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Money

for New Palgrave Money and Finance

by

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MONEY  
(for New Palgrave Money and Finance)  
James Tobin

Money as a social institution and public good.

Among the conventions of almost every human society of historical record has been the use of money, i.e. particular commodities or tokens as measures of value and media of exchange in economic transactions. Somehow the members of a society agree on what will be acceptable tender in making payments and settling debts among themselves. General agreement to the convention, not the particular media agreed upon, is the source of money's immense value to the society. In this respect money is similar to language, standard time, or the convention designating the side of the road for passing.

The reason for the universality of money as a social institution is that it facilitates trade. Trade among individuals enables them to achieve much higher standards of living than if each person or family were restricted to autarchic subsistence. Because of economies of scale, division of labor among specialists yields enormous gains. Of course, trades have always taken place by barter, and even in modern economies many exchanges occur without money. Barter is usually bilateral, thus in Jevons's famous phrase requires "a double coincidence [of wants], which will rarely happen." (1875, p.3) Multilateral trade is much more efficient, permitting each trader bilateral imbalances provided her trade in aggregate is balanced. Imagine, for example, that for lack of double coincidences no bilateral trades are possible among A, B, and C because A wants C's goods, B wants A's, and C wants B's. Obviously three-way exchange would benefit everyone.

Multilateral barter is conceivable. It could be arranged by putting participants in simultaneous communication with each other -- in person as at

a village market or a commodity or stock exchange, or by modern telecommunications. But any multi-participant multi-commodity market would need a clearing mechanism. A trader would not have to be balanced with every other trader. But in the absence of a money each trader would have to be balanced in every commodity. This would be awkward and inefficient. Participants would need to come to market with inventories of many goods. A natural conclusion of any one market session would be intertemporal deals, commodities acquired today in exchange for promised future deliveries of the same or other commodities. Without money, this too would be awkward: a typical trader would end up with debts to or claims on other traders in many specific commodities.

One could imagine using intrinsically valueless tokens during a market session to lubricate barter -- like poker chips for scorekeeping in a stakeless poker game. The tokens would make it possible to price each commodity in a common numeraire rather than in each of numerous other commodities. But if the tokens would become worthless at the end of the session, each participant would have to be required to return as many tokens as he or she started with. Otherwise no one would sell useful goods for tokens, for fear of leaving the market with them rather than with commodities of value. If instead the tokens will be acceptable tenders in this and other markets in future -- well, then they are money. (On these issues see Hawtrey 1927, Chapter 1; Starr 1972; Shubik 1984; Kareken and Wallace 1980.)

The social convention makes a society's money generally acceptable within it, and the practice of general acceptability reinforces the convention. Y accepts money from X in exchange for goods and services and other things of value because Y is confident that Z, A. B, ....and indeed X

will in turn accept that same money. Moreover, money is accepted from the bearer immediately and impersonally -- without delay, without identification. Since an economic agent's purchases and sales, outlays and receipts, are not perfectly synchronous, each agent's inventory of money fluctuates in size as money circulates throughout the economy. These fluctuations in individual money holdings enable essential intertemporal exchanges to take place. Workers are paid for their labor today, and next week they buy the food and clothing that are the truly desired proceeds of their work. The farmer and the tailor accumulate money from those sales; on payday they pay it out to their hired hands.

The moneys chosen by societies have varied tremendously over human history. So have their languages. In each case, what is universal and important is that something is chosen, not what is chosen. The variety of choice defies generalizations about the intrinsic properties of moneys. Livestock, salt, glass beads, and seashells have served as money. Major grain crops were natural media for payments of wages and rents, and therefore in other transactions and accounts. Cigarettes were money in prisoner-of-war camps. On the island of Yap debts were settled by changing the ownership of large immovable stone wheels. The practice continued after the sea flooded their site and the stones were invisible at the bottom of a lagoon. (Similarly when gold was international money in the twentieth century title to it often changed while the gold itself, safe in underground vaults, never moved.)

Some moneys have been commodities valued independently of their monetary role, intrinsically useful in production or consumption. Others have been tokens of no intrinsic utility and negligible cost of production, coins or pieces of paper. Commodity moneys derive their value partly, and token moneys

wholly, from the social convention that designates them as money.

In modern nation-states the sovereign government can generally determine the society's money. For example, the United States constitution assigns to the federal government (thus, not to the states) the power "to coin money, regulate the value thereof, and of foreign coin." The central government defines the monetary unit, decides in what media taxes and other debts to the government itself may be paid, and defines what media are legal tender in the settlement of other debts and contracts. (Starr 1974).

#### Precious metals as money.

Gold and silver have histories going back many centuries as the moneys of choice of many societies and as international media of exchange. Copper coinage antedates them, but copper became too abundant and was relegated to subsidiary coins. The precious metals are durable. They are divisible into convenient denominations. They can be made into ingots, bars, and coins of standard weights. When used as moneys, they have been sufficiently scarce -- relative to the non-monetary demands for them -- as to pack considerable value into convenient portable forms. They glitter. They have long been prized for ornament and display. Gold and silver, one or the other or both, were the basic moneys of Europe and of European dominions and settlements throughout the world from the seventeenth century, or before, until recently. In modern times gold, in particular, acquired awesome mystique. (Keynes 1930).

