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Why the Fed Should Hold Constant the Amount of Fiat
or High-Powered Money and Do Nothing Else

by
Neil Wallace

Economists, central bankers, and others take widely disparate monetary policy positions on matters that include regulation of financial intermediaries, open-market policy, and international monetary arrangements. This happens because there is no agreed-upon model or theory of money. In fact, most analyses of questions involving money proceed without any model at all. This leaves the Federal Reserve, which is called upon to make all sorts of decisions regarding money and the financial system, in an uncomfortable position.

Although there is no agreed upon model of money, economists working on the foundations of monetary theory agree about one necessary feature of any model of money: A theory of money must be a theory with what might usefully be called friction. This view is consistent with the oft-cited role of money as a lubricant that facilitates trade. Obviously, one cannot have a theory of lubricants without having a theory of friction. But standard economic theory (Walrasian general equilibrium price theory) has no friction; markets operate costlessly in the sense that individuals communicate and trade in fictitious markets whose operation does not utilize resources. And while frictionless economic theory has had its successes, there are many important phenomena that it cannot confront.

In general, frictionless economic theory cannot confront alternative forms of economic organization. In addition to not confronting money, such theory cannot explain the relative merits of the market mechanism and centralized planning; it cannot explain firms as ways of

organizing economic activity; and it cannot explain the role of nonprice allocation schemes like first-come first-serve which play some role in every market and important roles in some.^{1/} Frictionless economic theory cannot confront these phenomena because all involve institutions that to some extent substitute for markets. Since markets work too well and easily according to frictionless economic theory, such theory cannot explain why, in fact, the role of markets is to some extent limited and why there are institutions that take the place of markets.

In this paper, I will describe a class of models of economies that contains a sort of friction that I think is fruitful for analyzing the government's and the Federal Reserve's role in the financial system. But before doing that, I want to say a few words about why we need a theory of money and about how we might judge a proposed theory of money.

While we need a theory of money for both normative and positive purposes, I want to focus on the normative purposes. The normative questions we are concerned with here involve public policy with regard to the financial system. In most areas, economists deal with public policy questions in terms of two considerations, efficiency and income distribution. Efficiency is defined by a concept called Pareto optimality or nonwastefulness: a state of affairs or allocation--a complete description

^{1/} On markets versus planning see L. Hurwicz, "The Design of Mechanisms for Resource Allocation," American Economic Review, May 1973, and V. Smith, "Economic Theory and Its Discontents," AER, May 1974. On firms see R. H. Coase, "The Nature of the Firm," Stigler and Boulding, eds., AEA Readings In Price Theory Vol. VI, Homewood, Irwin, 1952. Coase argues that firms exist as substitutes for markets; think of much vertical integration (few markets) versus little vertical integration (many markets). For some remarks on first-come first-serve see N. Wallace, "Microeconomic Theories of Macroeconomic Phenomena and Their Implications for Monetary Policy," in A Prescription For Monetary Policy: Proceedings from a Seminar Series, Federal Reserve Bank of Minneapolis, 1976.

of who does what and who gets what--is nonwasteful if there is no other feasible state of affairs that would be preferred by someone and, at the same time, would be judged inferior by no one, or, in a convenient terminology, if there is no feasible Pareto superior allocation. For example, if the only potential claimants to a pie are Billy and Tommy, both of whom prefer more pie to less pie, then any division of the pie such that Billy gets what Tommy does not get is nonwasteful. As this example shows, in general there are many nonwasteful allocations that differ with regard to income distribution.

But discussions of monetary policy are hardly ever conducted in terms of efficiency and income distribution. These concepts can be applied only in the context of a particular kind of theory, a theory that takes the form of a coherent general equilibrium model peopled by individuals who attempt to do the best they can for themselves given their circumstances. There being no such theory of money that is widely accepted, goals for monetary policy have been stated in terms of aggregates like the price level, the unemployment rate, and growth--the prominent triad of the Employment Act of 1946. But such goal statements give rise to all sorts of disputes and inconsistencies. What is the proper concept of unemployment? Why is growth good? How should the price level be measured and why is a stable price level good?

