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What is Money?

by Allan H. Meltzer

Money is the medium of exchange. This simple statement answers the question: What is money? But the answer merely shifts attention to a different set of questions. What is a medium of exchange? Why is it used? What benefits or costs accrue to individuals and society from the use of money?

Attempts to answer these questions have introduced 'motives' for holding or using money, legal restrictions, or assumed some difficult-to-define services provided by money, for example, liquidity. Motives include the transactions and precautionary reasons for holding money. Money is used in transactions or to reduce costs of bearing uncertainty about the timing of future receipts or payments. The transactions and precautionary motives suggest reasons why money is used or held, but they do not explain why the same small group of assets is used repetitively for this purpose. Why are many transactions settled by use of a medium of exchange? Why do people use money instead of other assets to adjust for differences in the timing of receipts and payments?

Money is a nominal stock with a nominal price of unity; a dollar is a dollar, and a pound is a pound. The real value of a unit of money is \( 1/p \) where \( p \) is some measure of the cost of a basket of goods and services such as the consumer or retail price index. As \( p \) rises, each unit of money buys fewer real goods and services. The real value of a unit of money falls, and in periods of high inflation, the real value of money falls rapidly. The cost of holding money rises with the price level. The longer money is held, the less each unit is worth. People use substitutes for money to avoid the costs of holding money. Yet money continued to be used even in the famous German hyperinflation of the 1920s, in other hyperinflations at that time and, more recently, in the high inflations experienced in Argentina, Bolivia, Brazil, Chile, and Israel during the 1980s.

The continued use of money when prices rise at a rate of 100, 500 or 1,000% per year or more suggests how costly it is to replace existing money with new money. Barter as an alternative to money is a very costly and cumbersome procedure. Often multiple transactions - lengthy transaction chains - are required to exchange the good or service offered for the good or service desired.

The German inflation that followed the Second World War provides a case study. The US army estimated that barter was used in one-third to one-half of all business transactions in the US and British zones of Germany. Most of the remaining transactions were settled in rapidly depreciating German money. Money continued to be used as a medium of exchange despite the high inflation rate.

In Latin American or Eastern European countries that have experienced high inflation rates in the recent past, prices are often quoted in US dollars and many transactions are settled in dollars. The dollar is used as a unit of account particularly for purchases and sales of houses, land, and other durable assets. Often, this use persists long after inflation rates have been reduced. Tourists find hotel rental rates quoted in dollars and many prices indexed to the dollar. The dollar is also used as a medium of exchange in these countries. A contemporary traveller in Russia, much of Eastern Europe, and large parts of Latin America will have no difficulty offering payment in dollars.

People in these countries do not choose the dollar as a unit of account or medium of exchange because it has the lowest rate of inflation. Inflation rates in

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Germany and Japan have been lower than in the US for the past years. The dollar is used because it is widely recognised by both sellers and buyers. The use of the dollar in these countries suggests the importance of information in the choice of money.

**Money in Economic Theory**

Standard economic theory has difficulty explaining the use of money. Transactions take place in a central market at announced prices. By assumption, all markets clear, and all transactions are settled at once. By holding money, transactors pay a cost; they could have more goods and services if they did not hold money. There are no offsetting benefits to compensate for this cost.

To explain the ubiquitous use of money, economists depart from the standard model most often by introducing lack of synchronization of payments. Money is said to bridge the gap between receipts and payments. Receipts are assumed to be made weekly or monthly, while spending and payments are continuous. People receive income in the form of money, pay out money to purchase goods and services, and hold the unspent balance as either money or some short-term asset. Transaction costs are assumed to be high enough to induce people to hold some (low or) non-interest bearing money instead of interest-yielding Treasury bills or other short-term assets.