Sovereigns minted these precious metals on demand into coins of their own realms, with their own names. In addition to minting full-bodied coins for public circulation, sovereigns commonly provided token coins made of metals, convenient for retail transactions, negligible in intrinsic value but

convertible into the basic money of the realm. Many full-bodied coins circulated across national boundaries with values equivalent to their weight. For example, the original monetary unit of the United States was the silver dollar of Spanish America.

Until the late nineteenth century silver was more prevalent than gold as a monetary commodity. From medieval times silver was the English money of account; the pound sterling was initially a weight of silver. England and many other countries coined both silver and gold, but there were frequent periods when bimetallism degenerated de facto into one standard or the other. This happened when their prices at the mint diverged enough from their relative values in other countries or in commerce to offset the costs of arbitrage. Then "Gresham's law" would take over, and the metal undervalued at the mint, the "good money," would disappear from monetary circulation, "driven out" by the "bad money" overpriced at the mint. (Hawtrey 1927, pp. 202-4, 283).

In England in 1717 Isaac Newton, Master of the Mint, unintentionally overvalued gold, pushing silver out of circulation and in effect putting England on a gold standard. The switch was formalized in 1816. During the nineteenth century other European countries and the United States likewise gravitated from bimetallism to gold. Alexander Hamilton, America's first Secretary of the Treasury, complemented the silver dollar with gold coins. But it was not until the late nineteenth century that gold overcame silver as the basic money of the United States. The values of sterling and dollars in gold set by Newton and Hamilton, implying an exchange rate of \$4.86 per pound, lasted until 1931, with several wartime interruptions.

The heyday of the international gold standard was 1880-1914, when all major national currencies were convertible into gold at fixed rates. Silver,

like copper before it, was eventually demoted to token coin status. (Hawtrey, 1927, Chapters 16-20).

#### Functions of money.

A triad long familiar to students of introductory economics lists the functions of money: (1) unit of account, or numeraire, (2) means of payment, or medium of exchange, (3) store of value.

The U. S. dollar, for example, is the unit of account in the United States. Prices of everything are quoted in dollars, and accounts are kept in dollars. The various media that change hands in transactions -- coins, paper currency, deposits -- are denominated in dollars. That does not prevent anyone who cares to do so from quoting prices in a foreign currency or in bushels of wheat, or from finding sellers who will accept them in payment for other things. It just would not be very efficient as a general practice.

To be sure, some societies have used, and kept accounts in more than one money -- in both gold and silver or, for example, in Japan two centuries ago both in coins and in standard weights of rice. Today some national currencies may be acceptable means of payment in other jurisdictions -- dollars in Russia and Israel and Canada, yen in Hawaii, deutsche marks in Eastern Europe. The reason may be the frequency of cross-border tourism and trade. Or it may be that as a consequence of hyper-inflation people turn to a "hard" foreign currency as unit of account. For still a different reason, a new European currency, the ecu, may become a numeraire parallel to national currencies like pounds and francs and deutsche marks during the period of transition to a common currency.

A society's money is necessarily a store of value. Otherwise it could

not be an acceptable means of payment. (New York subway tokens cannot be generally acceptable money; they can become valueless any day, even for use as subway fare. U.S. food stamps, intended to be in-kind welfare benefits, are exchanged with cash at par, while grocery brands' discount coupons are disqualified by their expiration dates.)

Money is the principal means of payment of a society, but it is only one of many stores of value -- and quantitatively a minor one at that. Through most of human history land has been the major form of wealth, increasingly augmented by livestock and reproducible capital -- buildings, tools, machines, durable goods of all kinds. Claims to much of this wealth today take the form of bonds and shares and other securities. In the United States, basic money is only 6 percent of total privately owned wealth.

Even though a particular commodity or token is established as the generally acceptable medium for discharging debts denominated in the unit of account, it need not be and generally is not the sole means of payment in use. Derivative media, often termed representative money, arise and circulate as media of exchange. They are promises to pay the basic, sometimes called definitive, money on demand. In the commercial city states of northern Italy, merchants left gold with goldsmiths for safekeeping. They then found it convenient to circulate the "warehouse" receipts in place of the gold. Those payable to bearers were precursors of paper currency and banknotes. Those payable to named persons, and on their order to third parties, were precursors of checks. Indeed, once the goldsmiths realized that they need not keep 100 percent gold reserves against the outstanding claims upon them, and that they could lend their certificates to merchants promising to deliver gold later, they became banks.



Besides providing token coins, states issued paper currency redeemable in gold or silver, or delegated the privilege to a private bank chartered to serve the state, like the Bank of England, founded in 1694. In addition, ordinary private banks issued their own notes, backed only by their own promises to pay basic money, gold or silver. In the nineteenth and twentieth centuries, governments and their central banks came to monopolize the issue of paper currency. This was not a catastrophe for banks. In modern economies demand deposits in banks, transferable to third parties by check or wire or other order, have become the most important derivative media of exchange.

Whether derivative moneys were officially or privately issued, the ability of the issuers to carry out their promises to redeem them in basic money, gold or silver, was a recurrent problem. In wars and other emergencies governments often suspended these promises and issued irredeemable paper money. The trend in the twentieth century was to dispense with commodity money and to replace it with fiat money of no intrinsic value. Within each nation, the official derivative money, government currency, became the basic money. In 1933 United States paper dollars became inconvertible into gold except by foreign governments or central banks.