With regard to this last question, economists in the nineteenth century debated the following question: In an economy in which labor productivity is increasing, should the increase in real income accrue by way of an increasing money wage relative to a constant price level or should it accrue by way of a constant money wage relative to a falling price level? The Employment Act of 1946 advocates the former. But, as we shall see, there are examples of economies in which this policy gives

rise to an inefficient or wasteful state of affairs while the latter policy (a falling price level) gives rise to a nonwasteful state of affairs. Results like this one make most economists--and should make everyone--wary of adopting anything but efficiency and income distribution as goals for economic policy. But, as noted above, we need a theory in order to utilize these criteria.

How should a theory and, in particular, the theory I am going to set out be judged? There is an old precept that says, reject one theory only in favor of another. On that ground, do not too quickly reject the theory set out here because you will look hard and long for another theory of fiat money. Also, do not be put off by the simplifications of the theory. All theories abstract from many details of the so-called real world. And above all, do not be put off because the policy implications of the theory set out, implications summarized in the title, are so different from current practice. No reasoned argument supports current practice.

I. Samuelson's Overlapping Generation Model^{2/}

Consider a discrete time economy in which a new generation of N two-period-lived individuals (young in the first period, old in the second period) appear each period. Each young person is endowed with some amount of a single nonstorable consumption good. (You may think of each young person as being endowed with some labor that can be used to produce the nonstorable consumption good and of old people as unable to work.) As regards preferences, nothing but their own consumption matters

^{2/}Samuelson, P. A. "An Exact Consumption-Loan Model of Interest With or Without the Social Contrivance of Money," JPE, December 1958.

to these people: more consumption is preferred to less and everyone would like to consume something in both periods.

Thus, in this economy at any date there are old people and young people and there is a fixed amount of the one nonstorable consumption good. We are going to judge the nonwastefulness of various ways of distributing the consumption good. In doing that, we will take into account those who are currently alive--the current old and the current young--and all future generations. It is, by the way, a critical feature of this economy that there is no last generation.

1. A Wasteful Market Solution

If in this economy, we, so to speak, let matters take their course, then a likely or equilibrium outcome is that the current young and the young in each future period consume their endowment. No one gets to consume when old. Call this the no-trade allocation. I want to prove that this is a wasteful allocation in the sense that there is a way of dividing up the fixed amount of the consumption good in the current and every future period that makes everyone better off than under the no-trade allocation.

For the moment, suppose that everyone is identical in preferences and endowment, and let the endowment of each young person be Y units of the nonstorable consumption good. Moreover, suppose that preferences are such that the consumption bundle $(C_1, C_2) = (Y/2, Y/2)$ is preferred to the bundle $(C_1, C_2) = (Y, 0)$, C_1 being consumption when young and C_2 being consumption when old. Obviously, the fixed amount of the consumption good, NY , that is available each period--available from society's point-of-view--could be divided so that each of the $2N$ people alive at each date get $Y/2$ units. This gives rise to $(C_1, C_2) = (Y/2, Y/2)$ as lifetime

consumption for every young person and $Y/2$ as second-period consumption for the current old. This allocation is Pareto superior to the no-trade allocation according to which lifetime consumption is $(Y,0)$ for all young people and according to which the current old get nothing.

But how can a so-called market arrangement produce this Pareto superior allocation or any allocation in which people get to consume something when old? Clearly the young in each period have to surrender part of their endowment to the old. But what can the old give in exchange? In a sense, they have nothing and, in particular, nothing that would bind or commit next period's young people to turn over some of their endowment to the then old. This is the friction that allows this model to have a role for fiat money.

2. A Rational Expectations Fiat Money Solution

By definition, fiat money is unbacked or inconvertible money; the issuer does not promise to exchange such money for anything else. In the United States today, high-powered money or the monetary base (the sum of outstanding currency plus deposits of commercial banks at the Federal Reserve) constitutes the fiat money. One way to check this is to consolidate all balance sheets; what is left as wealth is all real assets (buildings, land, animals, etc.) and fiat money.^{3/} Another defining property of fiat money is that it is intrinsically worthless: Put formally, fiat money should not be an object that is wanted for its own sake (like consumption) nor should it help produce the consumption good (be like labor or land). To have a theory of fiat money, then, is

^{3/}To get this answer, one must regard government interest-bearing debt as claims on future taxes against which taxpayers have an offsetting liability.

to have a theory that explains the circumstances under which fiat money--intrinsically worthless stuff--ends up having value in the sense of exchanging for things like the consumption good of the model we have been describing.