Lack of synchronization does not imply that money is used or held. If there were no costs of information, transactors could issue verbal promises to pay. Later, when income is received, they could discharge the debt. This introduces credit – promises to pay – to solve the synchronization problem. Transactions could differ in time and place. If there is no uncertainty and no cost of acquiring information, everyone would know with certainty the income stream of any buyer, as well as everyone’s payments, liabilities, assets, and wealth position. Default risk is zero under the posited conditions, so the only cost to issuing credit is the time-value of payments.

Credit is used in developed economies to defer payment of purchases. Debts are discharged by paying money, not by the exchange of goods as in a barter economy that has no money. A small number of assets serves as the means of payment to settle credit transactions and to pay for goods, services and assets at time of purchase.

To explain the use of money – a small number of assets that serve as a medium of exchange – two additional postulates must be introduced into economic theory. The first postulate makes the marginal cost of acquiring information, measured in units of consumption sacrificed, depend on the goods or services selected for use in exchange. The second postulate states that the marginal cost of acquiring information about the properties of any asset falls as the frequency of use within a social group increases.

These postulates are necessary and sufficient to establish the use of a medium of exchange. They emphasise the uneven distribution of information that makes the use of a common medium of exchange useful and productive for transactions.

The usefulness of a medium of exchange and the fact that money is a stock imply that money is held. Hence money is a store of value as well as a medium of exchange. However, money is relatively unimportant as a store of value. In economies with developed financial markets, the stock of money is a small fraction of wealth – as little as 2% of the consolidated wealth of an economy.

**The Services of Money to Individual Transactors**

The traditional explanation of money is that it avoids the inconvenience of barter. Barter, it is said, involves the double coincidence of wants; each transactor must desire to trade what he owns for whatever the other transactor has.

Barter-credit eliminates the double coincidence problem without introducing money. But barter-credit is rare. The use of a medium of exchange brings advantages that make this social arrangement a dominant one for individuals and for society.

The use of money lowers costs of acquiring information by shifting attention to the properties of the asset and away from personal attributes such as the credit-worthiness of the buyer, his reputation, wealth or income. The buyer gains because it is less costly to make purchases; the seller gains for the same reason. Information costs are lower. Since purchasing becomes less costly, more purchases are made. Trade expands.

Transactions with a medium of exchange can be anonymous. The buyer who pays currency to acquire goods or services does not have to verify or reveal information to the seller. The seller only has to establish that the money offered by the buyer is genuine, not counterfeit. The ability to recognise an asset used as medium of exchange increases with the frequency of use, as the second postulate specifies.

Use of precious metals, such as gold and silver, as means of payment, spread in the Middle Ages. Gold or silver could be weighed to verify the value offered in exchange. Knowledge of the value of the means of payment was much easier to obtain and verify than knowledge of the value of randomly selected commodities or the wealth and honesty of a buyer or the value of his promise to pay. Transaction chains narrowed to a few objects. Eventually gold and silver became the dominant mediums of exchange for interna-
tional transactions, the international money of that era and many later eras. Use of these precious metals also became common in domestic transactions.

Textbooks invariably note that divisibility, portability and durability are among the properties of money. These generalisations are not without exception. Shells and rocks have been used as money. In wartime German prison camps, cigarettes were used as money. As these examples illustrate, information about the properties of an asset and knowledge that others have the same information are common to all monies, even those that are not divisible, portable or durable.

Once knowledge spreads that an object is generally used in settlement of debts and payment for goods and services, it becomes money - the medium of exchange. The medium of exchange may acquire other attributes. The government may make money legal tender for paying taxes and other pecuniary obligations owed to government. Prices may be quoted in units of the medium of exchange; money used as a medium of exchange may also be used as a unit of account.

There is no necessity that the medium of exchange, the unit of account, and legal tender be the same. The use of the dollar as a medium of exchange in Russia, Latin America, and elsewhere results from private decisions. Rarely is the dollar designated as legal tender in foreign countries. Likewise there are many historical examples of separate units of account used to designate value. The British guinea is a well-known historical example. Money prices could be quoted in guineas though payments were made in pounds. A current example, referred to earlier, is the use of dollar prices for real property and durables in countries with a history of high inflation. Payment may be made in dollars or in the current local currency equivalent. The ecu used in the European Monetary System is another example of a modern unit of account that is not a medium of exchange.