Internationally, gold was dethroned in 1971 as the medium for settlement of imbalances of payments between countries. Governments are no longer prepared to buy or sell gold at prices fixed in their own currencies. Gold is traded freely in private markets all over the world. Its price fluctuates as people speculate about its future. In the United States there is still an official weight of gold that theoretically corresponds to the dollar -- 0.0231 oz., i.e. a gold price of \$43.22, about one eighth of the free market price. But the U.S. government is not prepared to sell any gold for dollars at the

official price -- or at the free market price, for that matter.

The U.S. monetary base (M-0) is the amount of fiat currency the government, mainly its central bank, the Federal Reserve System, has issued. It is a "debt" to the public on which the government pays no interest and against which the government holds virtually no assets (other than its remaining gold stock, \$11 billion at the official price, and its drawing rights at the International Monetary Fund, \$19 billion). It is now this fiat money which derivative promises to pay dollars are, directly or indirectly, commitments to pay. Those promises include bank deposits and all other debts, private and public, denominated in dollars and payable at specified future times, tomorrow or thirty years hence.

In the United States in the fourth quarter of 1991 the stock of transactions money (M-1) held by economic agents other than the federal government and banks averaged \$890 billion, \$265 of currency (paper and coin) and \$617 of checkable deposits available on demand. The banks held reserves of \$53 billion in currency in their vaults or on deposit in the twelve Federal Reserve Banks, collectively the American central bank. The sum of the currency in public circulation and the currency or equivalent held as bank reserves is the monetary base (M-0), \$318 billion. It is often called high-powered money: every dollar of M-0 was supporting \$2.80 of M-1, and GNP transactions of \$18.20 a year.

Sovereigns have long profited from their money monopolies. Their mints charged "seignorage" fees -- and sometimes they cheated. Likewise, issue of currency bearing zero interest is a way for a government to pay its bills, easier than taxation and cheaper than interest-bearing debt. By regularly issuing base money to keep up with economic growth and inflation, the

sovereign collects seignorage year after year. In the United State today seignorage is a minor source of revenue. Since base money is only 6 percent of GNP, growth of dollar GNP at 7 percent a year means new issue of base money of only 0.42 percent of GNP, 1.68 percent of the federal budget. But for many less developed countries printing money is a major way of financing public expenditures; seignorage is a major source of revenue, because implicit taxation by inflation is politically easier than explicit taxation.

#### Commodity money v. fiat money.

The age of fiat money, first in one nation after another and finally internationally as well, has been more inflationary than the century of silver and gold standards between the Napoleonic wars and the first World War. During and following the 1914-18 war the gold standard broke down, and attempts to re-establish it during the Great Depression did not succeed. The Bretton Woods regime established in 1945 linked the world's currencies to gold via their fixed parities with the U.S. dollar, because foreign governments could convert dollars into gold at a fixed price. But this system differed radically from the pre-1914 gold standard in that currency exchange rates could be and were frequently changed. The discipline imposed on a government and economy by an exchange parity fixed for a long time was diluted. When this discipline became too much for the U.S. itself, the gold-dollar parity gave way in 1971, and the international monetary system was wholly a regime of fiat money.

Discontent with inflation since the second World War, and with the volatility of currency exchange rates since 1971, has led to agitation for return to the gold standard or some other commodity money. A commodity standard, if adhered to, provides a real anchor for nominal prices; its

discipline prevents hyperinflation.

However, although the long-run trend of prices during the gold standard period was flat, there were violent inflationary and deflationary fluctuations around it. More important, real economic activity was highly volatile, to a degree that would be politically unacceptable nowadays. (Cooper 1982 and 1991).

Irving Fisher, writing during the gold standard era, was greatly concerned by the instability of prices. He was complaining, in effect, about the volatility of the relative price of gold. Ideally, he would define the dollar in terms of a representative package of goods and services, the bundle priced in a comprehensive index number. Thus he revived the idea of a "tabular standard," proposed by several early nineteenth century writers, and described with approval by Jevons (1875, Chapter 25). But exchanges between paper currency and such bundles is impractical. Fisher proposed instead to make periodic adjustments of the gold content of the dollar, raising or lowering it in proportion to the rise or fall in the price index since the previous adjustment. In effect, the Treasury would be selling gold for dollars to fight inflation and buying gold for dollars to fight deflation. (Fisher 1920).

A recent proposal by Robert Hall (1986) would tie the dollar to a composite commodity "ANCAP" of ammonium nitrate, copper, aluminum, and plywood. Because ANCAP's prices have historically mirrored general indexes, it is meant to be a feasible proxy for the economy's aggregate market basket. Other proposals for commodity standards are described in (Cooper 1991).

The Fisher strategy could be followed, even imposed as a nondiscretionary rule on the central bank, in a regime of fiat money. The market operations to implement it would be carried out in securities rather

than in gold. The fundamental issue is not the monetary standard but whether stabilizing a price index should be the exclusive objective of monetary policy, to the exclusion of stabilization of real output growth and employment.