Once we define fiat money this way, it follows immediately that fiat money has value at some date if and only if it is believed that it will have value at the next date. Thus, one should not be surprised if expectations about the future play an important role in any theory of fiat money. Moreover, we see why the never-ending nature of our model is critical. Were there to be a last generation, fiat money could not have value when the last generation is old. But if so, then it could not have value when they were young and so on, giving us the conclusion that fiat money could never have value.

Now if the old people alive at the current date are endowed with some fiat money and if this amount will never be changed, then there exists an equilibrium in which fiat money has value, an equilibrium that gives rise to a Pareto optimal or nonwasteful allocation. By equilibrium I mean a price sequence (a sequence of values of fiat money at each date in units of the consumption good at that date) and an allocation (a description of who gets what, where who includes everyone currently alive and everyone alive in the future) that satisfies the following properties: (a) Individual choices are optimizing subject to them taking as given current and future values of fiat money and subject to them having the correct views about the future value of fiat money, and (b) those choices satisfy a market clearing condition in every period; the total demand for fiat money on the part of the young in each period equals the amount offered by the old in that period. For completeness,

such an equilibrium might be called a competitive, perfect foresight or rational expectations equilibrium, but I will simply call it an equilibrium.

How does such an economy with fiat money work? In each period, the old people offer at any price all the fiat money they have. This constitutes the supply of fiat money. The young people are demanders of fiat money, but in general their demand depends on the current value of fiat money and on next period's value of fiat money and on their preferences. For this economy, it is plausible to look for an equilibrium in which the value of fiat money remains constant from period to period. This is so because the supply of fiat money does not change nor do the factors that influence the demand. If the value of fiat money is positive and constant, then it looks to young people as if they can exchange one unit of their endowment for one unit of consumption next period. In other words, they face a zero interest rate. The upper boundary of the implied choice set is shown as the bold-faced line in Figure 1. The equilibrium value of fiat money is determined by the preferences of the young, by their choice of a point on this boundary. To pin matters down, we shall suppose that they display no time preference; namely, that when given the possibility of trading one unit of first-period consumption for one unit of second-period consumption, they choose equal amounts of the two. In other words, they choose $(C_1, C_2) = (Y/2, Y/2)$.^{4/} This means that each young person offers $Y/2$ units of his endowment in exchange for fiat money or that in the aggregate $NY/2$ units of the consumption good are offered. If we let M denote the number of units of fiat money supplied,

^{4/}An example of a utility function consistent with such preferences is the function $C_1 C_2$.

