

Money and Banking: An Interpretation

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by John Bryant

"So violent an outrage upon credit, property, and liberty as this compulsory paper currency has seldom been exhibited by the alliance of bankruptcy and tyranny When all the frauds impostures, violences, rapines, burnings, murders, confiscations, compulsory paper currencies . . . have their natural effect, that is, to shock the moral sentiments of all virtuous and sober minds . . ." Edmund Burke, Reflections on the Revolution in France.

This paper is an attempt at a unified, simple, and nonrigorous presentation of a new interpretation of the role of our monetary institutions. This new interpretation consists of putting a new light on old results. The essence of the interpretation is that banking and the provision of fiat money are intimately linked. The paper is based upon recent papers by the author, "Transactions Demand for Money and Moral Hazard" [1], "The Political Economy of Overlapping Generations" [2], and "The Competitive Provision of Fiat Money" [3], which in turn draw on a paper by Neil Wallace [10], a paper by Neil Wallace and John Kareken [7], a paper by Earl Thompson [9], and the well-known paper by Cass and Yaari [6]. The original insight is due to Samuelson [8]. This new interpretation may explain such phenomena as monetary instability, depression, and regulation of the banking system.

Before turning to a discussion of fiat money, some preliminary observations are necessary. Our monetary system is only a particular method of accounting. Viewed in this light, the great effort that has gone into explaining its existence seems misplaced indeed. Even simple transactions, much less the complex transactions of an advanced society, seem to require some method of keeping track of things. The perfect double coincidence of wants at a single point in time and geographical space is too silly to consider, and even in such a world some accounting seems likely. Moreover, even the perfect multiple coincidence of wants is too silly to consider. Which brings us to entries in the accounting system. What is money? It is a positive entry in the accounting system. Naturally, negative entries also are frequently useful. Our discussion of the monetary system will center around these positive and negative entries in the accounting system.

That the monetary system is an accounting industry has important implications. First, as our monetary system is "only" a system of accounting, is it then a "veil?" Not at all! Transactions are essential to an advanced society. And if an accounting system is crucial to transactions, then a threat to the accounting system is a threat to advanced society.

Now let us turn to some preliminary observations on positive entries in the accounting system, commonly known as money. The first question we address is the determination of the value of money. This, itself, is only a matter of accounting. The value of the total of positive entries in the accounting system must be the assets less the net worth of the accounting system. In a finite time world, money must be explicitly agreed to as a claim to the assets of the accounting system, and be retired at the end of the exchange of goods. In an infinite, "open-ended" problem, money is just valued as a claim on the assets of the accounting system.

The fact that money is a positive entry has important implications for the institutional framework processing money. In particular, as a positive entry money represents a certificate of past acts. And past acts either did occur or did not occur. Thus, money differs in an important way from a negative entry which represents a promise of future acts. Registering acts actually performed is a different and simpler task than evaluating and enforcing promises of future acts. This may explain why positive entries, money, go from hand to hand, while negative entries, loans, are usually handled by specialists, banks in particular.

Nevertheless, as in any accounting system, a system of money must guard against fraud. Fraud for money takes the form of counterfeiting, which dilutes the value of everyone else's claim to the services of the accounting system. It is worth noting that government deficit financing, the bogus production of assets, acts like fraud. Moreover, the fact that the accounting system money must compete with other accounting systems limits the feasible amount of such fraud. This has been emphasized by Kareken and Wallace [7] in the case where the competing accounting systems are foreign currencies.

Now we turn to the distinction between fiat money and commodity money. Traditionally, money is viewed as coming in two forms, commodity and fiat. The simplest example of commodity money is a commodity involved in multilateral exchange in which some of the members of the exchange do not consume that commodity. More generally, commodity money is a claim on a specific portfolio of commodities or real assets.^{1/} Fiat money can be viewed as "unbacked" money, although all money is "backed" by the assets of the accounting system. The difference comes down to the form of the asset backing. If the backing is a portfolio of commodities and real assets, then the money is commodity. If the backing is the value of the accounting system itself, then the money is "fiat." It has frequently been observed (correctly?) that commodity money gains value in its use in exchange above its value as a commodity. If this is true, then the money is part commodity and part fiat. The assets of the accounting system includes both a portfolio of claims (or commodities and assets themselves), and a value of the system itself. The accounting system is providing fiat money in the amount of its net entry.

Commodity money presents few interesting problems. For example, in a simple world without fraud, and in which there is a unique market portfolio, commodity money would be claims on that market portfolio. In a more complex world, and one where there are nonlinearities in the costs of information, a single simple portfolio (gold?) may be settled on when that would not occur barring such costs. However, such concerns seem to be of relatively small moment. This is why we concentrate on fiat money.