#### Free market money?

Would it be possible to privatize money? Certainly it is possible to privatize derivative issues of money, promises to pay fixed amounts of base money on demand. But United States experience suggests that the supply of money, even derivative "lowpowered" money, cannot safely be left to free market competition.

Before the establishment of the national banking system in 1864, private banknotes were the only paper currency of the United States. The several states freely chartered banks, and those banks freely issued their own banknotes. These were promises to pay silver dollars, but so-called "wildcat" banks contrived to make it tough for noteholders to find them. There was no central bank to control the aggregate issue of banknotes. The notes circulated at varying discounts from par and often became worthless, stranding innocent holders.

As a result, Congress established a system of nationally chartered banks in 1864, and taxed state banknotes out of existence. Only nationally chartered banks could issue notes, and these had to be fully backed by U.S. Treasury debt securities. In effect, they were Treasury currency, supplementing various direct issues of Treasury currency (including the inconvertible "greenbacks" the union government issued during the 1861-64 Civil War, which were made convertible into specie in 1879). Central banking did not begin in the United

States until the Federal Reserve Act of 1914, which confined the issue of banknotes to Federal Reserve Banks.

Although private banks, state and national, were out of the business of issuing demand notes, they were still in the business of accepting demand deposits, the increasingly prevalent form of derivative money. Banks' balance sheets were regulated, but depositors were at risk. Their banks might not be able to pay in gold or equivalent on demand. After the epidemic bank failures of the 1920s and 1930s, Congress initiated a system of federal deposit insurance. Deposits in banks and other financial institutions became governmentally guaranteed, like banknotes after 1864. In the 1980s, these deposit guarantees became an expensive burden on federal taxpayers.

Could government get out of the money business altogether? It seems barely possible with commodity money and not possible with fiat money. If the government defined the dollar as a certain weight of gold or ANCAP or some other commodity or bundle, then private entrepreneurs could issue "dollars," either checkable deposits or paper notes. They would be promises to pay the bearer the equivalent in the chosen commodities. The commodities themselves would not necessarily circulate on their own; indeed ANCAP and other composites could not.

The money entrepreneurs would have to keep inventories of the commodity as reserves. If one hundred percent reserves were required, the currency would be like goldsmiths' warehouse receipts, and the private issuers would earn just a small fee for "minting" the commodity into paper. Left to themselves, they would become banks, acquiring risky and illiquid assets while incurring demand liabilities. Caveat emptor would reign. The rates various banks would have to pay to attract funds would reflect depositors' appraisals of the

risks. Notes and checks of risky banks would not be honored at par. In short, the very problems that resulted in consensus that issue of money cannot safely be left to unregulated free markets would recur.

Could the government's role be confined to defining the unit of account, the commodity equivalent of a dollar, in the same way that the government -- through the Bureau of Standards in the United States -- defines weights and measures? Could the system operate without any government-owned or government-issued base money? In its absence, clearings among private banks would require awkward transfers of ownership of the commodities kept as reserves against their liabilities. Very likely some one bank or consortium would arise as an unofficial central bank, and its liabilities would play the role of base money, the medium in which clearing imbalances among other banks are settled. The central bank, official or unofficial, would have to hold inventories of the standard commodity, gold or ANCAP or whatever, and be prepared to convert currency into the commodity and vice versa. That institution, history also suggests, would eventually be nationalized.

A fortiori, if there is neither an official definition of the "dollar" nor any issue of dollars by the government or a quasi-governmental institution, there would be no standard commodity for private banks to compete in supplying to the public. Barter trading would be the rule, and the public good advantages of social agreement on money would be lost. Since the institution of money is a public good, it is not surprising that its advantages cannot be realized by private market competition unassisted and uncontrolled.

## How Can Money Have Positive Value in Exchange?

Economists have long regarded the theory of value as the central question of their discipline. What determines the prices at which goods and services are traded for each other? The prices in question include the wages of labor in terms of consumer goods, the rent of land in terms of its produce, and many other relative prices. They encompass interest rates and asset prices, thus the terms of trade of commodities to be delivered in future for commodities available today. They cover interregional and international trade, where the prices of concern are the terms on which imports can be obtained by exports.

Money, however, is an embarrassment to value theory. According to standard theory, something can have positive value only if it generates positive marginal utility in individuals' consumption or positive marginal productivity in the making of goods and services that do generate marginal utility. The embarrassing puzzle is sharpest for fiat money. All of its value comes from the fiat that makes it money. Fiat money has no intrinsic non-monetary source of value. It cannot be eaten or worn or be used in any other way that generates utility for consumers, except a few numismatists. Nor can it contribute to the production of things that consumers do value. It can be produced at zero social cost. Yet it is a scarce commodity for any individual agent. Why is it worth anything at all? That the institution of money is of value to the society as a whole as a public good does not automatically give it value to individuals in market exchanges.

The uphill struggle of modern economic theorists to cope with these challenges is exhibited in the proceedings of a recent conference. (Kareken



and Wallace 1980). Their solutions relied principally on the overlapping generations model, which unrealistically assigns to money the function of being the sole or the principal store of value that links one generation to the next. The most careful, thoughtful, and perceptive formal models of the roles of credit and money in transactions and strategies, in partial equilibrium and general equilibrium systems, are those of the game theorist Martin Shubik (1984).