Figure 1

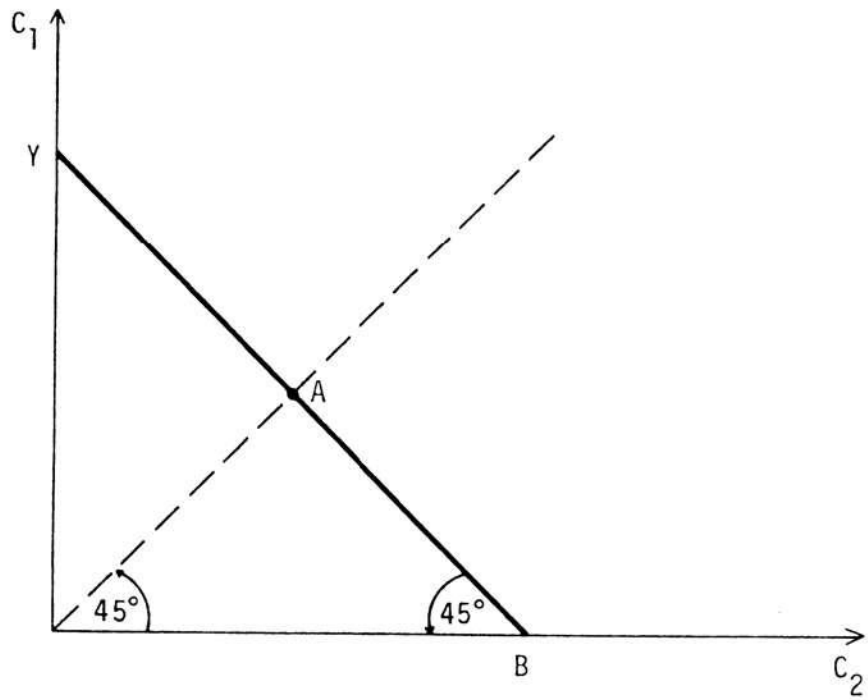
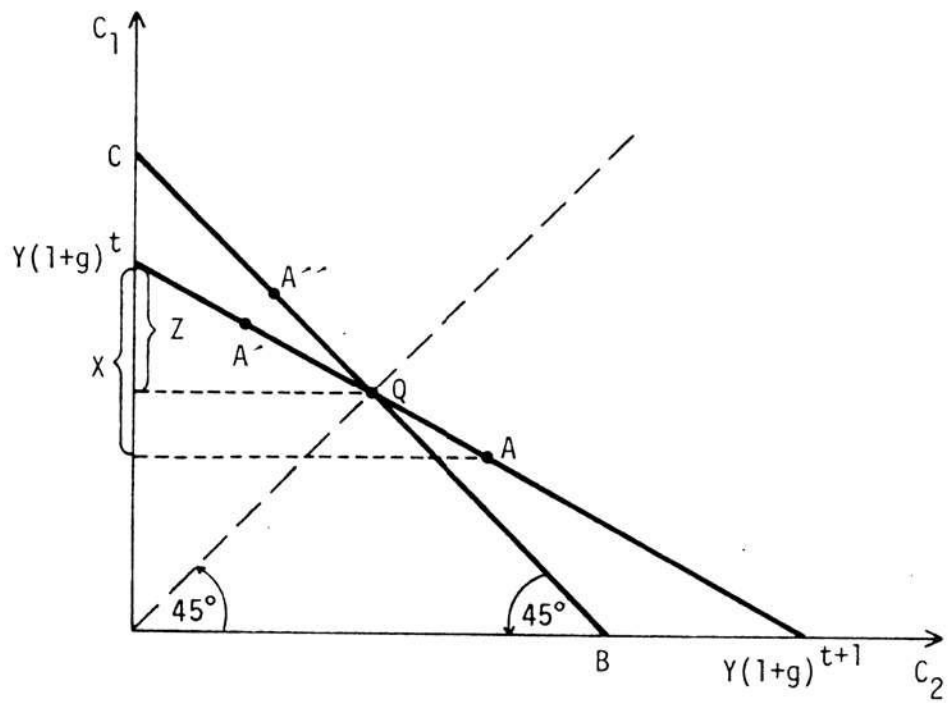


Figure 2



each unit exchanges for $(NY/2)/M$ in every period. It is easy to verify that such a price sequence is an equilibrium according to the definition given above.

We can also indicate why the resulting allocation is nonwasteful, at least among the class of allocations that treat all young people of all generations the same.^{5/} Any such allocation limits the consumption bundle of young people to the choice set shown in Figure 1. Given the assumed preferences, the bundle $(C_1, C_2) = (Y/2, Y/2)$ is best from their point-of-view. While the current old could be made better off at points to the southeast of point A, the current young and the young of all future generations would be worse off. (All points on the line segment connecting A and B and including the points A and B are nonwasteful.) Points on the boundary northwest of A are wasteful because the young are worse off than at A and so are the current old. The no-trade allocation is, of course, one of these.

3. A Deflationary Example

Suppose we consider a model slightly different from the model above in one respect: Let the endowment of successive generations grow by the factor g so that each young person of generation t has an endowment of nonstorable consumption good equal to $Y(1+g)^t$. Let us first suppose that the quantity of fiat money is unchanging and equal to M . Since the quantity of the consumption good is increasing exponentially at the rate g , you might surmise that the value of this fixed quantity of fiat money increases; that is, that deflation occurs. And, in fact, there is an equilibrium in which the value of money grows exponentially at the rate g

^{5/} For a general proof, see J. Kareken and N. Wallace, "Portfolio Autarky, A Welfare Analysis," Journal of International Economics, 7, 1977.

implying that young people face an interest rate of g . The corresponding choice set is depicted in Figure 2 along with the equilibrium allocation, point A, say.^{6/} This gives rise to a nonwasteful allocation.

