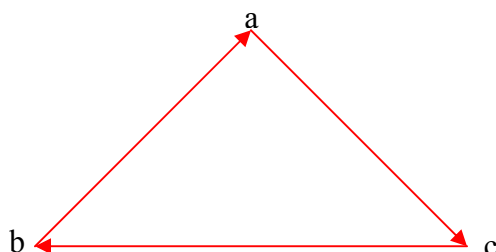


NEW TRADE THEORY TAKES OVER MONETARY THEORY



M. Gani
Institute Director
Economic Science Institute
House 24, Road 7
Uttara, Dhaka-1230

Economic Science Institute
Working Paper 4/2

May 2004

Please send questions, comments, criticisms and suggestions to the author at
<mailto:ganisoman@hotmail.com>

NEW TRADE THEORY TAKES OVER MONETARY THEORY

Abstract:

Prevailing trade theory is a neglected stepchild of economics. Micro rejects the sole reason for trade's occurrence. It declares zero profit in equilibrium. Monetary theory and macroeconomics dismiss concerns of trade financing. They assert that money has nothing to do with traded output, but everything to do with storing value. But now a new trade theory takes over monetary theory, by reducing money into a mere tool of trade, as just a means of payment. It takes over theory of exchange, abolishing any distinction between micro and macro. Finally, all of economics becomes a study of exchange, what Whately wished in 1832.

This magical empowerment of trade theory occurs as we add indirect trade formally. We put it in the familiar input-output table. We consider demand and supply at four levels: for each good, for each transaction, for each household/nation, and for each economy. At each level, something different happens in equilibrium. We employ intermediaries to settle prices through arbitrage, and payments through seigniorage (by creating and issuing money). Suddenly economics studies economy rather than human behavior. The market economy is an institution of exchange, which is a matrix of real output. All economics now belongs to trade.

Keywords:

Social Choice, Trade, Entrepreneurship, Intermediation, Payment Circuit, Money, Price, Unemployment, Business Cycle, Debt.

JEL Classifications:

A10, C67, C68, D46, D57, E10, E24, E30, E40, E52, F10, J64.

Helpful suggestions from
Dr. Fauzul Kabir Khan, Dr. Abdur Rob Khan and Mr. Vikas Vij
Are gratefully acknowledged.

1. Background and Purpose

In 1832, Archbishop Whately recognized and anointed the king of economic theory. Economics was to be a science of exchange. David Ricardo soon delivered a cripple that came to be known as trade theory. It was a cripple, because it did not cover indirect trade, which is what most real trade is. Later refinements by Heckscher (1919), Ohlin (1933) and Samuelson (1948, 1949, 1953) made trade theory more elegant and less empirical, but did not overcome its disability.

Indirect trade creates two major complications. First, it necessitates the use of money as a means of payment, and money alone installs a transmission mechanism to propagate instability along its circulation path. Secondly, it requires the presence of intermediaries to organize the transactions, settle prices, and arrange means of payment by creating and issuing money.

The cripple could not establish the reign over intermediation or over means of payment. The biggest stumbling block was put up by William Jevons around 1868 with the first edition of *Money and the Mechanism of Exchange*. He threw away the analytical key necessary to unlock indirect trade. Trade, whether direct or indirect, requires two conditions: double coincidence and equality of demand and supply. Jevons dismissed double coincidence, and opined that money was merely a more convenient alternative to barter. Nobody had any further urge to ask why traders shed tears over cash-flow problems. Everybody was convinced that money was not necessary as a means of payment. So the existence of money became a puzzle, which was solved by making it a store of value. It was decided that people wanted money to store value in it, as if nobody ever heard of money being spent to pay for real goods. Indeed, banks exist to lend money so people can spend them, and nobody appears to have noticed how this stacks up with the claim that money is a store of value. If it is a store of value, why borrow it and spend it?

While Jevons was murdering double coincidence, Walras was creating a model of pure exchange, as if somehow trade was not exchange. With much help from Pareto, the sole reason for the occurrence of trade was rejected. In Walrasian general equilibrium, profit is zero. If trade is not gainful, why would it occur? There was no trade theorist who could fight against microeconomics on account of the issue of gains from trade. Trade theory lived like an alien outside the majestic halls of economic theory. It dealt with foreign trade, and it was treated like a foreigner. It is as if it was hanging out precariously without much honor, though not yet hanged.

A century after Whately's recognition of exchange as the king of economics, Robbins (1932) removed all reference to exchange from the definition of economics. Economics was defined as the study of allocation, as analyzed by Walrasian-Paretian constrained optimization.

What Robbins called economics soon came to be seen as no more than microeconomics. Its aura of majesty was marred as Keynes marched with a somewhat heretic general theory in 1936. It is as if a patriotic general led his army to battle, but the king lay crippled and castigated outside the capital. The Keynesian assault gave rise to macroeconomics, trying to grapple with the multiple bad effects of not admitting double coincidence. The *General Theory of Employment, Interest, and Money* wants to understand how unemployment occurs, and what relation it has with money. The Ricardian or the Walrasian Model does not know how it occurs, because there is no indirect trade in those models, and no occasion for unemployment can arise except under indirect trade.

Even in the hands of Keynes, money was a store of value and not a means of payment, though the only way money could be linked to the multiplier effect was for it to circulate and spread the effect. Despite lack of clarity, Keynes beats up microeconomics for its sins.

In due time, the Keynesian theory of money was put out of circulation to some extent, almost like Gresham's Law: bad theory drives good theory out. The completely insane idea of

self-fulfilling prophesy took over monetary theory and macroeconomics, almost coinciding with the time when an astrologer advised the first lady at the White House. And one had hoped economics would be science!

There is another bizarre twist to this strange tale. Carl Menger was doubtlessly the most capable economic thinker of the nineteenth century. Among the four horsemen (Jevons, Menger, Walras, and Pareto) who unleashed the neoclassical revolution, he was the one to explicitly recognize that exchange had to be gainful. But as ill luck would have it, he dabbled in a bit of mathematics to consider a barter in which two people kept trading until they eliminated any further gains from trade, downgrading himself to the level of Jevons and Walras. Of the four, Menger was the least inclined to employ mathematics, and probably also the least skilled in this new language of royal discourse. And the little math he did was to make it next to impossible to rescue the cripple named trade theory. By the same token, it was made impossible for money to be seen as a tool of trade. Menger, and his disciples, especially Mises (1933) received the revelation of money as a means of payment, but could not show how.

There is a show biz mantra: show, don't tell. Mises is like a priest, who just tells it and does not show. Thus though Mises tells that money is necessary as a means of payment in indirect trade, and hence cannot be neutral, Lucas (1972) cannot see what he hears (from Mises). So Lucas shows how money is not just neutral, but superbly so: it is super-neutral.

In retrospect, the inability to formalize indirect trade reduced economics to the study of allocation by an isolated individual, with no formal technique to put the intermediary in the scene (Baumol 1968), and to make the use of money as a means of payment. The ability to verbalize is not helpful to spectators who do not listen. They want to see forms and shapes. The Austrian School has excellent stories to tell about exchange, but it flops in show business.

The days of ignominy are over now. We have ushered indirect trade in formal garb, putting it in an input-output matrix. The new model looks after trade in every possible level: at the level of each good in isolation (the Walrasian regime of pure exchange), at the level of each transaction (the Ricardian regime of barter), at the level of each household with indirect trade, (the Misesian regime of money) and at the level of the whole economy (the Keynesian regime of bonds). Overruling Jevons, we bring back double coincidence in barter, and further expand it to multiple coincidence in indirect trade. Using money as a tool of trade to transfer claims on real output under indirect trade, we cut monetary theory to size. Money is now an obedient servant of trade, and banned from behaving like the king's treasurer who used to deal with stores of value. Trade theory now abolishes the distinction between micro and macro. And economics, all of it, now belongs to theory of exchange alias trade. Yes, the name 'theory of trade' sounds vulgar while 'theory of exchange' sounds majestic. But let it be known as it may.

Sorry, catallactics does not sound well; and praxeology would not either. But Mises might be pleased, because it is his message in Leontief's table: praxeology looks like input-output. Somehow, the priestly circles of the Austrian School have always regarded exchange as the king, but never launched a campaign for coronation, because the vulgar show of mathematical attire did not appeal to the sermonizers. But the vulgar eyes must see the dress.

It is really double coincidence that does the trick. If double coincidence in real goods does not exist, then create artificial double coincidence by using money as an artificial payment. With the input-output table, it is so easy to do that one must wonder why it was not done before. Once we see what the table can do, we cannot stop theory of exchange from taking over all of economics. So let us see how trade theory becomes economic theory, and how monetary theory becomes a beast of burden whose job is to carry claims on output from one to the other.

2. Why Trade?

The traditional answer to the question of why trade occurs is very simple. It occurs because it is gainful. However, the unclear worldview behind the prevailing model soon forsakes its own great discovery, as microeconomics boldly asserts that profit in equilibrium is zero. Trade theorists have done nothing to fight microeconomics on this issue.

There are two major areas in which the traditional worldview permits self-mutilation. The first is a lack of distinction between optimization and entrepreneurship. The second is a lack of distinction between a natural mechanism and a man-made institution. Let us clarify these distinctions and see their implications.

2.1 *Optimization versus Entrepreneurship*

There are two fundamentally distinct economic actions: allocation and exchange. The allocation action is devoted to making optimal use of existing wealth, endowment, or income. There is no real gain from the optimization exercise, because nothing can be done to exceed the existing wealth. Optimization merely prevents avoidable waste. In contrast, entrepreneurship is devoted to creating new wealth out of nothing. It turns something of lower value into something of higher value. It is possible only by the action of exchange. When the same good is valued at a lower level by the current owner than by the prospective buyer as compared to a given payment, exchange allows pure gains. Exchange is essentially an entrepreneurial action. An optimization model cannot understand how pure profit can exist in equilibrium.

The Ricardian model's seed of self-mutilation lies in the idea of comparative advantage. This concept is suitable for optimization but not for entrepreneurship. An unstated assumption of the Ricardian model is that someone owns all countries. Exactly the same results are obtained if one carries out an allocation exercise. Thus suppose that the King owns both England and Portugal. It is rational for him to maximize global income from production. If the factors are immobile between the two domains, the solution is to specialize each according to comparative cost advantage. Globally speaking, there is no gain, but a mere prevention of inefficiency. The same applies for any number of countries that are owned by one king.

But if one took the Smithian concept of absolute advantage, one could build an entrepreneurial model of competitive trade. Though specialization in production can be explained by both comparative cost advantage and absolute cost advantage, the latter concept produces factually more correct predictions. Independent producers or countries do not care about comparative cost advantage at all, but they do care about absolute advantage. Let us consider a concrete example to see the implication.

Consider Bangladesh and America. By any measure, Bangladesh has comparative cost advantage in the production of food compared to any reasonable assortment of industrial products. If the comparative cost advantage model is to be believed, Bangladesh should specialize in the production of food and export it to America. In reality, Bangladesh exports (low-tech) industrial products to America; and the bulk of its imports from America have long been food.

The above is not a special exception to the Ricardian model: the overall trade pattern is not consistent with the Ricardian model. Leontief Paradox (Leontief 1954) is a more general exposure of the problem. The puzzling idea of counter-trade exposes the problem of conceptualization. Competition means that America and Japan both produce motor cars and sell them to both markets. The world car market is a single market, and there are many sellers. There is in reality no such thing as counter-trade, but there is competition. To think of a Japan as a

single decision maker is the problem when real Japan consists of many independent producers and consumers of cars. Genuine counter-trade would occur if Toyota were to import cars as well as export them. (Strangely, counter-trade now-a-days refers to barter!!!)

Competition follows the dictates of absolute cost advantage. If a country has absolute disadvantage in both products in a two-good competition model, it will result in the rise of multinational corporations which will buy up the resources of the less efficient country. The competent producer will produce both goods for both countries, and the incompetent will be out of business. Its general proof is clear in the worldwide phenomenon of urbanization. When compared to the rural, the urban sector is able to make more productive use of every factor: land, labor, and capital. The result is readily visible: the rural economy virtually disappears as it loses control over all its factors, and reappears as an extension of the urban sector. The land remains where it always has been, but its control goes to the urban sector. Internationally, the same phenomenon appears in the guise of multinational corporations. Comparative advantage of the absolutely disadvantaged does not lead to trade, but to tragedy: it leads to extinction.