It was argued at the beginning that a condition for fiat money to be held and valued today is that it will be acceptable in exchange for intrinsically useful commodities tomorrow. But this bootstrap story may not work. Suppose the world itself is known to be finite; its end will come at a definite future time. In the last period, one minute before midnight so to speak, you may need money to buy whatever consumer goods might generate utility, at least solace. Otherwise you will be confined to your own resources. But who will sell you anything, knowing that the money will be worthless while the goods might be a source of some utility? Thus money is worthless one minute before midnight, and by iterations of the same argument, it is worthless today. Even if the institution of money had public good value between now and the end of the world, the money itself would have no market value to individuals.

The escape from this logical impasse is that we do not all and will not all expect with certainty the end of the world at any definite time. We always do, always will, assign some probability to its continuation. Since there are many other paradoxes involved in thinking about human behavior in a world with no chance of a future beyond a definite time, it is best not to take that prospect seriously in economic modeling.

Formal general equilibrium theory, which describes the imaginary world of frictionless barter, does of course express the prices of goods and services in a numeraire. It is tempting to identify numeraire prices as money prices. But the numeraire is just a mathematical normalization convenient for handling the fact that the supply-equals-demand equations for N commodities determine only the N-1 relative prices. Those relative prices are, by construction, independent of the scalar arbitrarily attached to the numeraire.

Standard value theory does, of course, have something to say about the value of commodity money in terms of other goods and services. In a gold standard regime, the relative prices of gold in other commodities have to be the same at the mint and in the market; they cannot depend on whether the gold is circulating in coins or being used in jewelry, dentistry, or rocketry. That is simply a condition of the absence of arbitrage profits. It definitely does not say that under the gold standard the relative price of gold is the same as it would be if gold were not money. As argued above, gold's role as money must increase the demand for it, and that must affect its price unless it is supplied perfectly elastically. The same will be true of any other commodity or bundle of commodities chosen as the monetary standard. A substantial part of the value of any commodity used as money arises from the convention or the fiat that makes it money. The distinction between commodity money and fiat money is not absolute.

#### The Neutrality of Money.

Although business managers, financiers, politicians, and workers are worry a great deal about monetary institutions and policies and their consequences for economic activity and well-being, pure economic theory

minimizes these consequences. Theory puts the burden of proof on anyone who contends that money and monetary inflations or deflations do much good or much ill.

Classical economists liked to insist that money is a veil, obscuring but not altering the real economic scenario. (Robertson 1959, p. 7). Their modern descendants expound "real business cycle theory," premised on the view that economic developments that matter to societies and individuals are independent of monetary events and policies. (Prescott 1986). It is true that economic fluctuations and trends are frequently misinterpreted by stressing superficial monetary phenomena to the neglect of resources, technologies, and tastes. But money does matter, really.

Does an economy arrive at the same real outcomes (in variables like volumes of production, consumption, and employment, and in relative prices such as the purchasing power of wages and the price of oil relative to that of bread) as it would without the institution of money? Clearly not. Without money, confined to barter, the economy would produce a different menu of products, less of most things. People would spend more time searching for trades and less in actual production, consumption, and leisure.

That is not the comparison the classical economists, old and new, intend by the "veil" metaphor. Their fantasy is a frictionless, costless system of multilateral barter, in which relative prices and the allocations of labor and capital among various productive activities are determined in competitive markets. Their proposition is that the outcomes of an economy with money are the same as those that would arise from their ideal barter model. The corollary is that real economic outcomes are independent of the particular nature of the monetary institutions. (Dillard 1988)

These propositions cannot be true of commodity money. Real economic outcomes with commodity money will differ from those with fiat money, and will also depend on what commodity is selected as money. Inventories of the chosen commodity have to be held for exchange purposes and for governmental and bank reserves, beyond the stocks held in connection with the commodity's non-monetary uses in production and consumption. In growing economies demands for monetary inventories will be steadily increasing. The relative demands for monetary and non-monetary inventories are bound to change with economic and technological developments that alter the incentives to produce the commodity and change its prices in terms of other goods and services. Examples are discoveries or exhaustions of gold and silver deposits and innovations in mining and processing technologies. Since the monetary commodity's price is fixed in money, its output will decline when there is general inflation and rise when there is deflation. Intertemporal choices involving the monetary commodity, as well as contemporaneous choices, will be significantly affected by its monetary use.

The availability of moneys, whether commodity or fiat, whether basic or derivative, as stores of value necessarily brings about significant deviations in real outcomes from the hypothetical regime of frictionless barter. This is true even though that regime is postulated to include markets in state-contingent commodity futures, "Arrow-Debreu" contracts. (Arrow and Debreu, 1954). Holding monetary assets gives agents more flexibility: they can convert them into consumption of any kind at any time in any "state of nature," though not at predictable prices. The flexibility is a convenience to individual agents. But, as Keynes saw, it opens the door to "coordination failures" which are the essence of macroeconomics -- demand for goods and services may at

times diverge seriously from supplies. (Keynes 1936, Chapters 16,17)

### The Classical Dichotomy

It is possible to recognize that an economy with monetary institutions is different in real outcomes from a barter economy, even from an ideal frictionless barter economy, and still to argue that its real outcomes are independent of the purely nominal parameters of those institutions. It would be terribly convenient if the determination of the absolute price level, the reciprocal of the value of the monetary unit in a representative bundle of consumer goods, could be split off from the determination of relative prices and the associated real quantities.