Now suppose instead that monetary policy is conducted so as to keep the value of fiat money constant. This requires that the quantity of fiat money be increased, in fact, by g percent per period. We may suppose that this required amount is handed out each period to the old people with each old person getting the same amount.^{7/} Everyone knows that this is the monetary policy.

This policy keeps the value of fiat money constant. It now looks to young people as if their budget set is bounded by the line CB in Figure 2. The equilibrium consumption bundle is at point Q.^{8/} But the bundle at point A is preferred to that at point Q. (Why?) That is, the current young and all members of all future generations are better off under deflation than under the policy that keeps the price level constant. And what about the current old? They also are better off

^{6/}The line through point A is determined as follows. It passes through the endowment $Y(1+g)^t$ and has slope equal to $-1/(1+g)$. The point Q is determined by the intersection of that line and the dotted line that passes through the origin with slope equal to one. How do we know that point A lies southeast of point Q rather than northwest of Q, say at A' ? Well, suppose to the contrary that A' is chosen when the boundary of the budget set is the line passing through Q and A. We know that if the choice set boundary were CQB, then Q would be chosen, implying that Q is preferred to A' . But A' is preferred to A . Hence, Q is preferred to A . This contradicts the assumed choice of A when the choice set boundary is the line through Q and A.

^{7/}It is essential that this handout be viewed as independent of the amount of money they have acquired when young. But it is not essential that the handout go to the old. It could as well go to the young.

^{8/}Can you prove that the equilibrium is at Q and not somewhere else on the dotted line that passes through the origin?

under deflation. Under deflation they get to consume the quantity X, while under the policy that keeps the value of fiat money constant, the current old get to consume only the quantity Z. (Again, see Figure 2). For this model, this proves that a policy of holding constant the amount of fiat money and letting deflation occur is better than one that keeps the value of money constant.

And these examples generalize in the following way. In a wide variety of such models, a policy of holding constant the quantity of fiat money gives rise to a Pareto optimal or nonwasteful allocation. This can, as in the last example, imply a rising value of money (deflation) or can imply a falling value of money (inflation). No matter what, the resulting allocation cannot be improved upon.

But despite my plea that you not reject a theory because it abstracts from certain details of the so-called real world, you may, I suspect, have some qualms about taking this prescription seriously. After all, where are banks and other financial intermediaries? What about business cycles? And, what about international monetary relations?

II. Private Borrowing and Lending and Financial Intermediation

In this section I am going to describe how to alter the model described above so that it is consistent with private borrowing and lending. And, although it is something of a copout, I am going to regard financial intermediaries as mechanisms for carrying out various kinds of borrowing and lending.^{9/} The question we ultimately want to

^{9/}A copout because intermediaries are firms, not mere veils. See my introductory remarks on firms.

address is whether the presence of private borrowing and lending alters the conclusion of the last section; namely, that a policy of holding constant the stock of fiat money is okay.

Borrowing and lending constitutes one kind of trade among individuals. And economists know how to formulate models in which such trading occurs; populate the model with individuals who differ from one another in time preference or endowment. We shall take the latter route.

Suppose we alter the first model introduced in the following way: Let some young of each generation be endowed with some amount of first-period nonstorable consumption and let some others be endowed with some amount of second-period nonstorable consumption. In general, the latter, when young, will want to borrow from the former.^{10/} In what sense, if any, does this borrowing and lending substitute for fiat money?

If the aggregate endowment is, so to speak, tilted sufficiently toward second-period consumption, then the market equilibrium that arises in the absence of fiat money is nonwasteful. And, indeed, then, there is not an equilibrium in which fixed-supply fiat money has value. But if the aggregate endowment is tilted sufficiently toward first-period consumption--the limiting case being the model of the last section--then the market equilibrium that arises in the absence of fiat money is wasteful. And, then, there is an equilibrium in which fixed-supply fiat money has value, an equilibrium that gives rise to a nonwasteful allocation.

^{10/} If the second-period endowment is stochastic, then the borrowing and lending takes more subtle forms. There is, then, room in the model for risk-sharing agreements and for portfolios that are diversified in a determinate way.