In short, the pattern of trade based on absolute advantage must be different from the one based on comparative advantage. There is little room for doubt that the model based on absolute cost advantage is more consistent with the empirical evidence.

Trade as an engine of growth is an established fact, but it is not at all well explained by the comparative advantage model. If (South) Korea were to adhere to the dictates of comparative advantage, it would still be producing food and remain as poor as other countries that seek to survive by exporting food. There is no hope that Korea would survive in the face of competition from America, Canada, and Australia as major food exporters, despite the fact that these are industrial countries. It would be absurd to think that there is good reason for America to let its enormously productive and advanced agriculture die just to abide by comparative cost advantage, and begin importing food from the Congo. The fact is that the predominantly agrarian nations are actually food importers while the largest food exporters are industrial countries where agriculture is a very small part of the economy. It all shows that absolute cost advantage governs actual trade.

The entrepreneurial element in competition should not be overlooked. If we were to listen to Adam Smith, then we would encourage the son of the peasant to refuse to be a peasant anymore. He would seek to gain the advantages that his father did not have, and try to become a competitor to the son of the judge or the merchant. The entrepreneurial element consists in overcoming comparative disadvantage. Allocation of scarce resources that have alternative uses is not the guide to competition: the acquisition of what one does not have is the driving force.

Without absolute advantage, one does not survive competition. If we build a trade model in which comparative advantage is no longer the key, we have really very little to inherit from either Ricardo or Walras. An entrepreneurial model of trade must necessarily be fundamentally different from an optimizing model of trade. We will show that this means that we must have new ideas and forms about prices and payments. The Misesian spirit must be poured down into Leontief's bottle of input-output.

3.2 *Natural Mechanisms versus Human Institutions*

The other element of the worldview regarding trade also leads us to a fundamentally new perspective. We do not accept the classical view that man has a natural propensity to engage in trade. We think that trade is possible only after the establishment of basic institutions of the market to permit trade and prevent plunder.

The reasoning is simple. We do not see any evidence of trade among any non-human animals. And we cannot imagine that human beings could engage in trade except rather recently, after the creation of market institutions no earlier than the rise of agriculture.

In our view, nature permits and perhaps mandates plunder and hunting by predatory animals. A lion kills and eats the fawn and never pays, and is under no obligation to pay. In human society in the state of nature, the strong suppressed and plundered the weak, and turned the vanquished into slaves, serfs, subjects, and servants. There has been a long and hard struggle of humanity to prevent plunder and to compel the stranger to pay.

The key notion is estrangement. Trade occurs between strangers who are not supposed to get anything for free, and are obliged to pay. Trade does not occur inside the family. There is sharing and caring, but no trade inside the family.

We should not confuse intra-family transfers with exchange between strangers. It is not a helpful idea to pretend that parents and children have an exchange relation through some implicit contract. To make empirical sense, it is necessary that poor parents who would need old age pension from children would live long enough. But the poor parents usually died quite young, leaving behind a gang of orphans. In contrast, parents who could expect to live long enough are rich enough not to need pension from children, and indeed rich enough to leave bequests for children. In short, there is really no exchange inside the family.

The strong do not want to pay the weak. It was not too long ago that Alexander would take over Persia by force rather than buy it. Nor did Hitler make any recent payments for taking over Poland by force. Fighting against plunder remains the daily job of the police everywhere. Humanity fought long and hard to establish the right of the weak to be paid by the strong. This means that for economic analysis of trade, we must mention that one resorts to trade rather than plunder if and only if the cost of buying is lower than the cost of plunder. The victims of plunder offer resistance to make it costly for the plunderer. The law mandates payment.

We need to assert this point because payment is an institutionally enforced obligation. A trade model must analyze the payment according to the institutional rules. We will consider two rules. The first says that the value of the payment must be equal to the value of the good which it pays for. The second says that the utility of the payment to the recipient must be the highest from among all goods of equal value that could be offered in payment. The second leads to money.

The first law means that demand must be equal to supply and that arbiters must settle prices. The second law says that double coincidence must be present in every transaction, and that artificial double coincidence may be created by intermediaries if multiple coincidence exists. All these can be shown as simple equations relating to the input-output table.

Our model must insist that trade is undertaken for gains, and that the gains persist. The persistence of gains from trade is understood by referring to competition based on absolute advantage. This advantage is not wiped out merely by the spread of information. If everybody has perfect information on how Bill Gates sells his software, they do not automatically become as good as Gates to make competing software. Perfect information does not permit a goat to compete with the cougar. Endowments do matter. Kirzner (1979) insists that ignorance may persist so that opportunities to compete may remain unexploited.

Competition does not lead to homogeneous goods, but to deliberate differentiation. Except for natural products whose homogeneity cannot be altered by man, there is no reason for people to produce a manufactured product or service which is just like that of others. The idea that for a homogeneous product, competition wipes out pure profit therefore does not apply to reality. We should not assume homogeneity that does not exist.

3. Formalizing Trade

It seems that the allocation model does not offer a tractable method to deal with indirect trade, as it involves counter-optimal actions. It requires buying without intention to consume, and selling without production. We are left with no option but to explore a new analytical tool.

To create the tool, we see that in a trade, every good has a buyer and a seller. It seems reasonable that we should therefore denote a good with two subscripts, the first denoting the producer/seller and the second denoting the consumer/buyer. This is consistent with the input-output table. Thus let x_{jk} denote the good sold by j , and bought by k .

But it is now obvious that this one good must be seen in association with the other good that pays for it. Since the buyer k must offer a good to seller j in payment for x_{jk} , the payment must be denoted by x_{kj} . Together, the vector $\mathbf{x} = (x_{jk}, x_{kj})$ can be regarded as a direct trade.

It is important to notice two special properties of the vector. First, the subscripts appear in reverse order ($jk|kj$) to indicate that the buyer of the first good is the seller of the second and vice-versa. Indeed, every transaction must meet this condition as the buyer delivers a payment to the seller. It is simple rhetoric to see that both goods are payments for one another. We can define a transaction as a pair of payments between any two agents. In it, the subscripts of the two payments must be of opposite order. The payments may be real good or money.

The second interesting property of the vector is that it is not a regular vector. It does not belong to either a single row or a single column. They are transpose elements which together define the symmetry property of a matrix. Considering the non-traded output x_{jj} of j and x_{kk} of k , we can expand the exchange vector into an input-output matrix as follows:

$$\begin{array}{cc} x_{jj} & x_{jk} \\ x_{kj} & x_{kk} \end{array}$$

For the moment, let us ignore the subsistence output by setting them to zero.

$$\begin{array}{cc} 0 & x_{jk} \\ x_{kj} & 0 \end{array}$$

To formalize indirect trade, we notice that in it a first good pays for a second, but is paid for by a third good. Thus suppose that three goods: $\mathbf{x} = (x_{ij}, x_{jk}, x_{ki})$ are traded among (i, j, k). Here, j gives his own good x_{jk} to k , but gets nothing from k . Instead, he gets i 's good x_{ij} without giving anything to i . How can j give some real good to k without getting back any real payment? How can j get a real good from i without giving a real payment to i ? The answer: money must be used. We see that this indirect trade must be broken down into two transactions if commodity money is used; or into three transactions if fiat money is used.

Suppose x_{kj} is used as commodity money. Though j is not the consumer of k 's good, he will buy it from k , and then he will sell it to i in two successive transactions (x_{jk}, x_{ki}) and (x_{ki}, x_{ij}).

If fiat money m is used, there will be three transactions in sequence. Suppose that j has the money in addition to his real good. The three transactions are (m_{ji}, x_{ij}), (m_{ik}, x_{ki}), and (m_{kj}, x_{jk}). Money m has different subscripts to show who gives and who gets it, though it is the same regardless of subscripts. We might rewrite the transactions as (m, x_{ij}), (m, x_{ki}), and (m, x_{jk}). This is where we have found money as a tool of trade. Money must be used as a tool to transfer claims on real output. Thus j 's claim over the output of k is transferred to i who claims k 's output and compensates j on behalf of k . This money has absolutely nothing to do with storing value.

The indirect exchange of order 3 can be written out fully in matrix form as

$$\begin{array}{ccc} 0 & x_{ij} & 0 \\ 0 & 0 & x_{jk} \\ x_{ki} & 0 & 0 \end{array}$$

For generalization for n different countries, each with its own kind of product, we can write the global exchange matrix \mathbf{X} as an input-output matrix containing all non-traded, directly traded, indirectly traded, and inter-temporally traded goods:

$$\begin{array}{cccccc} X_{11} & X_{12} & X_{13} & \dots & X_{1n} \\ X_{21} & X_{22} & X_{23} & \dots & X_{2n} \\ X_{31} & X_{32} & X_{33} & \dots & X_{3n} \\ \dots & \dots & \dots & \dots & \dots \\ X_{n1} & X_{n2} & X_{n3} & \dots & X_{nn} \end{array}$$

The matrix of course reveals the pattern of trade in detail. We will explore the details at four levels. First, for each cell x_{jk} , we will look at demand and supply. Secondly, for each transaction between two elements (x_{jk} , x_{kj}), we will see how the demand and supply of one good affects the demand and supply of the other good that pays for it. Thirdly, we will look at each country's/household's balance of trade, comparing the row and the column for one country. This is the stage where indirect exchange and money enter the picture. Fourthly, we will study global trade. With one equation for each level, we will find the intricate pattern of linkages.

The crucial task of theory is to explain how the kinds and quantities are determined and how they are paid for. We have three distinct sets of questions.

First, we want to know what determines the quantity x_{jk} in each cell of the matrix, and then what determines the relation between the quantities (namely, prices) of the goods that directly or indirectly pay for each other. This gives us theories of output/income and prices. It makes price theory (microeconomics) and income theory (macroeconomics) inseparable.

Secondly, we need to know what determines the kind of each good and the relation between the kinds of goods that pay for each other. This gives us theory of money and business cycle. This is where trade theory enslaves monetary theory and kills the idea of neutral money.

Thirdly, as we try to explain the properties of the exchange in terms of the kinds and quantities, we also must learn about the process of exchange. Intermediation issues involving institutions, entrepreneurship, transaction cost, and competition become pertinent in formalizing the answers to the first and second set of questions. This is where the classical idea of invisible hands, self-correcting market machines, and spontaneously sprouting institutions are defeated.

The advantage of this formalization with the input-output table is that the theory of international trade and international finance are no longer kept separated by crippling ideas of comparative cost and exchange rate machines. They are now happily married as inseparable parts of an economic model that deals with all micro and macro issues at once. The new model is not just a revision of the Ricardian trade model, but also a revision of the Walrasian general equilibrium model of exchange of the domestic economy. The most interesting advantage of the above formulation is that it forces us to look at observable properties of traded (and non-traded) goods, and saves us from intractable issue of human behavior. We begin and end with observed trades and explore relations among goods. We study the behavior of goods, but not of humans.

4. Measuring Gains from Trade

The standard presentation of the gains from trade as compared to autarky is straightforward, but it remains incomplete. There are two dimensions from which completion is required. The first is the efficiency gain from specialization. The second is the gain from production that just cannot occur under subsistence.

4.1 Efficiency Gains from Specialization

The standard presentation of gains from trade assumes a given factor endowment, which is fully employed under autarky or trade. The prevailing trade model shows the gains from specialization for one country, but does not consider the global factor endowment and gains for the other side. One feels that the other side makes symmetric gains. This would be okay except that microeconomics creates trouble. The gain is wiped out by microeconomics, as it does not care about factor endowment, but simply assumes that the country keeps increasing export supplies until marginal cost is equal to price. Microeconomics is mistaken, because it forgets that the country is already on its production possibility frontier, and hence cannot expand output to the point of eliminating the gain. Let us graphically demonstrate this issue.