The study of money has been organized around another taxonomy as well: money which fulfills a transactions function, and money which fulfills a store of value function.^{2/} This distinction is important in understanding the role of fiat money. It has

^{1/} In "real assets" we include government liabilities backed by real government assets or by the taxing authority.

^{2/} This is not, of course, the complete version of Keynes taxonomy, only the part that remains topical.

been observed that the two functions of money cannot be divorced. Money is held only so that at some point it can be used in a transaction for a good. Moreover, if money does not retain value, it cannot be used in transactions. This does not imply that the taxonomy is invalid, only that it has to be interpreted with care. To interpret this taxonomy, let us turn to the standard competitive (Arrow-Debreu) model of the economy. In that model there is no role for money. There are two obvious ways to alter that model in order to introduce a role for money. First, one can introduce costs to exchange. Second, one can rig an infinite period version of the perfect competition model so that it exhibits the well-known capital overaccumulation problem (or some variant thereof). That is to say, one writes a model where the steady-state real rate of interest falls short of the growth rate of aggregate income.^{3/} For the technically inclined, the infinite horizon analog to the transversality condition is not met, and optimality is not achieved in general. If money exists because of costs of exchange, one can define it to be satisfying the transactions function. If money exists because of the capital overaccumulation problem, one can define it to be satisfying the store of value function.

The above interpretation of transactions and store of value functions is not as clean as it seems, however. Notice that costs of exchange do not in themselves explain why there is fiat rather than commodity money. Claims to real commodities and assets can be exchanged. The costs of exchange must introduce an element of the capital overaccumulation problem in order to generate a role for fiat money. The costs of exchange must ensure that without fiat money, the rate of growth of income exceeds the (safe) rate of interest. Otherwise, commodity money dominates fiat money, as the rate of return on the latter is the rate of growth of income.^{4/} By our definition, fiat money may fulfill both transactions and store of value functions, or only the latter function. Commodity money may only fulfill the transactions function. Whether fiat money satisfies

^{3/} See Thompson [9].

^{4/} The government could impose fiat money by imposing costs on exchange of nongovernmental claims, or by constantly deflating, and thereby produce a capital overaccumulation problem.

the transactions function is important in analyzing the effects of changes in costs of exchange, endowments, population growth, production technologies, or tastes. For other considerations, the distinction is not important.

Having introduced fiat money, we are ready for our analysis of its provision. The fact that fiat money is a positive net entry imposes a severe problem on the industry providing the accounting system: the well-known seigniorage problem. Suppose the accounting system is costlessly set up. Money is just costlessly printed on costless paper and handed out. Then, if the system is provided competitively, the value of the system is zero. But this says the system provides no real balances. Therefore, the provision of money must somehow be limited. Suppose there are fixed set-up costs to providing the accounting system. This eliminates the problem of no value. It provides a barrier to entry into the accounting industry. But unless the cost is very high, the provision of fiat money will be inefficient. Too many costs will be incurred for the real value of money, because in the competitive system the costs must equal the value of the accounting system. Fiat money is by nature a public good.

Before getting more concrete in our interpretation of the above analysis, let us put a little more structure on the problem. The model used is a very simple specification of a world involving exchange. People are made to differ in a very simple and easily analyzable way. We will consider a version of the Samuelson [8] Pure Consumption-Loans Model due to Neil Wallace [9]. Each period N individuals are born and they live two periods. There is no production, only exchange of endowments. $N/2$ of the individuals (type 1) are identical and are endowed with L units each of the single transferable, but nonstorable, consumption good in their first period of life. They are endowed with nothing in their second period of life. $N/2$ of the individuals (type 2) are identical and are endowed with nothing in their first period of life. They are endowed with ℓ units of the single transferable, but nonstorable, consumption good in their second period of life, $\ell < L$. The young of type 1 exchange goods to the old of type 1 for fiat money. They also loan goods to the young of type 2 for promises of goods tomorrow. In

this manner everyone manages to get consumption in both periods of life. Notice that without fiat money, the rate of interest is negative while the rate of growth of income is zero. Therefore, the model exhibits the capital overaccumulation problem, even though there is no capital in the model. The above-mentioned problem of seigniorage is immediately obvious in this model. The young of type 1 would prefer to produce their own money than to give up goods to the old for money. And the next generation of type 1 individuals have the same motivation.