In such an equilibrium, private borrowing and lending and valued fixed-supply fiat money coexist. Therefore, as implied by our statement about wasteful and nonwasteful allocations, the mere existence of private borrowing and lending does not eliminate the role of fiat money.

But there are senses in which private borrowing and lending and fiat money are substitutes. Thus, economies of the kind we have been describing that differ only in the degree to which aggregate endowments are tilted toward first-period consumption display an inverse relationship between the amount of private debt and the total value of fiat money. Also, economies that differ only because fiat money is being altered at different rates can display an inverse relationship between the total value of fiat money and the inflation rate. And, finally, in such models various restrictions on private borrowing and lending--for example, an outright prohibition on private borrowing and lending or a tax on it--enhance the demand for fiat money. But, while these aspects of substitution between private debt and fiat money will help us explain why there is widespread government interference with private debt creation--a good deal more in other countries than in this country--they do not by themselves provide a justification for such interference.

If a government or monetary authority is charged with maintaining the value of fiat money, then, in general, it must be concerned with everything that goes on in the economy. If in the economy we have been describing, the degree to which the aggregate endowment is tilted toward second-period consumption is increasing over time, then unless something is done the value of the fixed quantity of fiat money declines. In other words, there is inflation. The same happens if over time there

are technological developments that make it easier and easier to store the consumption good of the model we have been describing. In their effects on the demand for fiat money, such developments are similar to payments mechanism developments that reduce the demand for fiat money. But, as we saw in the last section, if the goal of monetary policy is the achievement of a nonwasteful state of affairs, then these developments do not call for a response from the monetary authorities. The problem is not the development that threatens to alter the value of fiat money, the problem is the goal of attempting to keep constant the value of fiat money.^{11/}

III. Monetary Policy and Business Cycles

Perhaps nothing divides the economics profession more sharply than their views about the merits of an active countercyclical monetary policy. But since a great deal has been written on this subject, I will be exceedingly brief.

Those who advocate an activist policy seem to treat as a fundamental postulate some degree of money-wage and price inflexibility and seem to treat as invariant or causal recently observed correlations between, on the one hand, measures of aggregate demand--various monetary aggregates among them--and, on the other hand, measures of economic activity--GNP, employment, and unemployment.^{12/}

^{11/} For a more detailed but still incomplete discussion of laissez-faire toward the financial intermediation industry, see N. Wallace, "A Payments Mechanism Without Fed Involvement and Fed Monetary Policy Without Required Reserves." Research Department Staff Report #82, Federal Reserve Bank of Minneapolis, 1977.

^{12/} See, for example, A. Okun, "Inflation: Its Mechanics and Welfare Costs," Brookings Papers on Economic Activity, 2, 1975 and F. Modigliani, "The Monetarist Controversy or, Should We Forsake Stabilization Policies?" American Economic Review, March 1977.

The wage and price inflexibility postulate goes back at least to Keynes. But no economist regards as satisfactory a theory that begins from such a postulate. First of all, prices and wages do not behave the same way at all times and in all countries. So we must explain the circumstances in which they display so-called inflexibility and the circumstances in which they do not. Secondly, it is an acknowledged task of economists to explain the behavior of prices and wages, the explanation flowing from a specification of the underlying physical environment. After all, prices and wages do not behave, people behave.

Similar comments apply to observed correlations between aggregate demand variables and measures of economic activity, correlations that are closely related to those that go under the name Phillip's curve correlations. First of all, the correlations that were treated as invariant and causal ten years ago are not the same as those observed today. Second of all, as for the wage and price flexibility assumption, advocates of activist policy based on recently observed correlations have never produced a coherent argument in support of their causal interpretation of these correlations.

