and obligations.

All previous theories of money are now dismissed wholesale. No theory that fails to recognize the transfer of claims and obligation with money can stand.

4. Relation between real goods and money

The model of indirect trade makes it crystal clear why money appears in indirect trade: it is a device necessary to create the indirectness of indirect trade. It is related to the indirectly traded real good as its payment.

To formalize the matter, let q_{AB} denote the quantity of a traded good sold by agent A and bought by agent B. Multiply this by the price p_{AB} to get the value of the good $v_{AB}=p_{AB} * q_{AB}$. Equivalence with the other good q_{CA} that agent A buys means $v_{AB}=v_{CA}$. But reciprocity requires that the subscript orders must be precisely opposite. Between A and B, reciprocity requires $v_{AB}=v_{BA}$, not fulfilled by $v_{AB}=v_{CA}$, because if B is the buyer, the payment cannot be made by C who is not B. If Bibi buys the food, Chini cannot pay for it by giving the cloth. Bibi must pay Abu. And if Chini gives the cloth to Abu, Abu must pay Chini and not give the payment to Bibi.

Let m denote money. Then the two step process is given as $\{(v_{AB} = m_{BA}):: (m_{AC} = v_{CA})\}$.

Money enters in between the two goods to create artificial reciprocity. Abu gives rice to Bibi, and Bibi gives money to Abu. Then Abu gives money to Chini who gives cloth to Abu. Money serves as a means of payment to settle claims and obligations. Anything that settles claims and obligations is a Means of Payment

(MOP) and money is a MOP. It is of course an artifice, but it is the most commonly traded object.

Previous economics never understood the relation between real goods and money. Walras Law and ISLAM analysis utterly failed to make sense of the relation. The model of indirect trade reveals the transfer of value and rebuilds monetary theory afresh by linking money to real goods.

Without any clue to how money is related to real goods, previous economics never defined the equilibrium quantity of money for a specified basket of indirectly traded goods. The new model delivers it with devastating clarity to demolish old monetary theories of all stripes and colors. The cited example of indirect trade is easily presented as the following matrices.

$$\begin{pmatrix} 0 & v_{AB} & 0 \\ 0 & 0 & v_{BC} \\ v_{CA} & 0 & 0 \end{pmatrix} + \begin{pmatrix} 0 & 0 & m_{AC} \\ m_{BA} & 0 & 0 \\ 0 & m_{CB} & 0 \end{pmatrix} = \begin{pmatrix} 0 & v_{AB} & m_{AC} \\ m_{BA} & 0 & v_{BC} \\ v_{CA} & m_{CB} & 0 \end{pmatrix}$$

Goods Matrix W
Money Matrix K
Goods-Money Matrix C

The equation of reciprocal equivalence gives $M=PQ$ where M is the sum of money in the Money Matrix K , and PQ is the sum of values of the real goods in the Goods Matrix W . M is the equilibrium quantity of money corresponding to the specified basket of indirectly traded goods. The equation $M=PQ$ implies that the sum of price elasticity of money and output elasticity of money is equal to one: $[(dP/dM)*(M/P) + (dQ/dM)*(M/Q)] = 1$. This is a direct demolition of classical quantity theory of money, Lucasian rational expectation model, Friedman’s monetarism and Keynesian theory of money. It is strictly empirical.

The policy guidance is obvious. Maintain the supply of money at equilibrium quantity to avoid both inflation and unemployment at once. If actual supply of money exceeds the equilibrium quantity, there is inevitable unnecessary inflation and its many evils. If the actual supply falls short of the equilibrium quantity, there is inevitable unemployment that is wholly unacceptable and unnecessary.

5. Choice Theory

The root of the failure of the mainstream is the failed theory of rational choice. Rational choice applies to all animals subsisting in the natural ecology, but does not apply to human beings, because they defeat it by pursuing entrepreneurial choice.

Exchange is an unnatural phenomenon that defies the natural law of subsistence. Natural law allows the strong predator and the cannibal to hunt down the weak prey, kill and eat it without payment. Alert humans carried a long and hard struggle over thousands of years to put up a resistance against plunder. They imposed the laws of equivalence and reciprocity to govern exchange.

In addition to governing the relation between objects by the law of equivalence, and relation between agents by the law of reciprocity, society installed a third law to govern the relation between agents and objects. This is the law of freedom enterprise. This is where rational choice is defeated and the classical ideology of free enterprise is upgraded into theory.

An agent incurs a cost of production or purchase to get the good, and derives benefit from its consumption or sale. The difference between the benefit and the cost is welfare improvement. Hence the agent to object relation is a relation of welfare. Microeconomics knows nothing of it, and is summarily dismissed. Micro makes seller's price equal to marginal cost, making welfare gain zero. The buyer's price is made equal to marginal benefit (marginal utility in units of money), making welfare gain zero. In reality, the seller's price is higher than the seller's marginal cost of production, and the buyer's price is above the seller's price because the merchant adds a mark up. The buyer's price is below the marginal cost of production incurred by the buyer (who actually aborts production just because of this high marginal cost of production). Neoclassical price theory cannot stand anymore.