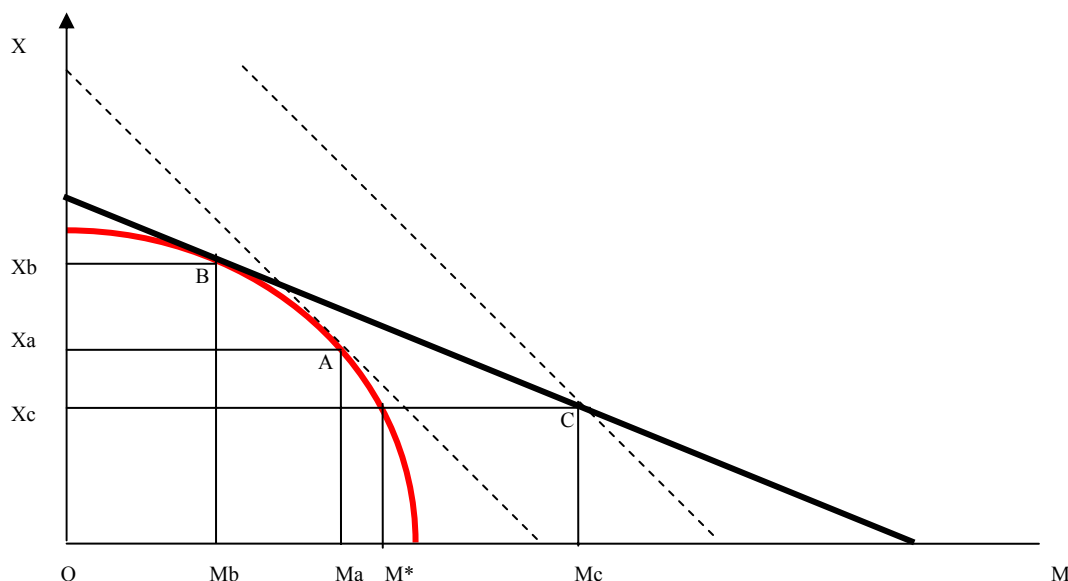


Figure-1: Gains from Trade

In Figure-1, the country produces and consumes two goods X and M. The points A and B lie on its production possibility frontier (PPF). Under autarky, at the domestic price ratio given by the dashed line, it produces at point A with outputs (X_a, M_a) . To avoid clutter, indifference curves have not been drawn. Under autarky, the highest level of utility is achieved at point A, while point B is inferior and point C is superior in utility. Under trade at the international price ratio given by the solid line, production shifts to point B on the PPF, but consumption moves to point C on the budget line. The country exports $(X_b - X_c)$ and imports $(M_c - M_b)$. If it reduced production of X by $(X_b - X_c)$, it could produce $(M^* - M_b)$ of M. For unit $X = (X_b - X_c)$, marginal cost measured in M is $(M^* - M_b)$, but price is $(M^* - M_b) + (M_c - M^*)$. Its net gain is $(M_c - M^*)$.

The gains from trade are forgotten by microeconomics in two related ways. First, as already mentioned, it simply assumes that the country expands production of X to the point where marginal cost is equal to price, forgetting the factor endowment. It is already on the PPF and cannot expand exports to drive down the price of X or drive marginal cost up. Secondly, it merely assumes that the price is competitive in the sense that it is equal to marginal cost. The problem here is that the world price already contains the gains from trade, but microeconomics takes this price as given and optimizes production by imputing the gains as part of cost of production. It overvalues its factors in view of the global price of its product, and hence thinks that the marginal cost is equal to price. In short, it has a faulty theory of price and competition. We must look at this problem in more detail later.

4.2 *Entrepreneurial Gains from New Production*

Though the efficiency gains from trade must be acknowledged, its share in empirical sense is quite small. The overwhelming bulk of the gains from trade come from making use of hitherto useless things. It amounts to an expansion of the very production possibility frontier. There is no analytical method known to us to measure it in the abstract. The empirical task is to measure the employment of resources that were unemployed before trade, adjusting for relocation of factors from previous import-competing goods to the new export sector.

The standard presentation assumes that a country is fully employed. This is an extreme assumption; but an optimization model cannot work without it. An entrepreneurial model can very well begin with the assertion that a country has a reservoir of unused resources that cannot be put to use unless there is an opportunity to make profitable use of them. Trade offers that opportunity. For an optimization model, unused resources cannot be counted as part of the factor endowment.

Let us emphasize the inherent limitation of the allocation model with respect to resource use. It looks at the world from the viewpoint of a single individual. It cannot see how usable resources can be left idle. It cannot see an anomalous distribution of endowment at the base of trade. The problem is that the resources that are useful to A belong to B who thinks that they are useless. The aborigines of the Amazon may have no use for the wood of the forest that the residents of New York could put to great use. The desert dwellers of the Middle East had found no good use for the horrible smelling awful tasting liquid that had gushed out in their world, until foreigners discovered their use as fuel for vehicles. An allocation model cannot imagine the useful being unused. A trade model must recognize the anomaly in endowment. It must see that the creation of new wealth is possible if the less useful (or useless) goods are made more useful by giving them to those who can make better use of them, compared to some reference good.

When trade opens, new opportunities to achieve economies of scale and scope open up. Small scale production often does not permit the use of more advanced technology. Larger scale is often the key to greater productivity. A greater mix of products also makes it possible to make newer use of resources in more versatile manners than are possible within a limited scope.

Another major new element is the opportunity to import complementary factors. If iron and coal must be used together to smelt the ore to make iron goods, then the anomalous endowment of one country with coal but no iron, and another with iron ore but no coal means that before trade, neither iron nor coal is usable. If we look at the empirical significance of the trade in factors, we must acknowledge that this as a major source of gains from trade. Trade permits growth not just by substitution between old uses, but by creation of new uses.

5. Output Determination

The standard analysis of output determination says that the demand and supply of any particular good together determine its output. We retain this assertion with two crucial differences. First, equality of demand and supply involves equality of marginal cost with marginal benefit, only under subsistence but not under trade. Secondly, as explained in the next section, equality of demand and supply determines output but does not determine price.

6.1 Output Determination under Subsistence

Under subsistence, the producer is the consumer. The demand for goods is restrained by the resource constraint $W = \sum_j c_j x_j$ where c_j is marginal resource cost of good j . The problem is to maximize $U(x_1, x_2, \dots, x_n) + \lambda(W - \sum_j c_j x_j)$. The solution involves the first order condition $c_j = (U_j/\lambda)$ where U_j is marginal utility and the expression (U_j/λ) may be interpreted as marginal benefit measured in the same numeraire units as resource costs or income.

There is really no market price or exchange under subsistence. It is however harmless and useless to suppose that the price of the good is equal to its marginal cost from the supply side and the marginal benefit from the demand side. This condition does not apply under trade, as explained below.

6.2 Output Determination under Trade

Under trade, output is also determined by demand and supply, but the details are not the same as under subsistence. The first big shock from the new model is that when the producer of one good is the consumer of another good bought against his own product, the relation between marginal cost and marginal benefit becomes unhinged. The production of one good now depends on the consumption of the other. The optimization analysis of the familiar type is no longer helpful.

Consider a concrete scenario. Crusoe produces a certain quantity of apples and no more, despite the fact that his island is full of apple-bearing trees. He equalizes the marginal cost of work to the marginal benefit of the last apple he plucks. He lets other apples go to waste. But now imagine that Defoe from the neighboring island offers him some bananas against his apples. Though Crusoe has no reason to produce more apples for his own consumption (as the marginal cost of work is greater than the marginal benefit of consumption of apples), he agrees to do extra work to produce some extra apples for Defoe. This can happen if and only if the marginal benefit of the consumption of bananas is high enough to justify his higher marginal cost of production of apples. Optimally, he equates the marginal cost of apple to the marginal benefit of banana.

We have now two scenarios to compare. The Ricardian full-employment model of optimization would suggest that Crusoe will cut down his own consumption as well as increase production of apples in order to export them so long as he considers only the price and does not count the income changes. He will of course reduce banana production. In reality, export is made mostly out of increased production, and the domestic consumption may mostly increase. The trouble is with the assumption of full employment. If that assumption was correct, an hotelier would have to sleep on the streets if he took guests. But if there is no full employment at the start, the hotelier will just build new rooms for guests. It means that an entrepreneurial model needs to make a more empirically accurate assessment of the factor endowment to support new production for export. The old term factor abundance may be reinterpreted to mean that a country has some unused factor available to expand output to the limit of that endowment.

We may be able to stretch optimization analysis to the case of barter by equalizing the marginal cost of the export good to the marginal benefit of the import good (per dollar). But we

cannot do much to study indirect trade in which exports to a second country earns the income to finance imports from a third country. The relation of production and consumption to price becomes less clear while the significance of income increases greatly. With indirect trade, the producer may no longer consider the marginal benefit of consumption of any good in particular, but may simply consider the income. Likewise, the importer may disregard cost of production and focus only on the benefit of consumption in terms of unit income. That is, it may border on earning income for the sake of income instead of for the sake of consumption financed by income. It raises the possibility that exporters may consider nominal income since money must be used in indirect trade, and may not care about real income counted in baskets of consumption.

The allocation model's equilibrium output occurs at a point where marginal cost is equal to price. An entrepreneurial model sees no reason to reach that point, because it permits some degree of monopoly. While an optimizer is a strict price-taker, an entrepreneur is not a price taker. An allocation model cannot let the same individual determine both output and price, but an entrepreneurial model can. This is because an entrepreneurial model splits the individual into two successive economic agents. First, the agent as an optimizer chooses a level of output based on a presumed price. It is generally unthinkable that there is any producer who can produce enough to drive the price down to marginal cost. Most real life producers run out of factor endowment long before the price has fallen to the level of marginal cost. This in itself offers a degree of monopoly power. But after the optimizing exercise, the same producer adopts the role of an entrepreneur who seeks to get a higher price. It is as if the entrepreneur buys the good from himself at a low price (equal to marginal cost), but then attempts to raise the price as much as possible given the demand. Empirically, the presence of intermediaries suggests that the market price is higher than the marginal cost of production.

Analytically, one may distinguish between two situations that permit output to be lower than the competitive output (where price=marginal cost). First, if the supplier is producing at full capacity, but able to get a price higher than marginal cost, it is ascribed to excess demand. In a general equilibrium model, it is not possible to have excess demand for every good. In contrast, one may consider agriculture and natural resource sectors as perennial over suppliers.

Secondly, if the producer is not using the factor endowment fully and getting a price higher than marginal cost, then there is some degree of monopoly.

Entrepreneurs know well that excess demand or monopoly cannot persist forever. They change the product in some respects to enter the market where there is excess demand. What happens in the long term is of little relevance. Short order entrepreneurs keep cooking up product variations to defer the arrival of the long run in the festival of gainful trade feasting on gains.

6. Price Determination

After studying a single output, we need to move to the analysis of a single transaction (x_{jk} , x_{kj}). We want to explore the relation between the goods that pay for each other. There are two relations between the payments (x_{jk} , x_{kj}). The first is the quantity of payment, otherwise known as price. The second is the kind of payment. In this section, we look at the quantitative relation between (x_{jk} , x_{kj}). The relation between the kinds is taken up in the following section.

Traditional trade theory does not consider price determination. Microeconomics usurps the job. Though it is often synonymous with price theory, microeconomics has mutilated price theory. It says that price determines demand, and then demand determines price. We must rescue price theory. In the rescue, we must consider the definition of price, the allocation under predetermined price, and the arbitrage process to determine price.

7.1 Definition of Price:

Let us begin with the definition of price. It is proper to define price as the quantity of the payment per unit of the good. Thus if a shirt is exchanged against dollars, then the price of the shirt is the number of dollars per shirt. This definition immediately reveals why the prevailing theory of price is in trouble when it says that demand and supply determine price. We have just seen in the previous section that demand and supply determine the output.

If y pays for x , then the price of x is given by the ratio (y/x) . Now, the demand for x is the quantity of x the buyer wants to buy (and is able to pay for it), while the supply is also the quantity of x that the seller is willing and able to sell. When demand is equal to supply, it determines the quantity of x for which demand is equal to supply. That quantity is called output. It certainly does not determine the quantity of y . Thus even at a simple linguistic level, it is ungrammatical to say that the demand-supply equilibrium determines price.