Don Patinkin (1956) called this separation the classical dichotomy. Only monetary shocks would affect the general price level, and those shocks would raise or lower the nominal prices of all commodities in the same proportions. Only real shocks -- to tastes, technologies, and resource supplies -- would affect relative prices and real quantities. This proposition would not exclude the fact that the monetary institutions themselves matter. The choice between commodity money and fiat money, the choice among possible commodity standards, and the arrangements for derivative moneys might well affect the social efficiency of markets and trade.

What are the nominal parameters whose settings, according to the classical dichotomy, would make no real difference? For a commodity money, such a parameter is the definition of the monetary unit in terms of the standard commodity, e.g. the weight in gold of a dollar. For fiat money, the key nominal parameter is the quantity of money -- base money, all transactions money, or some even more inclusive aggregate.

Why should cutting the gold content of the dollar from .0484 ounces to .0286 ounces, raising the dollar price of gold from \$20.67 to \$35.00 (as Franklin Roosevelt did in 1933), make any real difference? The dollar values of existing public and private stocks of gold, and of monetary claims to gold would rise in the same proportion. Won't all other commodity prices do likewise? Then all relative prices and real quantities, including those of gold, will be the same as before.

For fiat money systems, and for commodity standards where issues of derivative moneys have become essentially independent of the commodity, the quantity theory of money achieved similar dichotomization. According to the theory, which might more accurately be called the quantity-of-money theory of prices, an increase in the nominal quantity of money would raise all nominal commodity prices in the same proportion, leaving relative prices and real quantities unchanged. Quantity theorists argue that an increase in the quantity of money is equivalent to a change in the monetary unit. A hundredfold increase in the stock of French francs would be -- would it not? - - the same as De Gaulle's decree changing the unit of account to a new franc equivalent to 100 old francs. Since the units change could make no real difference, the other way of multiplying the money stock could not either.

These analogies fail, for several related reasons. In most economies money is by no means the only asset denominated in the monetary unit. There are many promises to pay base money on demand or at specified dates. If there is a thorough units change, like De Gaulle's, all these assets are automatically converted to the new unit of account. Roosevelt's devaluation of the dollar relative to gold was not a pure units change. He did not scale up the dollar values of outstanding currency or even of Treasury bonds with

provisions for such revaluation. Naturally private assets and debts expressed in dollars were not scaled up either. Likewise, when the quantity of money is changed by normal operations of governments or central banks or by other events, the outstanding amounts of other nominally denominated assets are not scaled up or down in the same proportion. They may remain constant, as when money is printed to finance government expenditures. They may move in the opposite direction, as when central banks engage in open market operations, which typically increase the amount of base money outstanding by buying bills or bonds, thus reducing the quantities of them in the hands of the public.

#### The Quantity Theory.

The quantity theory goes back to David Hume, probably farther, but its major and most effective protagonists have been Irving Fisher (1911) and Milton Friedman (1956).

In its crudest form, the quantity theory is a mechanistic proposition strangely alien to the assumptions of rational maximizing behavior on which classical and neoclassical economic theories generally rely, as J.R. Hicks eloquently pointed out in a famous article (1935). Specifically, it ignores the effects of the returns to holding money on the amounts economic agents choose to hold. The technology of monetary circulation fixes the annual turnover of a unit of money. Suppose that every dollar "sitting" supports just  $V$  dollars per year "on the wing," to use D. H. Robertson's famous terms. (1959, p. 30) Suppose, further, that the economy is assumed to be in real equilibrium and the supply of money is doubled. The public will not wish to hold the additional money until the dollar value of transactions is doubled, and this requires prices to double.

Surely the demand for money to hold is not so mechanical. The velocity of money can be speeded up if people put up with more inconvenience and risk more illiquidity in managing their transactions. Money holdings depend, therefore, on the opportunity costs, the expected changes in the value of money and the real yields of other assets into which the same funds could be placed. Fisher and Friedman would agree.

The quantity theory can still be rationalized, as a proposition in comparative statics. Compare, for example, two stationary situations of a given economy, in each of which the money supply and price level are constant over time. Let the money supply in the second situation be twice that in the first. Then an equilibrium in the second situation will be the equilibrium of the first with a nominal price level twice as high. This will be true even if the demand for money is modeled as behavioral, not mechanical, and is allowed to depend on interest rates, expected inflation, and other variables.

However, it is not sufficient to double solely the quantity of money, narrowly defined. All exogenous nominal quantities, including outstanding stocks of debts and assets, must also be doubled. Or the second equilibrium must be interpreted as a stationary state that will be reached only when all these other nominal stocks have had time to adjust endogenously to the new quantity of money. This quantity theory does not apply to short-run changes in monetary quantities engineered by central banks, for the same reasons that render the "units change" metaphor inapplicable.

In its interpretation as a proposition in long-run comparative statics, the quantity theory supports "neutrality" as asserted in the classical dichotomy. Neutrality has come to have two meanings in monetary economics. Simple neutrality means that real economic outcomes are independent of the



levels of nominal prices. Superneutrality means that those outcomes are also independent of the rates of change of nominal prices.