The use of money as a unit of account reduces information costs for transactors. Without a unit of account, any transactor must know the bilateral exchange value of each commodity for every other commodity. If there are \( n \) commodities, there are at least \( \frac{n(n-1)}{2} \) separate values. The number of bilateral exchange ratios (prices) rises quickly. With \( n = 100 \) commodities, there are at least 4,950 prices to know. At \( n = 500 \), the number is 124,750, and with 1,000 commodities there are at least 499,500 prices. Trade would be limited by costs of information. Traders would not know the value of items offered in exchange.

Use of a unit of account to express value reduces the number of prices from \( \frac{n(n-1)}{2} \) to \( n \). This reduction in costs of information encourages the expansion of trade.

After a physical object such as a metal becomes money, resources can be saved by issuing claims against the metal. Goldsmiths in the Middle Ages stored gold and precious metals to protect the owners from theft or loss. At first the goldsmiths provided safekeeping. Later they learned there was a low probability that all the gold would be claimed at once. The goldsmiths could profit by issuing paper claims to the gold in their vaults in excess of the value of the gold. Thus, goldsmiths became bankers, and paper claims to gold circulated in place of gold. Eventually paper currency became not just a claim to gold but a fiat money with no backing.

The low cost of producing paper currency is a benefit to society if an effective principle is used to limit the amount issued. Without such limitation, over-production of currency leads to inflation that destroys the
value of currency, money and all nominal values.

For the individual, there are other costs to using currency. Risk of loss and robbery are not negligible. The anonymity that makes currency valuable as a medium of exchange makes it difficult to identify or to claim lost or stolen currency.

Demand deposits or cheques are also used to settle transactions. Unlike currency, anonymity is no longer possible. The seller requires information about the buyer. Payment by cheque is generally restricted to people who can establish credit with the seller or with an intermediary who issues a credit card. Electronic systems of verification have reduced the costs of information about users of credit cards, thus encouraging their use.

A credit card substitutes for money at the time of purchase, but credit transactions are settled by the payment of money, typically by using chequeing deposits. Money serves as the means of payment in transactions of this kind by discharging the debt incurred when using a credit card.

**Investing in Information**

To analyse the medium of exchange function more fully, consider a transactor who has an initial endowment of resources including his own labour time and some information about exchange ratios and qualities of commodities. He has several alternative ways of transforming his initial endowment into a preferred bundle. As in standard price theory, he can use his endowment for production, consumption, or exchange. In addition, he has two options that are neglected in traditional price theory.

- He can use resources to increase his information about the qualities of goods and opportunities for exchange. If the transactor uses resources in this way, he invests in information.
- He can engage in indirect or roundabout methods of exchange, accepting goods with low marginal cost of acquiring information, transferring and storing, then exchanging these goods for others until he obtains an optimal bundle. The resources allocated to the exchange process are the (real) costs of transacting or exchanging and are, of course, distinct from the resources exchanged.

Under conditions of uncertainty about the quality of goods offered in exchange and about prevailing market opportunities, the costs of acquiring information and exchanging are neither zero nor identical for every good or service. The first postulate, introduced above, recognises that the marginal cost of the resources the transactor uses to acquire information or to carry out transactions is the amount of consumption or endowment sacrificed. This marginal cost depends on the goods or services he selects (or about which he chooses to acquire information), and is different for different goods.

By choosing a sequence of transactions (a transaction chain) involving assets with low marginal cost of information, a transactor can lower the marginal cost of exchanging. He incurs transfer and carrying costs and uses existing information about the qualities of particular goods instead of investing resources to acquire information about other goods or other trading arrangements. However, transfer costs increase with the length of the transaction chain, encouraging the rational transactor to compare the marginal cost of acquiring information to the marginal cost of re-arranging the transaction chain and to the benefits obtained from these and alternative uses of resources.