The quantity of y is determined by the demand and the supply of y . Thus if we want to learn about the quantity of y as well as the quantity of x , we must consider the demands for both x and y , and the supplies of both x and y . The demand and supply of one good certainly cannot determine the quantities of two goods.

There is an obvious but unnoticed lapse of rigor in mathematical reasoning in traditional price theory. It is a definitional error of the most elementary sort.

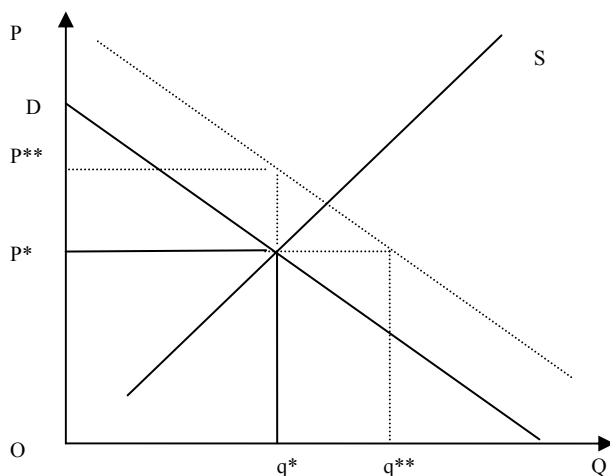


Figure-2: Price and Output

The graph shows price on the vertical axis and quantity on the horizontal. The key is to remember that price is a parameter in both the demand and the supply functions, and an equation does not determine the parameters, but determines the dependent variable. The demand function is $q_d = D(p, I)$ while the supply function is $q_s = S(p, C)$ where I and C are income and cost respectively, and p is price. The equation $D(p, I) = S(p, C)$ determines quantity $q^* = q_d = q_s$, and not the parameters p or I or C .

7.2 Allocation under Predetermined Price:

It is now unavoidable that we make a fundamental distinction between optimization and entrepreneurship. An original producer and a final consumer is an optimizer who must take the price as given and respond to it. Neither demand nor supply can even be defined unless a price is given. In short, price determines demand, but demand does not determine price. Likewise, price determines supply, and supply does not determine price.

The importance of the parametric nature of price may be brought out by looking at income as a parameter. Suppose that the consumer's income increases, as shown by the dotted demand curve. Now, the consumer can pay a higher price p^{**} for the same old quantity q^* , or buy a larger quantity q^{**} at the old price p^* . If the income is fixed, it is impossible for the consumer to raise the price and the demand together. The whole point of substitution in allocation is that if the price goes up, demand must go down. The idea that an increase in demand increases price is fully mistaken, because it is impossible without prior increase in income. One might say that an increase in income permits an increase in price or quantity or both. Likewise, a decrease in marginal cost may permit an increase in quantity of supplies or a reduction in price or both.

The problem is inherited from the inarticulate classical idea of demand and supply as forces that push around price in a machine. When supply is heavier than demand, it pushes the price down. When supply is lighter than demand, the price springs upward. This is a terrible way to visualize price determination.

The articulate idea would be to see the issue in two stages. In the first stage, optimizers presume some price and choose demands and supplies. The demands and supplies appear in the market, and may or may not be equal. The second stage is for the arbiters to perform the task of market clearing. If there is excess demand, the price is raised to kick out poorer buyers, and compel the remaining ones to buy less, and to encourage producers to bring more supplies in the next round. If there is excess supply, the price is lowered to encourage new buyers and allow old buyers to buy more; and it tells suppliers to cut down supplies for the next round.

In short, producers and consumers determine the quantities but not the price, while arbiters or auctioneers determine the prices but not the quantities. They are two very different kinds of economic agents. The price-maker is not the price-taker. The arbiter is neither a producer nor a consumer and has no part in choosing how much to buy or sell. Producers are at the mercy of the market after they have already made the production: they now suffer whatever price may come their way, and this may be more or less than what they anticipated. Consumers likewise are apt to be delighted or dismayed by having to pay prices lower or higher than what they thought they would like to pay. This is our worldview of what happens.

Prevailing price theory says that price determines demand and then demand determines price. There is no reason to allow this inconsistency. We let producers and consumer choose quantities under presumed prices, and arbiters set prices to clear the market.

7.3 Arbitrage Operations to Determine Price

In the transaction (x_{jk}, x_{kj}) , the two goods pay for each other. A fundamental institutional rule of payment is the principle of equivalence. It says that the value of the two elements in a transaction must be equal. Thus if $p_j x_{jk} = v_{jk}$ is the value of x_{jk} , and $p_k x_{kj} = v_{kj}$ is the value of x_{kj} , then the equivalence condition on the transaction (x_{jk}, x_{kj}) is $v_{jk} = v_{kj}$. It simply means that $p_k/p_j = x_{jk}/x_{kj}$.

What process ensures equivalence? As already noted, the arbitrage process determines the price. It is not possible to visualize the arbitrage process as optimization, because it is by its very character non-optimizing. The arbiter does not consume and yet he buys. He does not produce, and yet he sells. We must recognize the presence of a bargain which leads to an agreement between the buyer and the seller on price. The essence of the agreement is to find the ratio at which two goods that pay for each other are of equal value. Even in barter, one of the agents must take up the role of the arbitrageur to finalize the price. Game theory is needed here.

The implication of arbitrage is shattering. The arbiter does not consume what he buys and therefore disregards the marginal benefit of consumption. He does not produce what he sells and therefore disregards the marginal cost of production. In two steps, he destroys the link between marginal cost and marginal benefit. Yet the arbiter can function if and only if there is an arbitrage opportunity $\alpha = (\chi - \beta) > 0$ where α = scope of arbitrage, χ = marginal cost and β = marginal benefit. The arbiter chooses any arbitrary price in between the floor given by marginal cost χ incurred by the producer, and the ceiling given by the marginal benefit β enjoyed by the consumer.

So far, we have encountered two major differences with prevailing price theory. They are summarized in the table below:

	Traditional Model	Unified Model
Demand=supply determines what?	$D_x(p, I) = S_x(p, C)$ gives price p_x	$D_x(p, I) = S_x(p, C)$ gives output q_x
Relation between marginal cost c_x , marginal benefit (U_x/λ) and price p_x	$(U_x/\lambda) = p_x = c_x$	$(U_x/\lambda) > p_x > c_x$

The first difference may be deemed of minor importance. But the second assertion sounds totally incredible to us in terms of the allocation model. In the back of the mind, we might say: may be this happens in reality, but how can we let it happen in theory? It seems absurd that a producer would not expand output to the point where no further difference lies between marginal cost and price. The trouble is that theory has no obligation to care only about logic regardless of facts. The fact is simple: producers run out of endowment before they can reach the point where marginal cost is equal to price. In theory, the equilibrium price is above marginal cost because the producer cannot produce enough to equalize them.

The next objection is against the idea of arbitrage being non-optimizing. One thinks of perfect competition. In the back of the mind, we suppose that if some arbiters are able to buy low and sell dear and earn pure profit, surely others will not sit idle, but will run to compete. But in theory, we have nothing to guarantee that perfect competition will occur. Kirzner's idea is that ignorance about the arbitrage opportunity may persist. (See Kirzner 1973, 1979). Some arbitrage opportunities remain unexplored just because people are unaware of them. The long run does not assure automatic discovery of those opportunities.

It is important to see that the basic difference between marginal cost and marginal benefit occurs because the producer and the consumer is not the same person. If the arbiters were in competition, they would raise the producer's price and lower the consumer's price, but it would still be the case that the producer would get a price higher than marginal cost and the consumer would get a price lower than marginal benefit. That is, competition may affect the distribution of the net gain between the producer, the arbiter, and the consumer. But it would not eliminate the scope of arbitrage $\alpha = (\chi - \beta) > 0$.

Why do we insist on the gains from trade even at the risk of fighting against long-established price theory? Had trade been limited to barter alone, and had there been no indirect trade, we could live with the idea that at the margin, marginal cost is equal to marginal benefit. But we must consider indirect trade, which makes no sense without strictly positive gains from trade. The rhetoric goes beyond price theory. Unless we can delink the market price from marginal cost and marginal benefit, we are unable to make any sense of fiat money having a positive value. Zero gain may allow barter, but not indirect trade. It would make no sense to ascribe a value to money (for which one pays interest to the issuer) unless it aided strictly gainful indirect trade.

7. Indirect Trade and the Necessity of Money

We have so far considered a single good x_{jk} in isolation, and then a pair of goods (x_{jk}, x_{kj}) that pay for each other in a single (barter) transaction. Let us now consider the household's budget balance or the country's trade balance. Thus let household/country j sell its output to all n countries (including itself), and buy from all n countries (including itself). We must suppose that each country sells a different kind of product for this analysis. If a country sells many kinds of goods, it is shown as many countries. In short, it is a sectoral model.

It is no longer possible to look only at quantities, because different kinds of goods cannot be added. So we convert the exchange matrix into one of values. Let us replace the \mathbf{X} matrix by the \mathbf{V} matrix where $v_{jk} = p_{jk}x_{jk}$.

V_{11}	V_{12}	V_{13}	...	V_{1n}
V_{21}	V_{22}	V_{23}	...	V_{2n}
V_{31}	V_{32}	V_{33}	...	V_{3n}
.....				
V_{n1}	V_{n2}	V_{n3}	...	V_{nn}

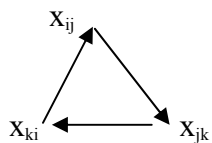
Our problem is to study the relation between the sales and purchases of one country j . Its total sales are given by $\sum_k v_{jk}$ to all $k=1, 2, \dots, n$ buyers. Its total purchases are given by $\sum_k v_{kj}$ for all sellers $k=1, 2, \dots, n$. We begin with perfect budget balance $\sum_k v_{jk} = \sum_k v_{kj}$. Lending and borrowing will be considered later.

We must get ready to allow indirect trade. Though the key concepts are extremely simple, they go against the prevailing core beliefs of both micro and macroeconomics. Suddenly, we must be ready for a Gestalt Switch where familiar things disappear, and unfamiliar things take their places. So let us take small steps to make the big transition. We are now crowning trade theory by dislodging the usurpers.

8.1 Definition of Indirect Trade

An indirect trade involves selling a real good and buying a real good against it indirectly. There are two steps. First, the producer sells the real good to some customer and gets no real good from the customer. In the next transaction, he gets a real good from a supplier different from the customer, and gives no real good to the supplier. This is possible if and only if there is a procedure that lets the customer of the first good deliver the second good to compensate the supplier of the third good, directly or indirectly. The simplest possible indirect trade therefore involves three real goods. Let us consider the indirect exchange $\mathbf{x} = (x_{ij}, x_{jk}, x_{ki})$ among three agents (i, j, k) . This exchange is shown by the matrix on the left and the triangle on the right

0	x_{ij}	0
0	0	x_{jk}
x_{ki}	0	0



An indirect trade may consist of 3 or more goods, but its essence can be glimpsed from the simplest case with three goods. All indirect trades with more than three goods can be reduced to the three goods case: the first good pays for a second and is paid for by a third good.

8.2 Preference Structure in Indirect Trade

We can no longer ignore the issue of preferences over different kinds of goods of equal market value in the face of indirect trade. To fulfill equivalence, all three goods (x_{ij} , x_{jk} , x_{ki}) must be of equal value. The basic logic is that in the set, each good pays for a second and is paid for by a third good so that the first, the second, and the third good all must be of equal value. If fiat money is used, we would see for example that agent i sells real good x_{ij} to agent j for \$1, then uses this \$1 to buy the third good x_{ki} from k ; and lastly k gives the money \$1 to j to buy x_{jk} . Clearly, the prices and quantities must be such that the goods are of equal value.