The case for superneutrality appeals to, and depends upon, the "Fisher equation." Early on, Fisher (1896) saw the importance of distinguishing between nominal and real rates of interest on assets and debts denominated in monetary units. Ex post, the algebraic difference between them is by definition the rate of inflation or deflation. This is a tautology. But Fisher (1911) is also credited with a meaningful proposition: anticipation of inflation (deflation) raises (lowers) nominal rates of interest but does not alter real rates of interest. The corollary is that whatever is the time path of money stocks that determines the path of prices, the paths of real economic variables are the same. Fisher himself was enough of a classical economist to believe this as a long-run theoretical truth, but enough of a pragmatic empiricist to find that nominal rates were very slow to incorporate adjustments for ongoing inflations and deflations.

#### The "Price of Money"

A 1975 conference on monetarism at Brown University is remembered for a pithy observation by Milton Friedman, offered only half in jest:

For the monetarist/non-monetarist dichotomy, I suspect that the simplest litmus test would be the conditioned reflex to the question, "What is the price of money? The monetarist will answer, "The inverse of the price level"; the non-monetarist (Keynesian or central banker) will answer, "the interest rate". The key difference is whether the stress is on money viewed as an asset with special characteristics, or on credit and credit markets, which leads to the analysis of monetary policy and monetary change operating through organized "money", i.e. "credit", markets, rather than through actual and desired cash balances. Though not so obvious, the answer given also affects attitudes toward prices: whether their adjustment is regarded as an integral part of the economic process analyzed, or as an institutional datum to which the rest of the system will adjust. (Stein, 1976, p. 316)

"What am I," asked the chairman of the session, George Borts, "if I answer 'one'?"

Any durable good has at least two "prices," the price at which it can be bought or sold, and the price of the services it renders per unit time. The price of the good itself is the present value of the expected, though uncertain, values the services it will render in future. For money, the first price is its purchasing power. Its services come in two forms: as a store of value, the capital gain or loss from changes in its purchasing power, and, as a medium of exchange, the benefits it yields in convenience, effort-saving, and risk reduction. Without cash on hand, an economic agent may find it costly to make desirable transactions, or to forgo them. The marginal productivity of holding money is the value of an additional dollar in reducing those costs.

What is the marginal opportunity cost to which agents will equate the marginal productivity of holding money? It depends on what alternatives are available. If money proper were the only store of value in the economy, the opportunity cost of holding money would be the marginal utility of immediate consumption relative to future consumption. Although this set-up is all too common in the literature, it confuses theories of money and of saving. Acknowledging the availability of other stores of value makes the cost of holding money the difference between the real capital gain or loss on money and the real rate of return on the non-money assets in which a marginal dollar could be invested.

If money proper were the only store of value in the monetary unit of account, though not the only one in the economy at large, the relevant opportunity cost would be the return on real capital, i.e. storable or durable commodities. In modern economies, however, the immediate substitutes for money

are promises to pay money in future. Since money and these substitutes are affected equally by price level changes, the opportunity cost is simply the nominal interest rate on those non-money substitutes.

Friedman's Keynesian is careless if he calls any of these opportunity cost concepts the price of money. These are prices of the services of money. Friedman's monetarist is right, therefore, to say that the price of money is the reciprocal of the commodity price level -- the real price, that is, for Borts was right about money's nominal price. Of course, there are as many relative prices as there are non-monetary commodities, and any average value of money requires using an arbitrary commodity price index.

To implement Friedman's asset valuation approach to the price of money, suppose that the nominal supply of money per capita, real per capita output, and the real interest rate all follow arbitrary variable paths, anticipated in advance. Assume, at least for illustrative purposes, the Allais-Baumol-Tobin model of the demand for money. (Baumol and Tobin 1989) The marginal productivity of nominal cash holdings for a representative agent is the reduction in the frequency and cost of exchanges back and forth between money and dollar-denominated interest-bearing substitutes. It is approximately equal to  $a(t)y(t)/(2m(t)^2v(t))$ , where  $a$  is the real cost of one of those exchanges,  $y$  is the agent's real income per period,  $m$  is the agent's average nominal cash holding, and  $v$  is the value of money, the reciprocal of the price level. Of these,  $a$ ,  $y$ , and  $m$  are arbitrary exogenous functions of time, while the valuation  $v$  is a function of time to be determined. Let  $r(t)$  be the exogenous path of the real interest rate. The value of money at any time  $T$  is the discounted value of its future marginal productivities:

$$(1) \quad v(T) = a(T) \int_T^{\infty} \exp(-\int_T^t r(s) ds) y(t) / (2m(t)^2 v(t)) dt$$

$$(2) \quad v'(T) = r(T)v(T) - a(T)y(T) / (2m(T)^2 v(T))$$

$$(3) \quad r(T) - v'(T)/v(T) = a(T)y(T) / (2m(T)^2 v(T)^2)$$

Equation (3), for the nominal interest rate, is the familiar equation for optimal cash holding. It involves the stronger Fisher equation, because the real rate has been taken as exogenous.