But there are now theories that go a long way toward explaining such correlations and why they shift across time and across countries. These theories, which have been described in detail elsewhere,^{13/} ascribe observed correlations between the price level and, say, total output or between some monetary aggregate and total output, to a relationship between unanticipated changes in the price level and total output. This

^{13/} See R. E. Lucas, "Understanding Business Cycles," in Carnegie-Rochester Conference Series on Public Policy, Vol. 5, ed. by K. Brunner and A. Meltzer, North Holland 1977 and N. Wallace, "Microeconomic Theories of Macroeconomic Phenomena and Their Implications for Monetary Policy," in A Prescription For Monetary Policy: Preceedings from a Seminar Series, Federal Reserve Bank of Minneapolis, 1976.

relationship is itself an implication of the notion that in most circumstances individuals cannot distinguish completely between changes in the general level of prices and changes in relative prices. When this notion is put together with rational expectations--the idea that individuals use the information available to them in the best way--the result is a theory that leaves little or no room for deliberate manipulation of total output and employment by way of monetary policy. According to this theory, the best the monetary authority can do is eliminate itself as a source of uncertainty. The prescription that flows from the models examined above accomplishes this.^{14/}

IV. Country-Specific Fiat Monies

So far we have been describing models of closed economies, a serious omission in matters involving monetary policy. The kinds of models described above can easily be adapted to accommodate many countries and, in particular, many fiat monies, one for each of several of the countries. But the implications that flow from such an analysis are, in a sense, not very reassuring.

The model suggests that absent government restrictions that artificially enhance the demand for a particular currency, capital controls being an important example, no international monetary system is consistent with uncoordinated national monetary policies. Thus, the model can be viewed as explaining why restrictions like capital controls are pervasive in the world today. Flexible exchange rates do not by themselves allow

^{14/} Indeed, the only fully spelled out, coherent model that approaches being a model of business cycles is Lucas, R. E. "Expectations and the Neutrality of Money," Journal of Economic Theory, Vol. 4, 1972. In the context of Lucas's model, which shares some of the features of the model described above, it is clear that an uncertain or random monetary policy gives rise to a wasteful allocation.

countries to pursue independent monetary policies. Absent restrictions like capital controls, one currency cannot depreciate continuously in terms of another. If it did, then there would be a tendency for everyone to substitute the appreciating currency for the depreciating one.

(Could the Canadian dollar for long depreciate at, say, 8 percent a year in terms of the U.S. dollar?) Nor, it would seem, could there be an unchanging exchange rate between two currencies expanding at different rates. The residents of the country following the less expansionary policy would be subsidizing residents of the other country, a situation that could not be expected to persist.

Even if monetary policies are coordinated and, indeed, even if the quantities of the several fiat monies are held constant, absent restrictions like capital controls, there is a problem with regard to what exchange rates ought to be. Absent such restrictions, exchange rates must be unchanging over time, but the model does not determine their values. This is to say that one fiat money is enough. Unless made effective through restrictions like capital controls, national boundaries do not by themselves give rise to separate demands for country-specific fiat monies.

But, although there are problems created by the presence of country-specific fiat monies, the conclusion that it is not possible to dominate a monetary policy that holds constant the stock of fiat money continues to hold. In particular, if all fiat monies are held constant, then any system of fixed exchange rates is consistent with an equilibrium that gives rise to a nonwasteful allocation.

V. Conclusion

There is at least one important qualification to the above analysis of fiat money. It has always been recognized that the printing of money is one way to finance government expenditures.^{15/} If we take it as given that any method of financing such expenditures involves coercion, then it follows that any method involves costs, explicit collection costs and somewhat hidden distortions. But, then, fiat money issue with its attendant explicit costs and somewhat hidden distortions is on a par with other taxes as alternative ways of financing government expenditures.

And there is at least one minor qualification. As just suggested, it is not costless to operate a fiat-money system, even one as simple as the one prescribed above. If we think of the fiat money as being currency, then resources must be devoted to replacing worn-out currency and to eliminating counterfeits.

But the fact that there are costs to operating a fiat-money system is in a sense reassuring. We started out by saying that a theory of money must be a theory with friction. If one has a real theory of friction, then no lubricant should completely overcome the friction, at least not without some cost in terms of resources. The fiat money of the model described above works too well. The fiat money of those models completely overcomes the friction. Once we take into account the

^{15/} In the United States, fiat-money issue is accomplished through Federal Reserve purchases of interest-bearing Treasury securities. But the Federal Reserve returns the interest payments on these securities to the Treasury. Were these securities held by the public, taxes would have to be levied to make the interest payments. The proposal to have the Federal Reserve pay interest on bank reserves has similar budgetary implications.

cost of operating a fiat-money system, this is no longer the case. A well-managed fiat-money system may overcome the friction to some extent at some cost just as a lubricant may partly overcome physical friction at some cost.