The puzzle now is to understand why direct trade is not occurring. Clearly, agent j has a real good x_{jk} worth \$1, but agent i does not buy it. Instead, he buys good x_{ki} from k , also worth \$1. It must be because agent i strongly prefers x_{ki} to x_{jk} . Had it been barter, we might willy-nilly accept that at the margin, the agent would be indifferent between the two goods, that the marginal utility of the two goods would be equal. But this can no longer be allowed if we are to explain indirect change. Strict preference is necessary to distinguish what is bought from what is sold from what is neither bought nor sold. Let U stand for utility as achieved by the agent shown in the superscript. To avoid subscript clutter, let the goods be ($a = x_{ij}$, $b = x_{jk}$, $c = x_{ki}$). Let us explain why for the three goods, the preference orders must be as follows in indirect trade:

$$\begin{aligned}U^i(b) &< U^i(a) < U^i(c) \\U^j(c) &< U^j(b) < U^j(a) \\U^k(a) &< U^k(c) < U^k(b)\end{aligned}$$

If the inequality signs are replaced by equality signs, we have nothing to explain why direct barter would fail. Nor would we know which good would be sold and which would be bought. For each agent, the most preferred good is bought, the weakly preferred is sold and the least preferred is neither bought nor sold. Without the strict inequality signs, we could not make these distinctions.

The above preference structure contradicts the idea of Pareto Optimality and its generalization known as Arrow's Impossibility Theorem. In our bid to crown the legitimate king, we must insist that the same preference structure that makes it impossible to build a transitive social preference order makes it possible to conduct indirect trade to give the most preferred good to each agent, unambiguously maximizing social welfare. There is a very clear social solution: let the first agent give his real good (a) to the second, who gives his real good (b) to the third (and not the first), who in turn gives his real good (c) to the first (and not the second). Arrow's Impossibility Theorem merely means that transitive social preference is impossible: it surely cannot mean that indirect trade is impossible. There is no need for transitive preference order for the society. Indeed, we will prove that non-transitive social preference is not merely possible, but also necessary for indirect trade, and direct trade. In short, transitive social preference is neither possible nor necessary, and hence has no relevance to economic analysis.

The fundamental error of Pareto Optimality comes from mistaking exchange for distribution. In an economy, there is no such thing as a one way transfer or a distribution of output. A good belonging to one agent goes to another agent by way of exchange, and not by way of distribution. Pareto misapplies Walrasian allocation to non-Walrasian distribution. When an agent buys several goods, the ratio of marginal utilities is equal to the ratio of prices. If many agents buy the same goods at the same prices, then they all of course equalize the ratio of marginal utilities to the ratio of prices. This however certainly is not true between buyers and

sellers. The ratio of marginal utilities between two goods cannot be equal to the ratio of price if one good is sold and the other is bought. In that case, there would be no gains from trade, and nothing to decide which good to sell and which to buy. In short, Pareto confuses selling with buying. He does not notice that one-way transfers or distributions occur in politics without economic rules. The state plunders the tax payer to feed the recipients of subsidy, like the lioness kills the fawn to feed her cubs. The fawn's loss of life is not compensated by the cub's meal.

Arrow just generalizes Pareto's mistake. Indeed, no society has a problem of deciding which one among three different goods it should produce. If it is an allocation problem, Arrow ought to specify the budgets. Who owns the resources that are to be allocated? As soon as a budget is provided, the owner of resource uses it to produce the good he likes most. Since in the example three people prefer three goods, they will end up producing three goods, each according to budget. Thus one would produce and consume (a), the other would produce and consume (b) and the last would produce and consume (c). If it is an exchange problem, one would produce (a) but consume (c); produce (b) but consume (a); and produce (c) but consume (b). This would occur because endowment anomaly makes it feasible for one to produce what one does not consume, and consume what one does not produce. If one produces (a) but consumes (c), it must be because it is less costly for him to buy (c) rather than produce it. Asking for Pareto Optimality is therefore against reason. If one prefers (a) and (c) equally, or incurs equal cost per dollar of output, it is not rational to produce (a) and consume (c) instead of simply producing and consuming (c).

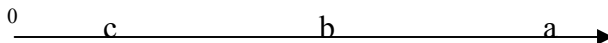
In sum, as long as each individual has strictly transitive preference, there is no problem that social preference order is not defined as a transitive preference order. It is none of the business of society to decide which among (a, b, c) is to be preferred to which one, but simply to allow the producer of (a) to get (c), the producer (b) to get (a) and the producer of (c) to get (b). We reject Pareto Optimality and Arrow's Impossibility Theorem because they are inconsistent with the reality of indirect trade (or any trade). Pareto thinks no further improvement is possible, and Arrow thinks no social welfare is function is possible. But our royal highness the indirect trade makes it the rule that trade must be gainful. Double and multiple coincidence define how people agree to mutually gainful trades, yet establish perfect democracy of equivalence.

The gloomy days of Walrasian zero-profit, Paretian lack of improvement, and Arrovian impossibility are over. Menger's cheerful days of gainful trade are here now. Hopeful Misesian entrepreneurs are at work, and the hopeless Robbinsian optimizers are left to pitiful subsistence. While the poor economizes, the creative entrepreneur creates wealth.

8.3 *Linear and Circular Consistency*

An individual's preference order must be transitive. The transitivity of preference order is a feature of consistency of choice. Unless choices are consistent, we cannot understand them. But consistency may take two different and mutually exclusive forms. This is a new concept likely to cause much consternation. But it is simple to grasp.

An individual's choice must be linear in the sense that it must be possible to use a straight line to place the choices according to some scale of preference. In a line, a point cannot be both higher and lower than another point. Thus if one prefers a to b, and prefers b to c, one must prefer a to c. Thus suppose that a horizontal line shows the utility rankings for any given value of goods (a, b, c). Linear consistency means that (a) cannot be placed both to the right and to the left of (b) to imply that that (a) is both preferred and not-preferred to (b).



We notice that in our example, each agent has linearly consistent choice. Each agent has clear orders of preference. However, no two of them have the same order of preference over the whole set of goods. First, they are different people; and do not have any need to have the same preference orders. Secondly, until they have opposite orders of preference over the same pair of goods, they cannot have reason to buy one and sell the other. If both agents prefer (a) to (b), then nobody wants to sell (a), and nobody wants to buy (b). If (a) is to be traded against (b), the seller of (a) must prefer (b) to (a), while the buyer of (a) must prefer (a) to (b).

The notion of consistency of choice involving buyer and sellers must permit the same good to be sold by one and bought by the other, against a given payment in the second good. The proper concept is circular consistency for this case. In a circle, there is no endpoint or starting point. On the clock's dial, 1 O'clock can occur both before and after 2 O'clock. Thus 1 PM can come after 2 AM, but before 2 PM. The key to this is the independence of AM from PM. Thus if we put two goods on a circle, it is possible that (a) is preferred to (b) by one agent, and then (b) is preferred to (a) by another agent. In a three good case, the first may prefer (a) to (b), the second may prefer (b) to (c) and the third may prefer (c) to (a).

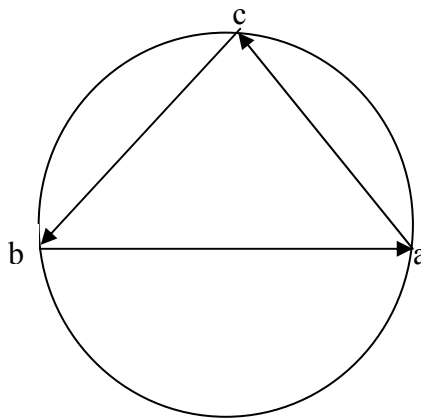


Figure-3: Circular Consistency

In our example of indirect trade, the owners of (a, b) both prefer (a to b), owners of (b, c) both prefer (b to c), and the owners of (c, a) both prefer (c to a). In each case, the owner of the preferred good refuses to sell it against the less preferred good, and therefore there is no barter. However, indirect trade is possible if money is used in the same direction as shown by the arrows in Figure-3. With money, the owner of (b) can pay the owner of (a) with money but not with real good (b); the owner of (a) then gives the money but not real good (a) to the owner of (c) to buy (c). Lastly, the owner of (c) gives the money but not (c) to the owner of (b) and buys it. In short, goods go in the opposite direction of the money. The preferences underlying the flow of money reveal circular consistency in which (a) is preferred to (b); and (b) is preferred to (c); and (c) is preferred to (a). A more detailed discussion is found in Gani (2003).

The key logic behind circular consistency is the independence of the agents. Each agent has linearly consistent preferences. When their preferences are combined, the social preference does not have linear consistency, but has circular consistency. Circular consistency is required so that each good has both a buyer and a seller.

A line segment has one good without demand, and one good without supply. Thus between agents (a, b), the line (b→ a) showing (a preferred to b) means that (b) has no buyer and (a) has no seller. Now, if the third agent (owner of c) is brought in, he can at once buy (b), and induce the owner of (a) to sell it by giving (c) in payment for (a), on behalf of consumer of (a) who is the producer of (b). In barter, if two ends of a straight line connecting (a, b) are joined to form a circle, then (a) would be preferred to (b), and (b) would be preferred to (a), and hence there would be barter. That is, circular consistency is required in every trade. It is connected to the vague concept of double coincidence, as explained below.

8.4 *Single, Double and Multiple Coincidence*

One of the saddest events in the history of economic thought took place when the phrase ‘double coincidence of wants’ was used dismissively. The term coincidence indicated that the author thought of it as a random happenstance, an awkward nuisance that sometimes happened. William Jevons (1876) regarded barter as a barbaric practice in which the awkward event of double coincidence was required. He saw that money overcame the inconvenience of barter. In this, he committed capital murder twice.

First, double coincidence is necessary in every trade, direct and indirect, regardless of whether money is used or not. He asserted that money was merely a more convenient alternative to barter; and it killed monetary theory in its embryo. Money is absolutely necessary to conduct indirect trade. The central debate in macroeconomics is about the neutrality of money. This pointless debate would be entirely avoided if the necessity of money was recognized. When a seller wants payment in money, the buyer must pay in money, and is not free to pay in his real good. The seller wants money to lay claim on a kind of good that the buyer does not have. Thus the producer of (a) wants to consume (c), but the consumer of (a) is unable to deliver (c), being the producer of (b). Money is a device to transfer the claims on real output such that the producer of (a) lays a claim on the output of producer of (c), who is to compensate on behalf of the consumer of (a) and the producer of (b). Money is absolutely necessary here. Barter is impossible. Barter and money are mutually exclusive and most certainly not alternatives.

Secondly, the idea of convenience killed good sense in theory. If Adam prefers bananas (b) to apples (a), and if Beth prefers apples (a) to bananas (b), then it makes absolutely no sense to say that there is inconvenience in barter. What is the inconvenience if one gets just what one prefers? For more than a century and a quarter, people kept using the metaphor of inconvenience or synonymous terms such as friction without ever bothering to specify what it is. No, there is no inconvenience in barter at all. Jevons apparently confused commodity money with barter. There is no doubt that paper money is more convenient than metal money, which in turn is more convenient than wheat-money or chicken-money, but chicken-money is money, not barter. This utter lack of sharpness condemned economic theory to barrenness and resulted in economic practice with tragedy. We will soon see why the improper theory of money lies beneath the improper practice of using money to generate needless poverty and instability.