Interpreted as the price dynamics of the economy, these equations describe the time path of the "price of money." The level of prices at each time converts the autonomous nominal money supply into the real quantity on which its marginal productivity depends. The price path itself generates the rates of price change which, added to the autonomous real interest rates, give the nominal rates. The marginal productivity of money at each point in time is equated to the nominal interest rate. Future as well as current values of money supplies, as well as other variables, affect current prices. An expected increase in future money supply raises prices today, and so does an expected future increase in real rates of interest. The Fisher equation is essential to maintain the assumed dichotomy between the paths of real and nominal variables. (For a calculation in this same spirit, see Sargent and Wallace 1981.)

### Money and Macroeconomics

In the above scenario, a key institutional fact is that the nominal interest rate on money proper is fixed, at zero. Expected inflation makes money's real interest rate negative and reduces the attraction of holding money compared to assets bearing the economy's real interest rate. For the same reason, an increase in that real interest rate is a disincentive to hold

money.

However, the same institution -- the fixed nominal interest rate on money -- threatens the classical dichotomy. It calls into question the Fisher equation, which is central to the independence from monetary influence of the real rate of interest and related real variables. It calls it into question in principle, in long runs and short, in equilibrium and in disequilibrium. If expected inflation diminishes demand for money, it by the same token increases demands for other assets, both interest-bearing promises to pay money and real capital. These substitutions will reduce the real interest rates on those assets; their nominal interest rates will rise less than the full inflation premium. This effect -- associated in the literature with the names of Mundell (1963) and Tobin (1965, 1969) -- refutes superneutrality, which is essential to neutrality in any general dynamic meaning. That is to say, it is not possible to determine the real interest rate and related real variables independently of the money equation, or to determine the value of money from the demand=supply equation for money by itself.

This is true whether the economy is assumed to be classical, with full employment assured by flexibility of nominal interest rates and prices, or Keynesian, with aggregate demand short of full employment. However, the real effects of expected price inflation and deflation are a reason for doubting the efficacy of price flexibility in sustaining or restoring full employment equilibrium in the face of aggregate demand shocks. (Fisher 1933; Keynes 1936, Chapter 19; Tobin 1975).

Irving Fisher, Alfred Marshall, and other monetary economists of the early twentieth century regarded neutrality in any sense as properties of long run static equilibrium, not of the dynamic transitions that dominate empirical

observations of monetary and real variables. According to them, people are slow in translating experience of inflation into their expectations of the future. This is how Fisher interpreted the strong positive correlations he found between inflation rates and real output. (Fisher, 1911). However, the Mundell-Tobin effect suggests a still stronger conclusion, since it calls into question the Fisher equation even when inflation expectations are correct and people are not victims of "money illusion."

In Friedman's litmus test there is much more at stake than meets the eye. The issue is how the price level, whose reciprocal is the "price of money," is determined. The monetarist's trained instinct is to think of it as determined by the demand-supply equation for money "as an asset with special characteristics." With the absolute price level thus determined, the function of markets for goods and services is to generate real, relative prices, just as in Walrasian general equilibrium theory. Those real variables, in turn, are exogenous to the path of the "price of money."

The Keynesian's trained instinct, on the other hand, is to think of the price level as an index of nominal prices of goods and services. As Keynes (1936, Book I) emphasized -- for labor markets especially -- markets in our monetary economies determine in the first instance nominal prices, not real prices. The price "level" is a synthetic aggregate of multitudes of individual prices determined in diverse imperfect markets, often decided by administrative decisions or by negotiations. For price determination the most relevant equations of a macroeconomic model are price and wage equations, often members of the Phillips curve family. These specify inertia of varying degrees in nominal prices and relate their changes to measures of real excess demand or supply. As a result, price indexes move smoothly and sluggishly over

time, not "jumping" like the price of a financial asset sensitive to market views of the future.

With the price level determined in goods markets, the function of the money demand=supply equation is to generate interest rates. That explains the Keynesian's instinctive response to the test question. Of course, the Keynesian recognizes that the endogenous variables of a simultaneous equations system are determined jointly, not equation by equation. That real variables are among those endogenous variables can be attributed to the fact that there is usually a non-zero discrepancy between the price path determined by the full system and the path that would be generated by the monetarist's asset price of money. The non-monetarist view does not take prices "as an institutional datum to which the rest of the system will adjust," but it does rely on variables besides prices to equate "actual and desired cash balances."

The equation of money demand and supply is just one of many relations in a theoretical or econometric macroeconomic model. The small tail cannot wag the big dog. That was too much to expect. The price level is a factor common to the valuation of many assets denominated in the monetary unit, many of them close substitutes for transactions money. Their quantities now and in future must make a difference. Of course monetary policies and supplies, current and prospective, are important determinants of the price level, and so are credit markets. But the channels of these influences run through demands and supplies in markets for goods and services. Understanding the process belongs to the messy subject of macroeconomics. Finance theory, however elegant, cannot provide a shortcut.

Monetary events and policies are not a sideshow to the main performance. The real variables of a monetary economy are hopelessly entangled with

monetary phenomena. They do not behave as if an economy enjoying the societal advantages of money were a frictionless multilateral barter economy seen through a veil. That barter economy would never have business cycles characterized by economy-wide excess demands and supplies of labor and other goods and services. The public-good advantages of the institution of money do not come so cheap. Among their costs are fluctuations in business activity and of the value of money itself. Pragmatic monetary economics is a central part of macroeconomics in general.



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