The first postulate makes the marginal cost of acquiring information depend on the good or service selected to be received in exchange. This choice allows the transactor to reduce the resource cost of acquiring a preferred set of commodities by substituting knowledge about transaction arrangements for investment in information about market conditions and the qualities of goods offered in exchange. Cost reduction occurs in two ways.

First, detailed information about market conditions such as location and identification of transactors, the quality and type of commodity bundles they hold, and the exchange ratios at which they trade probably decays more rapidly than knowledge about optimal transaction chains.

Second, as the use of an asset in exchange increases, the transactor learns more about the asset's properties. With growing use of particular transaction chains and improved knowledge of the properties of the assets exchanged, uncertainty about the asset's properties declines. Less investment in information is required to maintain the value of information about desirable transaction chains. Thus, the first postulate assures that the choice of transaction chain and of the assets used in exchange is neither random nor determined solely by the exchange – that is, by the initial and terminal commodity bundles with which trade begins and ends.

The second postulate states

1. that the marginal cost of acquiring information does not vary randomly within a social group, and
2. that the marginal cost declines as the frequency with which an asset is used increases. Transactors can acquire information about a particular subset of the available assets at comparatively low marginal cost once these assets are used frequently. Technical properties such as portability, divisibility, and durability influence the choice.

The second postulate implies that the transaction chains of the numerous participants in the market...
process exhibit some common properties. The repetitive use of a relatively small number of transaction chains by the members of a social group further reduces the marginal cost to each transactor of acquiring information about the assets most frequently used. The lower costs of acquiring information and transacting induce further clustering and the convergence of individuals' chains toward a common pattern.

There are many stages of development between double-coincidence barter and a fully monetary economy. At some stage, a few assets are used with dominant frequency in transactions. Money as a medium of exchange, as a transaction-dominating asset, results from the opportunities offered by the distribution of incomplete information and the search by potential transactors to develop transaction chains that save resources.

The analysis also explains the emergence of specialised trading functions such as brokerage and other market arrangements. They develop from the conditions that shape the (social) convergence to a dominant medium of exchange. Where information is complete and both information and re-adjustment are costless, specialisation of trading functions yields no economic advantages and has no utility. Where information and re-adjustment are not free, the situation changes. Specialised services lower the costs of acquiring information and trading by providing more complete information about the range of qualities and market conditions. With a smaller investment of resources a transactor acquires the same information, and more resources can be used for consumption or trade.

**The Social Services of Money**

For individuals, money is a substitute for investment in information and labour or time allocated to search. By using money, individuals reduce the amount of information they must acquire, process, and store, and thus they can reduce the number of transactions in which they engage to exchange their initial endowments for desired baskets of goods. The use of money increases the welfare of each money user by reducing uncertainty and the length of transaction chains and by increasing expected wealth and time available for leisure. Whatever other services create a demand for the assets that serve as mediums of exchange, their use as mediums of exchange increases demand. Individuals find it advantageous to allocate part of their wealth to money.

What is true for individuals is in this case true for society. The convergence of optimal transaction arrangements generates an aggregate demand for the assets used as mediums of exchange. The increased demand to hold inventories of these assets (money) is independent of the previous uses of the assets and, of course, increases the (relative) prices of the assets. The average amount held in cash balances depends on the prices of the assets held, the prices of alternative assets and, thus, on the relation between net marginal productivity and marginal cost.

Once inventories of money are held, payments and receipts are no longer synchronized. Lack of synchronization, however, does not explain the use or holding of money any more than the holding of money explains the lack of synchronization. Both are a result of the superior productivity of indirect methods of exchange, the smaller resource cost of acquiring information and transacting in a monetary economy.