With the above abstract model in mind, let us turn to the concrete interpretation of our previous analysis. First, we have to determine who produces the fiat money, the positive net entries in the accounting system. One possibility is that the government does so. But then others must be restricted from doing so. This is more difficult than just prohibiting counterfeiting. Suppose the loans between individuals of type 1 and type 2 in our model are handled by a banking system. There are returns to scale in evaluating and enforcing promises of future payment. Young individuals of type 1 deposit their money in a bank. The bank takes some of that money and loans it to individuals of type 2, who then exchange it with young individuals of type 1 for goods. The next period the bank takes the payment on the loans from old type 2 individuals and any money holdings and pays off on the deposits. The banking system, in providing the valuable service of making loans, has set up an accounting system. It creates offsetting positive and negative entries in the accounts. Its deposits are commodity money. But now, a sharp banker figures out that he can beat the system. He simply issues unbacked dollar deposits to young type 1 individuals in exchange for goods and consumes the goods. As a consequence, the price goes up and old type 1 individuals are worse off. However, the next period the banker meets his obligation by trading deposits for goods from the new type 1 individuals and using these to pay off the old type 1 individuals. The banker has not counterfeited, nor has he failed to meet any obligation. He has created fiat money. One monetary equilibrium is for individuals not to accept unbacked deposits. But another is

the one we have just described. Therefore, the government must regulate banks to insure that they do not create fiat money. It is worth noting that our sharp banker has negative net worth once he has consumed the seigniorage, if the value of his fiat money is ignored.

We see, then, that banks must be regulated to insure that they do not produce fiat money. If the regulation is not perfect, banks may still produce fiat money. Suppose that when they are caught, they are forced to close. Then, depositors lose their money. This means that deposits are risky assets. The appreciation of this risk by type 1 individuals then implies that these deposits must bear interest. This unnatural risk keeps the economy from achieving the optimal allocation. Moreover, a realization that the banks are about to be closed stimulates a run on the banks, as occurred in the 19th century. We have, then, one explanation for both sustained suboptimal equilibrium (the Great Depression?) and bank runs. The solution is, of course, careful regulation to insure that banks cannot have negative net worth. This might take the form of capital requirements, or of Regulation Q-like restrictions on interest payments on deposits.

As an aside, we note that deposit insurance may be necessary to guarantee to the individual depositor that the bank is not creating fiat money on the sly. And this, it seems, could be generated by the private sector itself. After all, holders of claims against any institution must worry about embezzlement. It is worth noting that the deposit insurance itself may produce some distortion. Suppose endowments of type 2 individuals are risky. The insurers want to insure against negative net worth resulting from creation of fiat money, but not against negative net worth resulting from bad loans. This may be difficult to achieve in practice, which may help explain the current circumstance of blanket insurance coupled with limitations on banks' portfolios.

So far, we have assumed that the government alone produces fiat money. Suppose instead the government allows the banking system to do so. We have already seen that this system, too, requires regulation. If providing the fiat money has no fixed cost, the competitive equilibrium has the unregulated market producing a real value of money

equal to zero. If the fiat money imposes a fixed cost, the competitive equilibrium of the unregulated economy generates costs equal to the value accounting system, which is almost certainly inefficient.

Assume for the moment that providing the accounting system has no fixed cost, but the government limits the production of money. Each bank produces its own money. This may produce an indeterminacy. At what rate do the banks' monies exchange? The banking system's money is valued at the worth of its monopoly in money production. But what determines each bank's share in that monopoly? This is the Kareken-Wallace [7] problem again, where they are treating fiat monies issued by different countries. There is nothing to tell us at what rate monies exchange. This, by itself, is an explanation of bank runs. What does an indeterminacy mean? This is unclear, but it does not sound like a characteristic of a stable banking system. Further, the existence of such an unstable banking system could itself cause a sustained suboptimal allocation. The banks could agree that the monies trade one-for-one and divide the total issue. But this agreement may be hard to police. Moreover, suppose a bank not only engages in money creation, but in taking on risky loans as well. Do the other banks take on the aggregate risk of the bank's portfolio? These observations suggest deposit insurance for banks, which we have observed, and a separation of the functions of creating money and risky lending, which we may have observed in the limitations on banks' portfolios.