Although the term coincidence was originally used pejoratively, let us retain it for being long-lived. But we must sharpen it. We must see sharply that preferences for traded goods must achieve a matching or coincidence of offer by the producer and acceptance by the consumer. The producer wants to minimize cost or disutility, and therefore he makes an offer of the good that has the lowest utility to him, from among all kinds of goods that are equally valued by the recipient. Since the first subscript of the good denotes the kind of the good, we can define Offer

in kind as the kind that minimizes the utility sacrifice. Thus if agent j has several kinds of goods, each of which is equally valued by the recipient k , he offers the one with the lowest utility:

$$\text{Offer (i)} = \min U^j(x_{1k}, x_{2k}, \dots x_{nk}); i=1,2,\dots, n.$$

It should be immediately clear that utility can be readily replaced by marginal cost. Thus if j is able to produce all n different goods to be given in payment to k , he will choose to produce the one with the lowest cost. In similar manner, acceptance by the consumer must be defined such that the consumer maximizes utility by choosing the kind of good, from among all different kinds of goods available against his payment. For buyer k , define acceptance as

$$\text{Acceptance (i)} = \max U^k(x_{1k}, x_{2k}, \dots x_{nk}); i=1,2,\dots, n.$$

Then for any good of kind (i), single coincidence is defined as Offer (i) = Acceptance (i).

$$\min U^j(x_{1k}, x_{2k}, \dots x_{nk}) = \max U^k(x_{1k}, x_{2k}, \dots x_{nk})$$

For a transaction (x_{jk}, x_{kj}) between two goods including money as artificial good, we must have double coincidence defined more precisely as

$$\text{Double-coincidence over } (x_{jk}, x_{kj}) = [U^j(x_{jk}) < U^j(x_{kj})], \text{ and } [U^k(x_{jk}) > U^k(x_{kj})]$$

In particular, we must notice that over the same pair of goods, the preference orders are of opposite signs. If they are of the same sign, there is no trade. The problem with indirect trade is that there is no double coincidence in real goods. The solution is to create artificial double coincidence. That is possible if and only if there is multiple coincidence. This condition exists if for every good, there is acceptance against a second good but offer against a third good. For the simplest indirect trade with three goods (x_{ij}, x_{jk}, x_{ki}) , multiple coincidence is given by the preferences of the three agents over the three goods as already mentioned.

$$[U^i(x_{jk}) < U^i(x_{ij}) < U^i(x_{ki})]; \text{ and } [U^j(x_{ki}) < U^j(x_{jk}) < U^j(x_{ij})], \text{ and } [U^k(x_{ij}) < U^k(x_{ki}) < U^k(x_{jk})]$$

The concepts of single, double, and multiple coincidence can now be reread in connection with a single good, a single transaction, and an indirect trade. A single good under subsistence is offered and accepted by the same individual, and hence it is both a minimum in cost and a maximum in benefit. Such a condition can occur only at the borderline where marginal cost is equal to marginal benefit. But a single traded good has the lowest marginal cost to the seller who offers it, but the highest marginal benefit to the buyer who accepts it. Since they are different people, the utilities cannot be compared unless we have the reference good. In a barter, compared to the reference good, the seller offers the good that has a lower marginal cost (disutility), and the buyer accepts it because it has higher marginal benefit. In indirect trade, each good is most preferred by one (who buys it), least preferred by the one who neither buys nor sells it, and preferred in between the lowest and the highest by the seller. The key is to remember that if the producer is different from the consumer, there is no reason for marginal cost to be equal to marginal benefit.

The notion of coincidence helps us find what is sold, what is bought, and what is neither bought nor sold. If all equally valued goods were equally preferred, there would be nothing to determine the pattern of trade. Pareto Optimality simply slaughters the pattern of trade by taking away the gains from trade. Clearly, profitable trade has no room for this profitless Optimality.

The new worldview makes the coronation of the new trade theory necessary. The production of the first good involves intermediation with a second good and consumption of a third good. Neither the Walrasian model of subsistence nor the Ricardian model of barter can handle the complexities created by single, double, and multiple coincidence in determining the pattern of trade. Microeconomics cannot handle the theory of price, and macroeconomics cannot handle the theory of income as they fail to see that the intermediated second good compensates the third good consumed by the producer of the first good, making all of them interdependent.

8.5 *Barter Possibility and Impossibility*

A very simple analytical trick helps us separate barter from indirect trade. It uses the notion of barter possibility. If any two agents (j, k) buy from each other, then they can settle the smaller of the two amounts by barter. Let us define barter possibility as the minimum amount traded in real good as $[b_{jk} = b_{kj} = \min(v_{jk}, v_{kj})]$. The remainder over this barter possibility is impossible to barter, and may be denoted by barter impossibility $w_{jk} = (v_{jk} - b_{jk})$ and $w_{kj} = (v_{kj} - b_{kj})$. The barter impossibility associated with the smaller amount is simply zero.

The above definition helps us decompose the matrix of traded goods into two parts, one for direct trade and the other for indirect trade. It is important to notice that by definition, $b_{jk} = b_{kj}$. This means that the Barter matrix made up of the barter possibilities is necessarily symmetric. The symmetry is required by the law of value (equivalence).

The element of barter impossibility define a matrix in which there are real goods against which there are no real goods in the transpose location, meaning that for any pair (w_{jk}, w_{kj}) , one is zero. The matrix is not symmetric. Let us call it the Wicksell Matrix in honor of Knut Wicksell, who discussed a three-way trade. Normalizing the values by unity, the indirect exchange involving three goods (x_{ij}, x_{jk}, x_{ki}) each valued at 1, the Wicksell Matrix is

$$\begin{matrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{matrix}$$

It is interesting to notice that the above is readily derived from a unit matrix by putting the last column before the first. In general, the Wicksell Matrix of order n can be easily written as an n by n matrix by putting the last column before the first from the identity matrix of order n .

8.6 *Seigniorial Entrepreneurship and Creation of Money*

The key problem in indirect exchange is that there is no real good in payment for a real good between any two agents. The solution is to use an artificial payment called money. The rationale of this is explained by the paradoxical behavior of the seigneur who creates money.

Suppose that farmer Ian produces food (x_{ij}) , and wants to buy some cloth (x_{ki}) from weaver Kimberly. However, the weaver does not need food, but desperately needs medicine (x_{jk}) . So Ian suffers from nakedness, as he cannot persuade the weaver to sell cloth for food. Kimberly is dying from sickness and needs medicine from John. But John needs food and does not need cloth. John is starving, because he cannot persuade farmer Ian to give him food against medicine, as Ian does not need medicine (but needs cloth). Though every good has demand equal to supply,

and they surely can agree on the quantities that will make the payments of equal value, no trade is possible through barter. Hence Ian's extra food will rot while John starves to death; John's medicine will go to waste while Kimberly perishes from sickness, and Ian will endure nakedness while Kimberly's clothes will be eaten away by moth.

This terrible scenario is a sobering lesson for economic theory. Traditional theory keeps thinking that transitive social preference is impossible and does not see the solution that enterprising man invented long ago. Theory also keeps blaming prices, as if somehow prices are not right here. The problem of course is that in addition to being of the right value (quantity and price), the payment must also be of the right kind. Entrepreneurs knew this and created the solution. Thus though Ian has really no need for medicine, he can buy the medicine against his food. After that, though he is not the producer, he can sell the medicine to the weaver. Both actions are counter-optimal and artificial. An allocation model sees no rationality of Ian buying medicine if he gets lower utility from it than from the food. But the entrepreneur bears calculated risk of loss of utility in the hope of making gains in utility. Schumpeter's entrepreneur destroys before creating, but Pareto's optimizer cannot do this.

The creation of commodity money has just been illustrated. One can buy a good without an intention to consume it, and sell it without having produced it. This action turns the commodity into money. It is just one more step to invent fiat money. Since the user of money does not consume it, the commodity may as well be of zero utility. Since he does not produce it, it might as well be something of nearly zero production cost. In other words, something that is not consumed need not be produced either. If a perfect fiat will do the same job, but at a lower transaction cost, then one would much rather use the fiat money. If there is paper money, for example, Ian would sell food to John and get money instead of the medicine, and pay Kimberly with money rather than with medicine.

There is no doubt that money first arose as commodity money. For a certain kind of good to become widely used as commodity money, it is necessary that there be regular merchants to sponsor it as money. A merchant needs capital. Before there is money, the capital must consist of some real good. The capitalist does not consume the capital, but uses it to generate profit. Thus a rich farmer with excess rice might try to use rice as capital to become a merchant. He might offer the producers of various goods a payment in rice with the explicit assurance that he would take the rice back in payment for any kind of real good. Rice would become money not because everybody wants to consume it, but because nobody consumes it and instead passes it to somebody else. This can happen if and only if the merchant is ready to sell anything against it. General acceptability has nothing to do with something being money: the presence of the entrepreneur who agrees to take it in payment for real goods is the only thing one needs.

Money is a management tool to manage transfer of claims over real payments. Anyone who can manage payments can create money. For more, please see Gani 2003.

8. Measuring the Need for Money

The practical benefit of the new theory of trade is that it provides a simple measure of the need for money. The Wicksell Matrix shows the value of output which must be traded against money and which certainly cannot be traded by barter. Prevailing monetary theory cannot even agree if money is needed, and hence does not bother to figure out a measure of the need. There are several measures of money called M1, M2, M3 and so on, because it is very unclear what money is. The new model leaves no ambiguity in this respect. The transpose of the Wicksell Matrix shows exactly how much money is needed where. The total need for money is exactly equal to

the value of the indirectly traded output as shown by the Wicksell Matrix. And of course there is no room for doubt that output in the Wicksell Matrix is absolutely dependent on money.

Let us put to rest the issue of neutrality of money. There are two necessary conditions for trade. The first condition requires the payment to fulfill the equivalence so the buyer has real good of the right value. The second is the condition of double coincidence so that the buyer can offer the right kind. In indirect trade, money transforms the ability to buy (given by the real good) into an ability to pay (given by claim on the good the seller wants).

It is absolutely important to notice that money is required precisely when the budget is balanced in real terms. Money has nothing to do with borrowing or lending, except that the only way for the creators of fiat money to inject it into circulation is to issue it as a loan. The issue is discussed in the next section.

9. Payment Circuit

A payment circuit is a simple graphical tool to present an indirect trade. Goods are arranged in a sequence such that the first good pays for the second, the second good pays for the third and so on until the last good pays for the first. It is the fact that the last good pays for the first good that creates the circularity. Except for this last link, one could just draw a straight line for the sequence. It would not work, because the last good would lack a seller and the first good would lack a buyer. We have already shown a payment circuit in Figure-3 under the title of circular consistency. Figure-4 shows that money goes in the opposite direction of the goods.

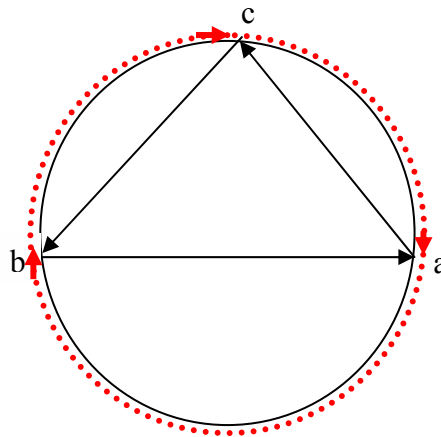


Figure-4: Payment Circuit

Outer Circle: Goods go from a to b to c to a

Inner Circle: Money goes from a to c to b to a

Circular Consistency: a preferred to b; b preferred to c; c preferred to a.

Any break in the payment circuit stops all trades in the circuit under the long circulation regime, where the same cash is used repeatedly. Under short circulation, the bank lends money to every trader, but requires it to be used only once, just like checks. If the payment circuit has n goods, long circulation uses 1 dollar n times while short circulation uses n dollars 1 time each. Short circulation has not appeared in real world, but should. Short circulation can eliminate the evils of involuntary unemployment, undue instability, and excess debt, as explained below. Vij (2003) offers a more detailed explanation.

10. Unemployment

Let us take quick note of the major implications of the theory of money as a means of payment necessary for indirect trade.

Involuntary unemployment occurs if and only if there is multiple coincidence (meaning that every good has both demand and supply at the precise market clearing prices), but there is no money to create the requisite double coincidence. The shortage of money occurs primarily because economists tell bankers that money has nothing to do with trade and therefore they feel no urge to issue money required against the output. Bankers do not treat money as a fiat means of payment. They treat money as capital because economists unanimously say that money is capital (also called store of value).

The more profound explanation is that bankers as seniors just do not discover the opportunity to lend fiat, especially as state regulators impose regulations on lending that have nothing to do with money as a means of payment. Bankers issue money to just a few favored borrowers who meet certain creditworthiness criteria. After all, long circulation means that if there are n agents each with \$1 worth of good ready to sell, the bank issues just \$1 to 1 out of n producers, and compels the others to get money by selling goods rather than by borrowing.

What is wrong with earning money by selling goods rather than borrowing it? It is wrong because people cannot earn the money if it is not in circulation. Well, it is in circulation, but circulates too slowly, making people wait unnecessarily long. It takes time for money to move from one agent to the next. In a long circulation system (the only one known to us in real life), it takes n units of time for money to circulate through the entire circuit. In comparison, under short circulation, it would take only $1/n$ time to complete the transactions. The time lost in unnecessary waiting creates involuntary unemployment.