The problem of exchange is that the same object has two agents associated with it, one as its seller and the other as its buyer. The paradox is that the seller produces it but does not consume it, while the buyer consumes it but does not produce it. The explanation lies in the welfare aspect, in the difference between the benefit and the cost.

As a rational animal, Crusoe would allocate his resources, summarily called labor, to produce apples and bananas such that the marginal cost of bananas in terms of apples will be the minimum. But if Crusoe has a chance to become human, he may find Defoe from the next island, and buy bananas from Defoe at a price much lower than Crusoe's minimum marginal cost, just because Defoe can produce bananas at a much lower cost than Crusoe. Hence Crusoe will abort the production of bananas and resort to buying them. This is an act of defiance of natural law of subsistence and defeats optimal choice.

The choice in the exchange between natural enemies Crusoe and Defoe defeats natural law. Crusoe as a hunting animal would naturally kill Defoe and take over

his bananas. But Defoe will fight back and wish to kill Crusoe too. By virtue of superior intelligence called alertness, Crusoe and Defoe may discover that it is cheaper to buy than plunder and bear the high cost of resistance including life and limbs. To engage in exchange, they have to defy natural law and institute social laws.

There are three social laws governing three relations in every instance of exchange. The first law governs the object to object relation of value by the rule of equivalence: two objects that mutually pay for each other must be of equal value. The second law governs the agent to agent relation of payment by the rule of reciprocity: the buyer has an obligation to pay the seller individually and pay nobody else, and the seller earns a claim for payment on the buyer individually and on nobody else.

The third law governs the agent to object relation of welfare by the rule of freedom of enterprise. An agent incurs a cost to produce or purchase the good and is free to produce or purchase it. And agent derives benefit from the object by consuming it or by selling it in favor of something else. The agent has a freedom to consume or sell the object. These two freedoms combine to create the freedom of intermediation: an agent may buy something rather than produce it, and then sell it rather than consume it.

The agents exercise the freedom of enterprise to achieve welfare gains that materially take the form of pure profit. The welfare relation dictates who will produce and sell (but not consume) the good, and who else will purchase (but not produce) and consume it. Who will sell depends on the performance order based on marginal cost. Thus if A incurs a lower marginal cost than B in the production of x, A will produce x and B will abort production. The same consideration makes it gainful for B to produce y and sell it.

Who will buy what is governed by the preference order defined by marginal benefit. If A gets a higher marginal benefit than B from y, then A will buy y. In the same manner, B will buy x because he derives higher marginal benefit from x than A does.

Rational choice gets the whack here because it can make no sense of comparing the marginal cost of x (that A produces) to the marginal benefit of y (that A consumes). It is unable to understand the gains from trade being the marginal benefit of y minus the marginal cost of x (that pays for y).

Rational choice sees the world from the viewpoint of one agent and hence is inherently incapable of seeing the performance order and the preference order

between different agents over the same pair of goods. Most tellingly, it is absolutely unable to understand that trade requires absolutely intransitive preference order: for A to sell x and buy y, and for B to sell y and buy x, it is necessary that A prefers y to x while B must have precisely the opposite order of preference, namely B must prefer x to y. Rational choice can make no sense of x being referred to y at the same time as y being preferred to x in the same exchange. Rational choice must be fully thrown away to make any sense of trade.

The kind of choice that makes sense of exchange is entrepreneurial choice. It is better to call it consistent choice to keep focus on the requirement that every instance of exchange must obey the three rules of exchange. The choice must be consistent with those rules. Rule consistency of social choice allows goal consistency of individual choice. Goal consistency has been studied to death by rational choice: the rational agent has a goal to minimize cost and maximize benefit.

Rational choice has nothing to explain in economics, but something to explain in biology. In the ecology, all animals obey the natural law of subsistence, which imposes the budget constraint and compels animals to minimize cost of production. That automatically means maximizing output value per unit of cost. But the ecology belongs to biology, not to economics.

An economy stands out of the ecology by defying the natural law of subsistence (optimal choice) by installing social laws of exchange. The repudiation of natural law occurs by disintegration of livelihood: the producer is not the consumer and by the unnatural integration of natural enemies. In the ecology, strangers kill and eat each other rather than produce for each other.

The intransitivity of social choice hides the most paradoxical matter of conflict avoidance and promotion of welfare between natural enemies. This intransitivity makes society possible. This is a truth so far out of reach of Ken Arrow and his followers that they must stop.

Intransitivity literally means reciprocity: if one gives, one must also take and vice-versa. Transitivity means a one-way journey of the predator: take (kill) but do not give (get killed), or give (get killed) but do not take (kill). 'Make a transit and do not come back' is the mantra of the jungle. Do not go away (with what you have taken), but do come back (to give what you are to pay) is the mantra of society. Both giving and taking is human. Only animals fail to do both giving and taking: they can do only one.

One single model of indirect trade explains everything in economics. Really nothing of old economics survives, except when wrong approaches led to the right destination by accident. Thus Keynes used invalid logic to reach a valid conclusion by a lucky accident: if there is financial repression evidenced in widespread unemployment, inject more money into circulation to restore employment. Certain bits of old economics survive as accidental survivors. When someone builds a skyscraper in place of horrifying cottage, the roof of the cottage may indeed survive as the new broom to mop the floor.