The use of money encourages the development of the market system by lowering the costs of acquiring information and transacting. With the expansion of the market, opportunities increase for professional middlemen and specialised traders to exploit the partial and incomplete distribution of information about particular commodities. Specialised traders substitute for a wider and more general distribution of information. The use of money also affects the intertemporal allocation of resources. Deferred payments, borrowing, credit and the payments system expand when a standardised asset with well-known properties becomes money for the particular group. The reason is that transactors become more willing to enter into contracts calling for deferred payment.

The magnitude of the net social productivity of money is not constant but varies with the degree of uncertainty about market conditions, including exchange ratios and the qualities of goods. Accelerated technological changes or innovations that change the qualities of goods and increase the number or types of goods raise the productivity of money. Large fluctuations in economic activity also raise costs of acquiring information and the productivity of money.

This analysis implies that the demand for mediums of exchange is higher in periods of rapid change than in periods of gradual or relatively steady change. The longer a period of steady, gradual change continues, the lower the productivity of money and the smaller the demand for assets that reduce costs of acquiring information by serving as mediums of exchange.

A stationary state or a world of steady growth are the limiting cases of economic theory. Tastes, technology, anticipations, population, and types of product are either invariant or change in a known, fully anticipated way at a steady rate. The marginal cost of acquiring information falls and in the limit approaches zero. Transaction chains no longer differ by the saving of costs of acquiring information and differ only by the costs of transfer. The main condition leading to the
selection of a small group of assets as money, and therefore the main source of the distinction between money and non-monetary assets, disappears in the stationary state or world of steady growth.

The introduction of money and its widespread use suggests that the gross gain to individuals and societies from using money is much larger than the saving in transaction costs emphasised in most textbooks. The latter are marginal benefits once money is used. The gross benefits include the saving in information costs.

The use of money also introduces two social costs that partly offset the gross benefits. First is the risk of inflation or deflation. Individual prices can change in a non-monetary economy, but inflation — a maintained increase in the rate of price change — can occur only in a monetary economy. Second is the risk generated by business cycles. The use of money permits people to shift from purchases of commodities to money holding. Since all prices do not adjust instantly, this increased demand for money has real effects. Aggregate demand and output fall. Unanticipated reductions in the stock of money have similar effects on aggregate demand and output. Historically, changes in the stock of money have been a major cause of cyclical fluctuations.

The size of the net social productivity of money depends on the assets selected as mediums of exchange. Once the community uses some assets as money, the private and social benefit can be increased by substituting claims against commodities for commodity money. Individuals gain from the use of substitutes for commodity money if the reduction of costs of acquiring information and transacting more than compensates for any increased variability of exchange ratios such as occurs in periods of inflation and deflation. There are potential net gains because the use of claims and fiat paper money reduces costs and resources used to make exchange in three main ways.

First, paper money permits society to develop a fractional reserve money system and to produce the same nominal stock of money at lower resource cost.

Second, the use of claims encourages the development of privately produced money and with it the development of the payments system. The cost of acquiring information about the qualities of paper money, whether produced by government or by private producers, is lowest if the paper money starts as a claim against commodity money. Historically, when information about the paper money becomes widespread, paper money has retained the property of general acceptability after the right to claim commodities has been removed.

Third, paper money frequently lowers the resource cost of transfer and exchange. This somewhat less than general proposition recognises that both costs and benefits are affected and that the size of the net benefit from the use of paper money depends on the prevailing monetary arrangements and the type of monetary policy followed.

Monetary history offers numerous examples of changes in monetary arrangements that reduced marginal costs of information or transfer for the assets used in optimal transaction chains. Subsidiary coinage is one of the earliest, and bank credit cards one of the most recent steps extending the range and use of mediums of exchange by reducing these costs. Suppose, however, that paper money is not introduced by a central bank or government but emerges in response to the public's search for optimal transaction chains. Many different producers are induced to issue paper money as a claim against commodity money. The social benefit resulting from the use of lower-cost money is partly offset by the higher cost individuals pay to acquire information. The legislation of 1844 in England and of the 1860s in the United States that reduced the number and types of notes in circulation by restricting the right to issue notes are examples of institutional
changes that raised economic welfare by reducing costs of acquiring information. The requirement of par collection of cheques under the Federal Reserve Act is another example.