Now let us suppose that providing the fiat money imposes a fixed cost, which is increasing in the real quantity of fiat money issued. This can remove the above indeterminacy. The cost incurred by a bank determines its share of the market. The monies are issued in indistinguishable form. The government still must regulate the industry to keep it from becoming too large. As discussed in Bryant [3], one way banks can engage in inefficient competition is through the payments of "rebates." Regulation Q restrictions on interest payments by banks can be interpreted as a prohibition of the

payments of such rebates, and thus as one means of prohibiting costly and inefficient competition between banks.^{5/}

The provision of fiat money clearly provides a problem for the economy. But why is this related to banks in particular? We have assumed that the banks provide the accounting system, and that they are regulated. But, could not other institutions engage in fiat money creation and thereby destroy the system? Indeed this is possible.^{6/} An institution which does engage in the accounting function and does have the option of creating fiat money should be subjected to regulation. This may not be as difficult as it sounds. Banks in their valuable role of facilitating borrowing and lending set up an accounting system. This accounting system may also be useful in the servicing of fiat money, giving banks a natural competitive advantage in the provision of money. Moreover, if nonbank institutions are prohibited from providing certain services, they may not be able to compete successfully in providing fiat money, even if they privately contract for appropriate regulators and insurers. The most obvious example is demand deposits. Banks alone can provide demand deposits. A nonbank institution may be unable to profitably sell its unbacked paper because it must offer a very high rate of return to offset its inability to offer the convenience of checking.

^{5/}This fixed cost of providing the accounting system may attenuate another of the extreme implications of the Kareken-Wallace [7] analysis. Suppose only one government decides to "tax" its money by running a deficit. Without any servicing costs to money, individuals cease holding that country's money, the Kareken-Wallace result. But suppose there must be facilities to service the accounting system. Then a small "tax" can be imposed as the cost is a barrier to entry. Moreover, if the deficit government prohibits facilities for competing accounting systems on its soil, it may keep its own people, at least, from switching. This is not very different from capital controls, as analyzed by Kareken and Wallace.

^{6/}The stock market crash of 1929 could be interpreted this way. Stocks were bid up as they became, in part, fiat money. The realization that this competitive valued fiat money system was not an equilibrium then precipitated the crash. The nonrecurrence of this event can then be explained either by learning or by changed regulations.

There are at least two gaps in the preceding analysis. First, suppose the economy were in a maintained suboptimal equilibrium because of inadequate regulation of the banks and no deposit insurance. If the regulation and insurance were then imposed, the above analysis suggests that the economy would move quickly towards the optimal allocation. A stable money would result, and deposits backed by loans would have the approximately correct risk associated with them. However, we know that the FDIC and associated regulation was set up in the Depression, but did not succeed in moving the economy out of the Depression. Second, we have not provided an analysis of negative net entries in the accounting system. These two gaps may be intimately connected.

First, let us turn to our simple abstract model to give us a point of reference. Negative net entries are easily produced in this model. Let $\ell > L$. The type 2 individuals, individuals endowed in their second period of life, have a larger endowment than type 1 individuals, individuals endowed in their first period of life. The young of type 2 promise to deliver goods to a "futures market" in exchange for goods of the old of type 2 of the previous generation. They also borrow goods from the young of type 1 in exchange for promises of goods tomorrow. In this manner everyone manages to get consumption in both periods of life. This model makes clear that negative net entries have the opposite of the seigniorage problem of positive net entries fiat money. The young of type 2 would prefer to take delivery from the young of the previous generation without issuing promises for goods tomorrow. And the previous generation of type 1 individuals have the same motivation.

The difference between positive and negative net entries can be viewed in another way. Everyone wants to be the first to initiate fiat money and get goods in return. But no one wants to initiate negative net entries and give up goods in return. The problem is not, as with fiat money, keeping it from springing up in excess. The problem is getting negative net entries started. A third way to view the difference is to consider our above sharp banker who issued fiat money and consumed the seigniorage. He has negative worth excluding the value of his money. But the banker in the "futures market" must have

positive net worth. However, he would rather consume that net worth than continue the operation of the "futures market." This sharp banker can at any time take delivery from the old of type 2 but issue no more loans. The accounting system itself has negative value as the net entry is negative.

Positive and negative net entries are, indeed, symmetric. There is no capital overaccumulation problem in the competitive model with a last period. Similarly, there is no capital underaccumulation problem in the competitive model with a first period. However, the world is not symmetric. Whereas one can conceive of setting up an institution which will exist for all future time, one cannot conceive of setting up an institution which will have been in existence for all past time. As we saw above in our simple model, the first generation setting up the "futures market" is unambiguously worse off. Therefore, the failure of the competitive solution to provide the "futures market" does not imply that one should advocate setting one up now. One can only wish that there always had been one. This observation is subject to two qualifiers, however. First, a "futures market" often can be initiated by an arbitrarily small "seeding." Therefore, any continuous social welfare function with positive weight on all generations would imply the setting up of the futures market. Second, a capital underaccumulation problem can be introduced in a model with costs of exchange. In such a world, the first generation can be made better off by imposing a "futures market."^{2/}

Negative net entry imposes as severe a problem for the accounting system as does positive net entry. Who puts up and maintains the positive net worth to offset the negative value of the accounting system? This clearly requires regulation. Some institution must be constrained or subsidized to provide the initial net worth, and then be regulated to force it to maintain that net worth. This, too, can explain capital requirements on the banking system.

