

Discussion by James Tobin

1. Introduction

Why does fiat money, consisting of intrinsically worthless tokens, have positive value? What determines its value? These are classical questions of monetary theory. This conference, at least its first session, seems to be based on two premises. One is that the two questions have not been satisfactorily and rigorously answered. The other is that the answer to the second question, the determination of the value of money, can be achieved if and only if a precise answer to the first question, the economic function of money, can be obtained. I am dubious of both premises.

2. Overlapping Generations and the Theory of Money

Starting from the presumption that fiat money should have neither value nor real consequence but confronting the fact that it does, some theorists have been grasping for straws. They have discovered the mortality of human beings, formalized in the *overlapping generations model*. Ever since Samuelson's (1958)† seminal exposition of this parable, we have known that providing for consumption in old age solely by personal accumulation of goods might be inefficient. A permanent arrangement by which retired workers can claim part of the output of active workers may make all generations better off. There are a number of such arrangements conceivable. One is a fiat store of value—intrinsically useless, costless to produce, somehow acceptable and known to be acceptable to all generations. Workers can acquire it by saving when young and then sell it for consumption goods when old. It is tempting to call this asset *money* and to exclaim, Eureka, here is the reason for the existence and value of money. Neil Wallace says it is the only model of money extant.

I do not believe that the overlapping generations model is the key to the theory of money. The “consumption loan” parable is valuable and instructive, but it should not be taken seriously as an explanation of the existence of money in human society. There is a semantic problem here. One can call the fiat store of value of the model *money*, but it bears little resemblance to the money of common parlance or the money that economists and policymakers argue about.

†See the reference list at the end of this book.

Here are six of my reasons for doubting that the model is the way to explain money in those customary meanings.

First, the overlapping generations model does not inevitably imply the necessity or desirability of an arrangement alternative to or supplementary to reliance on age-related endowments and on accumulation and decumulation of goods. The examples of the Cass, Okuno, and Zilcha paper (in this volume) remind us of this fact. Even if we confine ourselves to the simplest models, in which generations are internally homogeneous and alike in tastes, endowments, and so forth, we know that goods suffice as a store of value unless total reliance upon them would lead to an interest rate below the natural growth rate of the economy. But money is a universal phenomenon, surely not observed solely in societies or eras in which the net marginal product of capital has not exceeded the growth rate.

Second, if a nonreproducible asset has been needed for intergenerational transfers of wealth, land has always been available. Quantitatively it has been a much more important store of value than money.

Third, as the Cass-Okuno-Zilcha paper also makes clear, an alternative arrangement is needed in the overlapping generations model only if the life cycle is one of saving followed by dissaving. But in many, probably most, societies throughout history the dominant sequence was the reverse. The young lived off the production of the old, most of whom died before they stopped working and became dependent on their children. Those who did outlive their capacity to earn their own living were supported in kind by their children. They did not have to buy their excess consumption by dissaving. Until relatively recently the family was the social institution that smoothed out life cycle discrepancies between endowments and consumptions and did so without a lot of monetary transactions. Yet there was money in those societies nonetheless.

Fourth, as Robert Barro has argued, mortal individuals may behave as if their horizons were infinite, internalizing the utilities and anticipating the endowments of their descendants and benefiting or suffering from similar behavior on the part of their predecessors. Under some circumstances, gifts from young to old and bequests from old to young can overcome the inefficiencies that might otherwise result from reliance on barter and storage of goods. While I do not regard constructive immortality as realistic, I don't believe that the rationale of money depends on whether it is or not. If there were a society of ageless and immortal consumers, I would expect to find them using money.

Fifth, isn't it slightly ridiculous to identify as money the asset that the typical agent of the model would hold for an average of 25 years, say, from age 40 to age 65? The average holding period of a dollar of demand deposits is about 2 days.

Sixth, staying within the overlapping generations model and assuming that some arrangement other than barter and storage is called for, fiat money does not appear to be the most effective or likely mechanism of intergenerational transfer of consumption goods. Another mechanism—widely adopted in societies where fiat money already existed—is a social security scheme. The government promises more or less definite per capita real benefits to each old cohort and raises the needed real resources by taxes on their young contemporaries. I would rather grow old and feeble under that regime than be dependent on the price my young contemporaries

may be prepared to pay for my holdings of fiat money.

The reason for my preference is the following. The market price of fiat money will reflect decentralized decisions by agents, each estimating what the price will be when it becomes her or his turn to sell the money. The more I pondered the Cass-Okuno-Zilcha paper, the more doubtful I became that the fiat money solution would ever leave the starting gate and the more likely it seemed that the barter solution, with no intergenerational trade, would prevail. Why should young G^1 surrender consumption goods for money, knowing that what they get later in return depends on young G^2 's guess of young G^3 's guess of young G^4 's guess . . . of young G^N 's guess . . . of what young G^2 will pay for money? The uncertainty is not merely about what those generations' intertemporal marginal rates of substitution will be, but about what each preceding generation will think they will be. With no history as guide, G^1 is supposed to estimate—rationally!—these probabilities and to display no risk aversion.