The analysis does not imply either that society converges to a single medium of exchange or that the productivity of money and the contribution of money to wealth is limited to a single monetary asset. Different types of assets - some privately, some publicly produced - typically appear in the transaction chains adopted within a group and in the transaction chains of a single transactor at different times. These differences in the choice of transaction chain reflect differences in marginal cost that depend on the type of transaction and the transactor's information. Even in highly developed economies with extensive monetary institutions, transactors can use specialised information to develop transaction arrangements that lower transfer costs by avoiding the use of money. Moreover, sectors of an economy that develop specialised information about the properties of particular assets often find it useful to develop specialised mediums of exchange. An example is the use of deferred equity claims of various kinds in mergers and acquisitions. Skilled professionals use their knowledge and information to develop payment mechanisms that reduce taxes and other costs.

Our analysis suggests an extension of Gresham's law (cheap money drives out dear at fixed exchange rates) to the case of multiple mediums of exchange with variable or floating exchange rates. With floating exchange rates, stable monies drive out variable monies. Consequently, government or private producers desirous of maintaining the circulation of government and privately produced monies have found it desirable to provide arrangements for exchange of one money for the other on demand. Typically they set the price of currency in demand deposits at unity and guarantee conversion.

**Conclusion**

The use of money remained puzzling as long as the theory of exchange was restricted to the case of perfect certainty, a world in which information about market prices and the qualities of goods and services is obtained at zero cost. Standard price theory eliminated the main reasons for the existence and use of money by confining choice to three options - production, consumption and exchange - and setting costs of acquiring information about exchange opportunities and qualities of goods to zero. With costs of executing transactions zero and information a free good, there are no costs of shopping to assure that exchanges take place at the most favourable prices, and no benefits from reducing the resource cost of executing transactions and eliminating cross-hauling of commodities. Any asset is just as usable as any other for executing transactions and discharging obligations. As a result, attempts to explain the use of money generally accept some arrangements that accompany the use of money, such as lack of synchronization, as an explanation of the existence of money.

The existence of money ceases to be a puzzle once we recognise differences in the costs of acquiring information about market arrangements, relative prices, or exchange ratios. Individuals search for those sequences of transactions, called transaction chains, that minimise the cost of acquiring information and transacting. The use of assets with peculiar technical properties and low marginal cost of acquiring information reduces these costs. Money is such an asset, and the private and social productivity of money are a direct consequence of the saving in resources that the use of money permits and of the extension of the market system that occurs because of the reduction in the cost of making exchanges.

Money is a substitute for the specialised market skills that are part of a transactor's stock of knowledge or 'human wealth'. Resources allocated to search and to maintaining market information can be re-allocated once money is used as a medium of exchange. Trade and the market system expand, and the economy becomes increasingly monetised. More and better quality information becomes available with the expansion of the market and the opportunities for division of labour that lead to the development of professional transactors such as brokers and specialists. The use of a unit of account further reduces the cost of making exchanges.

The recognition of the central role of money as a medium of exchange does not imply that the collection of assets that serves as medium of exchange is most appropriate for explaining movements of the general price level. A definition embracing a larger collection of assets is appropriate if there are close substitutes for the medium of exchange on the supply side. In this case, slight changes in relative prices re-allocate output between the medium of exchange and other assets, so the collection of assets most useful for explaining changes in the general price level differs from the assets that serve as medium of exchange. However, even if evidence suggests that a broader collection is justified empirically and the term money is used to refer to the broader collection, the significance of the medium of exchange function and its importance for explaining the productivity of a medium of exchange remains.