The empirical test of this theorem should be easy. Calculate the ratio of loans to actual producers (including producers of export goods) to the value of the output. Disregard loans to intermediaries and importers and to the buyers of existing wealth such as stocks, bonds, future, options etc. Compare this loan to output ratio and the employment rate to find a positive relation.

11. Excess Debt

Let us note that money must be borrowed precisely when the borrower has real goods of the right value to buy the intended purchases. In the examples cited, the buyer has a real good of equal value of what he wants to buy, but still needs money to pay. Ability to buy is given by the value of the real good, but the ability to pay is given by the double coincidence. One can have ability to buy without ability to pay. Farmer Ian goes naked precisely when he has \$1 worth of food and wants to buy \$1 worth of cloth, just because the weaver does not accept food in payment for cloth. His ability to buy must be converted to ability to pay.

One of the 3 agents in our example must borrow fiat money from an outside senior. The option of using commodity money is really out of consideration in the modern age, because the transaction cost of using commodity money is extremely high. People must use money to convert their real goods into liquid means of payment, and not because they have lack of sufficient quantities of real goods.

The true burden of fiat-money loan is the excessively high service fee for the use of the fiat. Developing countries are nearly dead from the excess debt. An extreme shortage of international liquidity keeps international trade much below its potential volume. The world must create world money and issue it at service fees just enough to cover the management cost. Vij (2003) provides a detailed proposal to end excess debt issuing new international money.

12. Undue Instability

Undue instability in output occurs when there is no change in tastes, technologies, and endowments. It occurs because bankers are able to rapidly and massively increase or decrease the supply of money without regard to need and thereby destabilize demand.

It is important to see that real business cycle is impossible either under subsistence or under barter. Under subsistence, the failure of one producer has nothing to affect another producer, because there is no trade and no transmission mechanism. A weather disaster may destroy crops etc, but that is not business cycle. Otherwise, there is no way for involuntary unemployment to arise under subsistence. Nor is there any possibility of instability based on the failure of savings and investments to reach equilibrium.

Next consider barter. If one has an excess supply (of apples), he must sit with unsold supplies, but this cannot possibly affect anybody else (who supplies bananas etc). There is no transmission mechanism to propagate the instability. Surely, if the producer of apple wants bananas, there is nothing to prevent him from buying bananas if barter is possible. And if he buys bananas, he eats them, and does not sell them to buy coconuts. His failure to sell apples to the producer of bananas cannot be linked to his failure to buy coconuts with apples. And his failure to buy bananas cannot be linked to the banana producer's failure to buy coconuts. If the apple producer buys bananas and then sells bananas to buy coconuts, then banana is commodity money and it is no longer a barter economy. If this money exists, then the failure to sell the apple spreads to create the failure to sell coconuts. In short, it should be clear that if barter is possible, instability is impossible to spread.

The dramatic change comes with money. Now, if Ian fails to sell his food and get money, he also affects Kimberly's ability to sell cloth, because Ian does not have the money. In turn, Kimberly fails to buy medicine from John, who fails to buy food from Ian. The transmission mechanism rides on the special function of money. This function is the transfer of claims on output. Long circulation system has the transmission mechanism. If anyone hoards the cash, all the others are rendered unable to conduct any transactions, exactly and precisely when demand is equal to supply.

Keynesian theory of business cycle apparently thinks of money as a store of value, namely as a bond. But a bond cannot have a transmission mechanism. A bond is indeed a real good of a peculiar sort: it is future real good traded in the current period against current real goods. Suppose that someone saves seeds, but fails to find someone else to borrow the seeds in the current period and eat them as food or sow them as seeds. Why should it affect anybody other than the owner of the surplus seeds? Can the failure to lend the seeds affect the ability of others to buy or sell anything? It simply cannot affect others. The borrower of the seed is supposed to consume or invest it, and not to buy something else with it. His failure to borrow the seeds cannot affect his ability to buy other things unless the seed is another name of money.

If money is a store of value, it ought to be stored and not spent. If people take money not to spend but to store value for future use, why should hoarding money cause any problem? There is problem, because money is the opposite of a store of value: it is spent to get things out of the store. If one man stores money, the other man who must earn the money against the good is compelled to store the good against his wish. Business cycle is possible only if money is a means of payment, and its flow is abruptly changed. If one hoards money, all others in the payment circuit are rendered incapable of trading. Somehow this hoarded money must be unhoarded and put back into circulation. But then it has nothing to do with storing value. The precise problem is the unstoring: money is meant to be spent, and it creates perversion when it is not spent.

The multiplier effect can operate if and only if there is a payment circuit in which money transmits instability as it circulates. If the payment circuit has n goods but 1 unit of currency and someone hoards the currency, it disables trades worth n units. This cannot occur under barter.

In short, real business cycle is impossible. Real changes in tastes or technologies or endowments under subsistence or barter cannot create instability. Business cycle is impossible without the transmission mechanism riding on money. Undue instability is possible only in a monetized economy under indirect trade. Bankers can issue too much money to create sudden and massive inflation. They can issue too little to impose massive involuntary unemployment and stagnation. They can at once issue too much to some sector and too little to others, and cause simultaneous inflation and unemployment.

13. Exchange Rate and All That

The study of exchange rates offers an interesting aspect of competition among many issuers of money. What happens when there are n nations, each with its own currency? Which currency has the best chance of becoming the most widely used international money?

Just as the face value of fiat money has no relation to its intrinsic worth, the intrinsic value of a national currency (as measured by purchasing power) has no bearing on the exchange rate or on how widely one nation's currency may circulate abroad. It all depends on the transaction cost of using the money. Since money is supplied by a monopolist issuer who decides both the quantity and the price of its use, its circulation is mostly affected by the issuer's decision. This decision itself depends on transaction cost of managing payments.

Suppose that there are several seniors who create and issue money, but they are not equally able to manage payments. It means that the transaction cost of using money is not the same for different issuers. The simple prediction is that the senior who can make money available at the lowest transaction cost will find his money used more widely than those of others. Since the only way for the issuer of money to inject it as a loan, the variable to observe is the seigniorage fee (misnamed as interest rate). Whoever can lend the money at the lowest service fee will find his money used most widely.

Consider the Euro. It is not international money despite being a very good currency for the simple reason that its assured worldwide acceptability is not matched by its worldwide availability. Everybody wants to use the Euro, but the cautious issuers of Euro refuse to issue it to the rest of the world outside the European Union. Money must be issued as loan before it can circulate. And if it is a loan, it specifically means that the issuer does not buy any real good with it, but wants the money itself back in repayment of the debt.

The currency exchange is a small scale arbitrage activity involving the tiny amount of hard currency. The bulk of international transactions occur in the US dollar through official channels involving central banks. Because the exporter is not the same individual as the importer, inside every nation there is a transfer of dollars between the exporters and the importers. There is an exchange between the domestic currency and the dollar. It is governed by the balance between the demand and supply of dollars against the local currency. If a nation is perennially running deficits, the demand for dollars stays higher than the supply and the price in terms of local currency rises regardless of the purchasing power of the local currency.

There are several complex issues involving exchange rates. It will take too long to present them here. The point we want to stress is that transaction cost affects the circulation of currency in competition with other currencies. But regulations affect the process in many ways.

14. Bonds

Let us complete the trade model by considering the global equilibrium of exchange. We can introduce bonds. If a household/nation sells more than it buys, the surplus revenue must be lent to equalize demand with supply. The restriction is that the sum of surpluses must be equal to the sum of deficits. Let $f_k = (\sum_j v_{jk} - \sum_j v_{kj})$ be the excess of total income for household/nation k over its total expenditure. If this is positive, the household has a surplus. If it is negative, the household has a deficit. Let us add a bond sector numbered $(n+1)$ to the \mathbf{V} matrix. A deficit nation must produce and sell bonds to buy surpluses from others. If $f_k > 0$, we put $(-f_k)$ at the $(n+1)$ row of the k -th column to show a (negative) purchase of bonds. But if $f_k < 0$, put $(-f_k)$ at the k -th row of the $(n+1)$ column to indicate a (positive) sale of bonds. This will balance the household's budget. It will make $(\sum_k \sum_j v_{jk} = \sum_k \sum_j v_{kj})$, namely aggregate income equal to aggregate expenditure. This is the starting point for conventional macroeconomics. It is the last of four equations in our model, and we derive it from single goods through four steps.

15.1 Why a store of value is not money?

In the absence of a model with indirect trade, one cannot recognize money as a necessary management tool to transfer claims on real output. In that case, one is baffled by the apparent paradox of people gladly taking intrinsically worthless or intrinsically less worthy money against a real good. A plausible solution is to suppose that money is a store of value, and people take it to store value. Every model of money known to this author regards money as a store of value, and none regards it as a means of payment. Even Baumol (1952) measures how much money one would store in his model of transaction demand for money, without explaining why money must be used as payment.

The empirical scenario is that people do actually hold some cash balance, and some people may indeed hoard some cash for a long time. What is not understood readily is that this happens as a result of a perverse circulation of money. The only type of circulation of money known to the world is long circulation, under which a single piece of cash is used repeatedly as it moves from one agent to the next. The extremely slow pace of circulation makes it imperative for people to hold onto interest-free cash rather than interest-bearing bonds. Liquidity preference is a pervert reason to hold cash only under long circulation.

The use of money as a store of value would not be a big issue had it not been the biggest stumbling block for monetary theory. It is not a necessary function of money to serve as a store of value, and a store of value has no necessary reason to be money. The necessary function of money is that of a means of payment.

Though money can be and actually is used as a store of value under the perverse regime of long circulation, a store of value cannot become money. Suppose that short circulation is in practice. By definition of short circuit, every producer of real good is entitled to get money from the issuers directly against the output. This money is not bearer cash, but a singular-use check. The producer/borrower writes a check to the supplier to pay for the purchased output. There is therefore no shortage of money. In this case, everybody is able to instantly convert his real good of any kind into money. Nobody has any reason to hold cash balance, because no cash exists.

Obviously, it is possible for people to have genuine surplus income. If people have surplus income, they can invest this in bonds, for as short a period as one may consider, provided that there is demand for loans. The point is simply that if short circulation was practiced, then people would store value in bonds, and not in cash.

Let us see why treating money as a store of value does much violence to monetary theory. To look at the Keynesian model involving savings-investment equilibrium as the central piece in the puzzle of business cycle, suppose that some people have surpluses while others have deficits. We must assume that the trades are all done by barter, because the Keynesian model does not say that there is indirect trade and money is a means of payment. So we must think of money as bond or store of value in a barter economy.

If this is so, how can the failure of one person to lend the surplus affect anybody else and create a multiplier effect? In barter, the failure of one to sell (lend) savings (or indeed any real good) cannot affect anybody else, just because others are supposed to sell whatever they have by barter. This means that Keynes would be saying nothing different from the classical economists, who of course readily agreed that it was possible for a particular agent to oversupply something (be it against current output or future output). There is no transmission mechanism to multiply the effect of one person's failure to sell or lend. Only if money is a means of payment in indirect trade can it spread instability. A store of value cannot do that.

The practical violence form the use of money as a store of value is the creation and perpetuation of needless poverty. Gandhi said that poverty is the worst form of violence. Poverty occurs if people are disabled from using their productive capacities for which there is demand, and this can happen only if money fails to circulate. Short circulation of money removes the transmission mechanism and thereby eliminates the possibility involuntary unemployment. With short circulation, the buyer is not disabled form paying with money, because the issuers of money issue it directly to every producer. Short circulation also eliminates the possibility instability. For details, please see Gani (2003) and Vij (2003).

15. Four Equations of Trade

Let us put together four equations of trade to show why and how the new trade model covers all of micro and macroeconomics in a single unified model. We are recalling the key points already discussed.