Why, you may ask, should a young generation as skeptical as I have just described be willing to pay the taxes necessary to provide the promised social security benefits to its contemporary elders under the arrangement I said I would prefer to fiat money? The answer is that explicit governmental promise carries more conviction than the decentralized market expectation; there is no governmental commitment to the value of fiat money. The willingness or obligation individual young workers feel to the social security commitment is enhanced not only by the association of the tax with their own future benefits but also by the knowledge that their contemporaries will be taxed too. The social compact is clear and compelling. There is no social compact involved in market exchanges of goods for fiat money.

To these points may be added the central message of the Cass-Okuno-Zilcha paper, as I understand it. This is the fragility of the “monetary” rectification of a nonoptimal barter or no-exchange equilibrium. The appealing idea that an initial fiat money endowment of one aged generation suffices to fix things up—that is, leads to a Pareto-optimal competitive intergenerational equilibrium—proves to be a mirage. It is model-bound, dependent on assumptions other than mortality and overlap—for example, homogeneity of tastes and endowments within and across generations. Even with those assumptions, the stationary “monetary” equilibrium featured in Wallace's paper (in this volume) is only one of many Pareto-optimal competitive equilibria, one that will not prevail unless the initial price of money is just right. The Cass-Okuno-Zilcha counterexamples are ingenious and instructive. I interpret them to show in yet another context that general equilibrium theory contains little information about empirical observations; it is compatible with a vast range of histories. One may doubt that a social institution as basic and universal as money owes its existence to a process so unpredictable in its social and distributional consequences.

To summarize thus far, overlapping generations of mortal agents do not constitute either a sufficient or necessary explanation for money. The model does capture, as Cass, Okuno, and Zilcha have emphasized, one feature of money that any theory of money must confront: Its value to me today depends on its value to you tomorrow, which depends on its value to someone else the next day, and so on into the endless future. But the model does not capture other essential attributes of money connected with its use as a transactions medium and unit of account.

3. Fiat and Commodity Money

Before turning to that subject, I interject my opinion that Wallace and Cass, Okuno, and Zilcha, as well as many others, somewhat exaggerate the uniqueness of fiat money. Clearly enough, the value of paper money does not derive from the beauty of the engravings; the practice of putting money stocks in utility functions is reprehensible. But money is not the only asset more durable than human beings—consider land. It is not the only asset valued in a bootstrap or chain letter way—consider precious metals. And it is not the only asset valued more as a social than an individualistic phenomenon—consider telephones.

Moreover, the line between fiat and commodity money is not as sharp as many imply. There is a strong fiat element in the designation, whether by formal government mandate or informal social consensus, of any commodity as numeraire and means of payment. That is true of gold, cigarettes, boulders in lagoons, as well as paper. Demand for additions to the monetary stocks of the designated commodity is added to the demand for the commodity as a consumption or capital good. Unless the commodity is subject to constant real costs in production, its value is bound to be different because of its monetary use. The fact that dentists and hoarders pay the same price for gold, in labor and other commodities, does not mean that the marginal utility of gold dental crowns controls the value of monetary gold. Furthermore, commodity moneys have generally been supplemented by paper or fountain-pen promises to pay the commodity, issued privately or publicly with only fractional backing and circulated for long periods without tests of convertibility. Incidentally, those who are worried about instability of government supply of fiat money are advised to recall the nonpolicy volatility of supplies of commodity and representative moneys in the past.

4. Money as a Public Good Facilitating Multilateral Exchange

The traditional explanation of money is the division of labor, the daily recurring need to exchange specialized endowments or products for diversified consumption goods and services. Long, long ago our precursors pointed out that the use of a common medium of payment facilitates multilateral trade among members of an economy. Barter, in contrast, would restrict transactions to “double coincidences of wants,” Jevons’ famous phrase. The insight tells us why the social institution of money has been observed throughout history even in primitive societies. An insight is not a model, and it does not satisfy the trained scholarly consciences of modern theorists who require that all values be rooted, explicitly and mathematically, in the market valuations of maximizing agents. But I must say in all irreverent candor that as yet I do not feel significantly better enlightened than by the traditional insight.

Social institutions like money are public goods. Models of general equilibrium—competitive markets and individual optimizing agents—are not well adapted to explaining the existence and quantity of public goods. Another time-honored observation of monetary economists is the analogy of money and language. Both are means of communication. The use of a particular language or a particular money by one individual increases its value to other actual or potential users. Increasing returns to scale, in this sense, limits the number of languages or moneys in a society and indeed

explains the tendency for one basic language or money to monopolize the field. Theory must give way to history in explaining which language and what money — English and the dollar for our country — are adopted in any given community. Government itself is a public good, and one of its principal functions is to provide other public goods to its citizens. Naturally enough, nation-states regard the definition and coinage of money as one of their prerogatives and responsibilities.