^{2/}Bryant [2] provides such a model.

Notice that if some event occurs which eliminates the net worth of the banking system, nothing in the private economy will tend to get this "futures market" started again. Suppose, for example, that second-period endowments are risky. Then the banks, if not constrained correctly, will pay off an obligation to type 1 individuals before they will provide goods to their "futures" market. This can eliminate the futures market. Deposit insurance will not help in this circumstance. Deposit insurance only protects the interests of the type 1 individuals. Therefore, there must be some other instrument to guarantee positive net worth of the banking system. Appropriate capital requirements might be difficult to determine. In practice, it would be difficult to differentiate loans between type 2 individuals from those between type 1 and type 2 individuals. And how risky are endowments? Given that regulators cannot know all and anticipate all eventualities, this suggests a last resort policy for the Federal Reserve. To protect the net worth of banks, the Federal Reserve should stand ready to purchase bank assets at above current market value. This must, of course, be coupled with a regulation that forces such subsidies to be used in a "futures market," not in lining the pockets of owners of bank stock. Whether this policy is being followed or not is unclear. It certainly is not an explicit policy of the Federal Reserve. Indeed, it is a difficult policy to espouse in a free-market economy. Few pity the poor banker. Moreover, there can be little doubt that it was not the policy of the Federal Reserve during the Great Depression.

We have not yet considered the initial "seeding" of a futures market. One possibility is that banks are constrained to take the seigniorage from fiat money issue to sets of agents needing positive net entries and use it to set up a sequence of negative net entries for other agents.^{8/} The constraint could take the form of a capital requirement,

^{8/}The "collapse" of a bank's fiat money could then eliminate its net worth, and eliminate the "futures market." See also footnote 6. Banks' creditors could have been the creators of fiat money.

for example. Another possibility is that banks are given monopolies in certain activities, but are again constrained to use the rents in "futures markets." Lastly, the government could simply tax and use the proceeds to set up the banks. This last technique would also be hard to espouse in a free-market society, as Alexander Hamilton discovered. This may explain why more devious ways have frequently been used in history. Notice that the first two ways of starting a "futures market" might also initiate the "seeding" of a "futures market" following a crash. Perhaps new money creation would be feasible for banks following a crash, particularly if regulation is restructured to stabilize a previously unstable banking system. Monopolies on services also might still be of value. However, here the difference between positive and negative net entries presents itself in a new aspect. While with only positive net entries the economy may recreate itself in full bloom following a crash, with negative net entries a process of growth is initiated. An initial small input of net worth will produce a growing "futures market" which converges eventually to the "optimal" allocation. This can be easily shown to occur in our simple model with $\lambda > L$, for example.

Summary

The monetary system is an accounting system. But saying that does not imply that it is a veil, quite the contrary. Our monetary system is closely linked with fiat money. This interpretation of the monetary system may explain such phenomena as bank runs, depression, and instability in the international monetary system, and regulations of banks including at least capital requirements, Regulation Q limitations, deposit insurance, and limitations on bank portfolios. Monetary instability and depression are clear failures of our economy, and fiat money is a solution to a known failing of the competitive economy. But it is a solution which requires appropriate regulation.

It should be stressed that this is only one possible interpretation of our monetary system. There is another, more prevalent, view. The special restrictions on the banking industry are an example of a general principle of government. Government

regulation serves to sustain monopolies which otherwise would crumble under the pressures of competition. For example, Regulation Q is the imposition of a monopoly price, and restrictions on entry to banking are barriers to competition. This interpretation implies the move towards unregulated financial markets currently under consideration.

In choosing between the two interpretations, two points should be kept in mind. First, the two interpretations are not mutually exclusive. Second, before embracing the prevalent interpretation and advocating deregulation, one should be sure of the causes of the banking panics of the 19th century and of the Great Depression. Surely, even a small probability of reinstating those regimes outweighs the distortions of monopoly. ^{9/}

^{9/}Indeed, the current international monetary instability makes one wonder if we have left those regimes.

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