The n agents (nations) of the economy (world) sell and buy n different kinds of goods, whose values are given by the \mathbf{V} matrix:

$$\begin{array}{cccccc}
 V_{11} & V_{12} & V_{13} & \dots & V_{1n} \\
 V_{21} & V_{22} & V_{23} & \dots & V_{2n} \\
 V_{31} & V_{32} & V_{33} & \dots & V_{3n} \\
 \dots & \dots & \dots & \dots & \dots \\
 V_{n1} & V_{n2} & V_{n3} & \dots & V_{nn}
 \end{array}$$

This describes the entire economy, and its study is the study of everything in economics. Putting the supply on the left-hand side, and demand on the right, we consider successively each good, each transaction, each household/nation's trade balance, and the entire economy with the four equations below:

- | | | | | |
|-----|---|---------|-------------------|-----------------------------------|
| (1) | $v_{jj} = v_{jj}$; | Walras | Each good; | Subsistence for agent j ; |
| (2) | $v_{jk} = v_{kj}$; | Ricardo | Each transaction; | Barter between j, k ; |
| (3) | $\sum_j v_{jk} = \sum_j v_{kj}$; | Mises | Each agent; | Money for k 's balanced trade; |
| (4) | $\sum_k \sum_j v_{jk} = \sum_k \sum_j v_{kj}$; | Keynes | Whole economy; | Bond for entire (closed) economy. |

Equation (1) describes a subsistence economy in which the producer is the consumer. It is the only case where demand is automatically equal to supply and marginal cost is equal to marginal benefit. Walrasian (and Arrow-Debreu) General Equilibrium Model applies here as each individual may in fact produce all kinds of good, for each of which demand is equal to supply. There is no money, but quantity theory of money as numeraire of course applies perfectly. This is the only place where microeconomics has any valid application.

The subsistence economy cannot have any departure from full employment, because the producer cannot fail to consume his own output, because he produces just for himself.

Equation (2) applies to every transaction. Institutions must be created to permit the consumer to be different from the producer. Economic consideration of profit must be present to induce anyone to produce something for strangers. Because the consumer is no longer the producer, there is no reason to equate marginal cost to marginal benefit. Because the producer produces something which he does not consume, and consumes something he obtains against his own production, the production decision depends on the benefit from consuming what he buys, and not what he sells. Pareto Optimality does not hold. Price is bargained by the buyer and seller who act entrepreneurially and not optimally. The market price must be above marginal cost to allow profit to the producer, and below marginal benefit to induce the buyer to buy.

Equation (2) requires two necessary conditions of trade. First, the goods that pay for each other must be of equal value. The elaboration of this principle creates the theory of value (quantities and prices). Secondly, the double coincidence principle must hold so that the offer of the first good against the second is balanced by an acceptance of the first good against the second. In practice, barter is rare because it is hard to meet the condition of double coincidence with real goods.

But human ingenuity creates paradoxical solutions to permit indirect trade by introducing an artificial good with which double coincidence is created artificially. That leads to Equation (3), which describes indirect exchange. When a household sells to many agents and buys from many agents, it encounters the situation of indirect trade. Some customers have products the household does not want to buy in barter. Some suppliers refuse to take the household's product in barter. The problem is to create money so that the products of the customers can be given to the suppliers.

The primitive solution is to use commodity money. The household takes products from its customers even though it does not want to consume those products. It then gives those products obtained from its customers to suppliers who want them instead of the household's own product. This practice does occur, but the transaction cost is very high. The more advanced solution is to create perfect fiat money by an outsider who specializes in managing payments. The outsider issues money as credit.

Indirect trade creates a payment circuit such that the demand for the first good depends on the demand for the third which in turn depends on the demand for the second good and so on. It creates a transmission mechanism to propagate instability. The failure of one agent to have money disables his supplier from having access to money and hence disables the demand of his supplier, who affects the supplier to the supplier and so on. Business cycle is possible only if the trade is dependent on money, and the supply of money is arbitrarily changed without any change in the underlying demand and supply factors.

Indirect trade makes it explicit that even when the demand is exactly equal to supply for every good, no good can be traded unless money is available to make demand effective.

Equation (4) equalizes aggregate demand with aggregate supply by introducing bonds so that agent's with current surplus can transfer the surplus to those who have current deficits. It covers the traditional macroeconomics of savings-investment equilibrium.

The crucial thing to notice is that the four equations in fact do cover all issues in economics. Traditionally, microeconomics dealt with the first equation to study optimization. It was not aware that it applied to subsistence only. It did not study the preferences over different kinds of goods of equal value to understand the matter of payment. It did not see how to handle price as a quantitative relation between real goods that pay for each other. Nor did it learn to deal with indirect trade in which money is necessary.

Traditional macroeconomics began and ended with equation (4). It did not derive the equation from the first equation through the second and the third, and hence failed to see how the demand for one good affects the demand for the other good, and how intermediaries affect prices and payments.

The traditional use of the input-output table is to study inter-industry relations. We see that it is quite easy to study the symmetry property of the model by imposing Equation (2) on each transaction involving every pair of transpose elements. Subsistence and barter automatically meet the symmetry requirement, but indirect trade does not. Money is used to create the requisite symmetry. Further, bonds can be used if there are surpluses and deficits.

In retrospect, equations (2) and (3) provide the links between microeconomics in equation (1) and macroeconomics in equation (4). Equations (2) and (3) respectively remove the errors in price and monetary theory. Equation (3) in particular makes the presence of entrepreneurship explicit. Equation (2) makes it possible to introduce institutions in economic analysis. It is now possible to understand the demand-supply equilibrium more coherently. The key to see is that the demand depends on income, which in turn depends on the demand for what the consumer must produce, and that the demand is affected both by prices and the means of payment, both of which are dependent on the activities of the entrepreneurs as arbitrageurs and seigneurs.

16. Concluding Comments

Whately (1832) correctly saw economics as the science of exchange, but the formal tool to build economics as a science of exchange was not available. Neither the Ricardian trade model nor the Walrasian model of pure exchange became a true model of exchange, because the matters of payment and intermediation were not considered. In particular, the failure to study indirect trade left the role of the intermediary, the role of money as means of payment, and the role of arbitrage in price determination and seigniorage in circulation of money outside economic analysis.

Economics can at last be reconstructed as a true study of exchange. It can now provide a unified framework to include institutions, entrepreneurship, transaction cost and competition. The input-output table provides the format. Its great advantage is that it stands on strict empirical grounds. We do not have to make any strange behavioral assumptions to conduct the analysis.

The principal theoretical significance of the new model of trade is that the study of indirect trade compels us to recognize the means of payment and intermediation explicitly. It makes much of prevailing monetary macroeconomics obsolete. Also, by recognizing the gains from trade and the presence of intermediation, it changes price theory fundamentally. However, micro and macro can now be integrated seamlessly, making a distinction both unnecessary and impossible.

The principal practical significance of the new model is that it clarifies the problems of instability created by perverse circulation of money. The prevailing long circulation uses a single piece of cash many times, and carries with it the transmission mechanism to propagate instability. It is now a major challenge for policymakers to consider using the short circulation option to remove the transmission mechanism. The short circulation regime essentially creates a two-step barter with the issuer of money. First, the producer surrenders his real output to the seigneur in the shape of pledge to return the money by recovering checks from buyers. The producer uses the money by writing a check to pay for the goods. He collects the checks from his customers and returns them to the issuer to repay the money-debt. It is as if the seigneur buys up the entire (indirectly) traded product of the nation with money he issues, and then sells back the same against the money he gets back. It is as if every producer sells his output to the seigneur and gets its compensation from him. The fact that the real good stays with the producer until it is picked up by the consumer is a mere administrative detail.

Secondly, the supply of money remains equal to the value of indirectly traded output. Because the transmission mechanism is abolished by removing bearer cash, the short circulation system abolishes involuntary unemployment and cyclical instability. It is critical to see that involuntary unemployment occurs despite the presence of demand and supply. It is the root cause of needless poverty, defined as the failure to produce what is possible to produce with the existing productive capacity, and for which demand exists. Fiat money is the management tool that permits this output to be produced by one and consumed by another.

The gravest economic tragedy of humanity is the needless poverty. Proper use of money can facilitate the trade that can truly become the engine of growth to reach full employment. The new theory of trade deserves serious attention to learn how to promote trade that cannot be done without money, by using a short circulation system to achieve and maintain full employment. There is no justification to let involuntary unemployment destroy real human lives.

Bibliography

- Arrow, Kenneth J: (1951): Social Choice and Individual Values, New York: John Wiley & Sons.
- Baumol, William J: (1952): "The Transaction Demand for Cash: An inventory-theoretic approach".
Quarterly Journal of Economics.
- (1968): Entrepreneurship in Economic Theory American Economic Review, 58(2):64-71
- Deardorff, Alan (1984) "The General Validity of the Law of Comparative Advantage," Journal of Political Economy, 88(5), 941-957.
- Debreu, Gerard, (1991): "The Mathematization of Economic Theory," American Economic Review, Vol. 81 (1) pp. 1-7.
- Gani, Mohammad. (2003): Foundations of Economic Science, Dhaka: Scholars. Available from <http://www.amazon.com/exec/obidos/ASIN/984320655x>
- Heckscher, Eli. 1919. "The Effect of Foreign Trade on the Distribution of Income," Ekonomisk Tidskrift, pp. 497-512.
- Jevons, William J. (1876): Money and the Mechanism of Exchange. New York: D. Appleton and Co.,
- Leamer, Edward, E. (1980) "The Leontief Paradox, Reconsidered," Journal of Political Economy 88(3), 495-503.
- Leontief, Wassily. (1954). "Domestic Production and Foreign Trade: The American Capital Position Reexamined," *Economia Internazionale* 7, (February), pp. 3-32.
- (1966): Input-Output Economics, New York, Oxford University Press.
- Menger, Carl. (1951) Principles of Economics, Translated by J. Dingwall and B.F. Hoselitz, Glencoe, Ill.: Free Press, Reprint 1981, New York: New York University Press. Original German 1871.
- Mises, Ludwig von (1938): [The Non-Neutrality of Money](#)). Reprinted in Money, Method and the market Process, Selected by Margit von Mises and edited with an introduction by Richard M. Ebeling. Auburn, Ala: The Ludwig von Mises Institute, Norwell, Mass.: Kluwer Academic Publishers, 1990. Available at <http://www.mises.org/mmmp.asp>
- Keynes, John M. (1936): The General Theory of Employment, Interest, and Money. London: Macmillan
- Kirzner, Israel M: (1973), Competition and Entrepreneurship Chicago: University of Chicago Press
- (1978) Perception, Opportunity and Profit Studies in the Theory of Entrepreneurship Chicago: University of Chicago Press.
- Ricardo, David. 1951-1973. The Works and Correspondence of David Ricardo, edited by Piero Sraffa and M. Dobbs, Vols. I-XI, Cambridge: Cambridge University Press.
- Ohlin, Bertil (1933) *Interregional and International Trade*.
- Ostroy, Joseph M; and Starr, Ross: (1990) "The Transactions Role of Money," Handbook of Monetary Economics, B.F. Friedman and F.H. Hahn, eds., New York: Elsevier.
- Robbins, Lionel (1932): *Essay on the Nature and Significance of Economic Science*.
- Samuelson, Paul A. (1948). "International Trade and the Equalisation of Factor Prices," Economic Journal 58, (June), pp. 163-184. See factor price equalization, Heckscher-Ohlin Model.
- (1949) "International Factor-Price Equalisation Once Again," Economic Journal 59, (June), pp. 181-197. See factor price equalization, Heckscher-Ohlin Model.
- (1953) "Prices of Factors and Goods in General Equilibrium," Review of Economic Studies 21, (October), pp. 1-20. See Heckscher-Ohlin Model.
- Vij, Vikas. (2003): The Power of Money. Dhaka: Scholars. Available from <http://www.amazon.com/exec/obidos/ASIN/0973485213/>
- Whately, Richard. (1832): Introductory Lecture son Political Economy. (Available from Library of Economics and Liberty at <http://www.econlib.org/libraray/Whately>)
- Wicksell, Knut (1977), Lectures on Political Economy, vol. 1 Fairfield, N.J.: Augustus M. Kelley, (Original publication 1901, English translation published 1934.)
- (1978), Lectures on Political Economy, vol. 2, Fairfield, N.J.: Augustus M. Kelley, (Original publication. 1906, English translation first published 1935.)