Another classical observation is the triad of money's functions: unit of account, means of payment, store of value.

The public good characteristic of money certainly applies to the use of a common unit of account. In an economy of N commodities, the number of relative prices is $(N^2/2) - (N/2)$, and the number of price quotations on any given day when markets have not cleared will be much larger. Reduction of the information set to N money prices obviously facilitates calculation and comparison by buyers and sellers. For example, sellers exchanging their one commodity endowment during a particular period can simply set for themselves a reservation price in terms of money rather than in terms of every other commodity. Even the Walrasian auctioneer found it necessary to adopt a numeraire and impose it on bidders.

As this reference illustrates, the use of a common numeraire or unit of account does not logically compel the use of a common money in transactions. Commodity-for-commodity barter could be and are made with values equated by reference to numeraire or unit-of-account prices. But it is hard to imagine, and I suspect even harder to illustrate historically, a unit of account disembodied from a generally accepted means of payment. The dollar is our unit of account because physical dollars are generally acceptable in transactions.

The public good argument applies to acceptability as a means of payment. Indeed, there is, as the language analogy suggests, arbitrariness and circularity in acceptability. Dollar bills and coins are acceptable because they are acceptable; of course, the state has a lot to do with making them acceptable, by defining them as acceptable for settlement of private contracts and for tax payments. Dollar bills and coins are not the only means of payment in the United States; they do not even enter the bulk of transactions. Credible promises to pay those dollars, or to convey other such promises, also serve as generally acceptable media, or as widely acceptable media. Those that gain general acceptability are rarely actually converted into the currency they promise; the circularity of acceptability applies once again. But the ultimate fiat refers to the basic medium that also defines the unit of account.

The conventional story I have just rehearsed begins to explain the doubts I expressed at the outset. General equilibrium theory is not going to explain the institution of a monetary unit of account associated with a basic common means of payment. The public good characteristics that do explain the institution do not tell us much about what will determine the values of the unit of account in terms of various commodities. One reason this is not a simple matter is the multiplication and pyramiding of derivative circulating media. Not only is this process subject to the arbitrary circularity of acceptability already mentioned. It also involves a mixture of institutional history, legal regulation, technology, and private enterprise.

5. Limitations of Contracts and Markets

Why do most commodity transactions involve the exchange of money, basic or derivative? Money is not the only way of avoiding the restrictions of "double coincidences." Individuals can exchange their endowments for commodities they do not wish to consume at once and hold those for later consumption or exchange. The social costs of the procedure are the resources employed in trading, the stocks tied up in inventories, the failure to make mutually advantageous exchanges. These are magnified by agents' uncertainties about their own future preferences and endowments, trading opportunities, storage gains and losses.

Contracts for future delivery, and for contingent future delivery, are another way to mesh the endowment and consumption paths of various agents without the intermediation of money. In the ideal Arrow-Debreu world, the point of presumptive reference for so much economic theory, all transactions are handled this way. An economic history is just a realization of contracts made once and for all time and every contingency; no money is needed or used. We all know the essential reasons why futures markets, and especially contingent future contracts, are so limited in coverage in time, commodities, and contingencies. Those reasons include the costs of making and executing such contracts, the intrinsic difficulties, often impossibilities, of enforcing performance, the moral hazards involved in defining relevant states of nature.

Money, a basic or derivative acceptable means of payment, takes the place of insurance for a host of risks that are insurable, if at all, only at very high cost. This is true even of risks that are small for the economy at large though significant for individuals. If you are stranded in a strange town, it is unlikely that the taxi driver or innkeeper happens to want a lecture or offprint on general equilibrium. It is also unlikely that you previously had or seized the opportunity to contract for the delivery of their services in the precise contingency. Note, moreover, that the insurance you want is not so much against a high price for the services you urgently need as against the possibility that you cannot buy them at all. The holding of money provides the latter insurance, not the former.

Uncertainty of the future spot price of a commodity an agent will or may wish to buy, relative to the current spot price of what the agent has to sell, is inevitable except in an Arrow-Debreu world. That is to say, it is inevitable. Where the stakes are so high that price uncertainty is a large consideration, we frequently do resort to futures contracts and insurance. The greater the uncertainty, the less useful is money proper as "a temporary abode of purchasing power." For long holding periods, the liquidity and acceptability of money are outweighed by the uncertainties of its purchasing power.

It is surely a misunderstanding of a monetary economy to model it as if currency, or promises to pay currency, were the only stores of value or even the predominant vehicles of saving. Land and durable goods, or claims upon them, are the principal stores of value other than human beings themselves. Money is a very transient abode of purchasing power, not designed to be a lifetime store of value. For long-term bridges between sales and purchases, the capital and financial markets provide assets that offer higher returns and better hedges against risk. That is why choices among money, other assets denominated in money, and real capital appear to me to be central to monetary theory, absent though they are in the overlapping generations model.

That is why I think that Wallace should not conclude that because bonds would be redundant in his model they are either redundant or just another form of money in the fact or in other models.

One way to explain the function and value of money is the absence of some markets. In the ideal general equilibrium world, a complete and connected battery of markets would handle all transactions without circulation of any money. In the overlapping generations model, markets are necessarily incomplete because unborn generations cannot make contracts, and money substitutes for the missing futures markets.

But that is only one illustration of a general phenomenon. Markets are much rarer and much more restricted than economists, especially general equilibrium theorists, like to admit. Maybe the Walrasian auctioneer solicits multivariate excess demand schedules for all N commodities from all agents and clears the N markets simultaneously. Working for Arrow-Debreu, the auctioneer's list of "commodities" expands by orders of magnitude. In fact, most markets, even those most highly organized, are bilateral markets, one commodity versus money. Even the stock exchange is a collection of bilateral markets of this kind, with a specialist for each issue separately trying to find the market-clearing price. For most commodities, no organized market exists at all. Often there is bilateral bargaining. Often one party, usually the seller, sets a price at irregular intervals and accommodates willing transactors at the prevailing price.

When economists speak of these arrangements as markets, they are using a metaphor, an abstraction useful for many purposes but not for illuminating the functions of money. True markets are rare and restricted in scope because the operation of such markets is expensive. The number of spot commodities in the U.S. economy is a large multiple of the human population. Rarely do two suppliers produce the same homogeneous commodity, and most firms sell an ever-changing menu of products. It is simply inconceivable that there could be organized competitive markets for them, let alone Walrasian multicommodity market clearing, that would dispense with the need for money.

Failure of the conditions necessary for Arrow-Debreu equilibrium is one way to describe the reasons societies adopt, use, and value money—a contorted and contrived way, to be sure, but one that comes naturally to economic theorists. So a monetary economy will not achieve such an equilibrium. Neither will barter, given the costs of commodity exchange markets and bilateral transactions. A monetary economy reaches a different second best, presumably a better second best, than a barter economy. After all, it does not preclude barter or futures transactions but adds other options.

Questions of this kind, about alternative regimes, should be distinguished from questions about quantitative variations within any one regime. For example, given a monetary economy and its institutions, markets, and intermediaries, how does its equilibrium depend on the quantity of money? To say that real magnitudes don't depend on that quantity is not to say that money is a veil in the sense that the economy achieves the same equilibrium that it would in the absence of any monetary institutions. Nor is it to say that variation or evolution of the institutions of the monetary economy will be neutral. Indeed, all it really does say is that once you have money it doesn't matter how you label the unit of account: If quarters were dollars, prices would be four times as high. (Remember, however, that lots of assets, some

public and some private liabilities, some means of payment but most not, are denominated in the monetary unit. A valid quantity theorem or neutrality proposition really requires that all of them change in the same proportion, not just currency or some arbitrary M_j .) My point here is to elaborate my doubt, expressed at the beginning, that understanding why we have a monetary regime will tell us much about what determines the value of money within it.

6. Concluding Remarks: Constant Velocity and Superneutrality

I guess that the authors of tomorrow's papers, Shubik and Lucas, may share this feeling. They simply assume rules of the game that require use of money to purchase goods. They do not explain the origins of these rules but rigorously derive the value of fiat money from them and from other assumptions. These are interesting and instructive exercises. But caution is advised in applying their conclusions to the live issues of monetary theory and policy. In particular, any institutional rule or technological assumption that fixes the velocity of money—for example, that limits a dollar to changing hands just once per period—evades all the macroeconomic issues that hinge on the endogenous variation of velocity, questions which involve in turn the menu of money substitutes provided by government or by private agents and intermediaries.

A final word. I have argued that the life cycle, or overlapping generations, model is miscast as the hero of the great fiat money mystery. But I do believe that a life cycle or finite-horizon model of saving and asset demands has significantly different implications from a model of infinitely lived consumers. One example is the issue of superneutrality, the alleged invariance of real outcomes with respect to variations in the rates of monetary growth and of inflation. This *might* be true of an economy of identical immortal consumers who will accumulate every asset independently in whatever amount yields their common rate of time discount. This discount will control their consumption paths and capital goods holdings, independently of the real money balances they choose to hold alongside. Mortal consumers, however, have finite demands for wealth in general and in any specific form. They face a problem of portfolio choice; and if inflation lowers the return on money, their consumption and capital accumulation paths will be altered. Thus life cycle models will not be superneutral.