Federal Reserve Bank of Minneapolis

Quarterly Review

Winter 1984

Federal Reserve Bank of Minneapolis

Quarterly Review Vol. 8, No. 1 ISSN 0271-5287

This publication primarily presents economic research aimed at improving policymaking by the Federal Reserve System and other governmental authorities.

Produced in the Research Department. Edited by Preston J. Miller, Richard M. Todd, and Inga Velde.
Graphic design by Phil Swenson and typesetting by Barbara Cahlander and Terri Desormey, Graphic Services Department.

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Some of the Choices for Monetary Policy

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Almost daily, the Federal Reserve is offered conflicting advice about how to conduct monetary policy. Some people, such as the members of the Shadow Open Market Committee, advise the Fed to gradually slow the growth of money and let interest rates take care of themselves. Others, such as foreign central bankers, advise the Fed to lower interest rates and let money grow as it may. And still others, such as the *Wall Street Journal* and various supply-siders, advise the Fed to stabilize commodity prices and pay little attention to either money growth or interest rates.

Though conflicting, the advice the Fed receives seems to be based on a common view that choosing a monetary policy is a technical problem. The presumption seems to be that there is a unique best policy for the Fed to follow and the Fed's problem is to find it. Those advising the Fed seem to see their task as convincing the Fed that their particular analysis is the right one.

This attitude is somewhat hard to understand. Most economists agree that the choice of a government policy should be based on an analysis of how individual welfare is affected and that in general any policy choice results in both gainers and losers. How, then, can those advising the Fed argue that one particular monetary policy is best? Do they think they have found a policy that will benefit everyone and harm no one? Or are they arguing for a policy which they recognize will help some and hurt others but which reflects their personal judgement about how the interests of different groups should be weighted?

Considering the state of monetary policy analysis, this ambiguity is perhaps not surprising. Until recently, economists have simply not been able to build models which describe how individual welfare is affected by alternative monetary policies. Most of the models economists use to analyze monetary policies only consider how the Fed's actions affect certain aggregate features of the economy; they do not directly describe what happens to the individuals who make up the economy.

This paper describes a simple model which provides a coherent analysis of how monetary policy affects people in different circumstances.[1] The model is populated by three types of agents: borrowers, lenders, and people who hold assets valued in terms of the current price level (nominally denominated assets, like currency). A government is assumed to run a permanent budget deficit which it finances by issuing fiat money and bonds. The monetary policy problem in this model is how to choose paths of money and bonds to finance this deficit.

The model demonstrates that different policy choices affect the three types of people differently. In a situation like that in the United States today—where the government has a large prospective deficit and is a net debtor and where the real interest rate is high—the model says a more accommodative monetary policy would raise the price level but lower rates of inflation and real interest.[2] Such an outcome, the model says, would make the hold-

[1] I earlier used this model, a version of Samuelson 1958, to analyze the effects of credit controls (Wallace 1980). Here, as in that paper, the analysis may be fairly demanding for some readers. It requires familiarity with the material presented in an intermediate level (relative) price theory course.

[2] These somewhat unusual results are not unprecedented. See Sargent and Wallace 1981.

ers of nominally denominated assets worse off and borrowers better off, while lenders could be made either better or worse off.

The particular implications of the model for alternative monetary policies should be viewed cautiously, for they probably could be altered by reasonable changes in assumptions. What cannot be easily altered, however, is the message that the Fed's task as it selects a monetary policy is a difficult one—to weigh conflicting interests.

The Model

Here I describe, in detail, the people and the government in my model economy, how they behave, and precisely what I mean by *monetary policy.*

The People

The people in this model live only two periods. At each date t (where t is an integer) a new generation—generation t—of two-period-lived people appears. Thus, members of generation t are in this economy at t and $t+1$ only, and at any date t, the population consists of the members of generation $t-1$ (who are old at t) and the members of generation t (who are young at t).

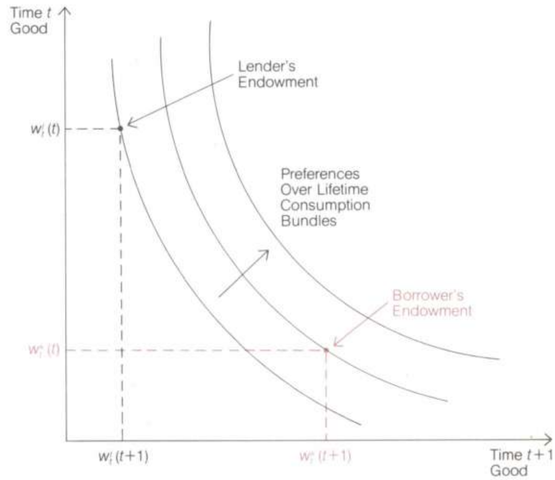
At each date, only one good exists. The good that exists at date t is called the time t good. Each member of generation t has preferences about the amounts of the time t good and the time $t+1$ good that she or he would like to consume in a lifetime (preferences about lifetime consumption bundles). I represent such preferences by an *indifference curve* map of the kind shown in Figure 1. Any combination of amounts of time t and time $t+1$ goods is on some indifference curve (even though I have shown only some of the curves). Each individual member of generation t is indifferent among bundles of the two goods on the same indifference curve, and (because people prefer more goods to less) each prefers bundles on higher indifference curves (in the direction of the arrow) to bundles on lower indifference curves.

Each member of generation t also has an income stream (an endowment) consisting of some amounts of the time t good and the time $t+1$ good, denoted $w_t^j(t)$ and $w_t^j(t+1)$, respectively, for member j of generation t. I assume that these goods cannot be produced and, in particular, that the time t good cannot be stored to produce the time $t+1$ good. In other words, unless member j engages in some sort of trade, she or he is stuck with the endowment as a lifetime consumption bundle.

To keep things simple, I assume that different generations are identical and that there is a limited kind of diversity within each generation. Each generation consists of two groups of people. Members of one group, whom I call *lenders* (or savers), are identical and have preferences and endowments that lead them to want to lend (or save) at most rates of return. Members of the other group, whom I call *borrowers* (or dissavers), are also identical and have preferences and endowments that lead them to want to borrow (or dissave) at most rates of return. As Figure 1 shows, lenders are heavily endowed with the time t good and borrowers with the time $t+1$ good, so trades of the two goods between the two groups are natural.

Figure 1

The Preferences and Endowments of Borrowers and Lenders in Generation *t*



I now describe competitive desired trades of the two goods by lenders and borrowers at various terms of trade (or rates of exchange). I denote these terms of trade r_t, which represents the price of the time t good in units of the time $t+1$ good. Equivalently, r_t is the discount factor for computing the value at time t of the time $t+1$ good; thus, time t wealth of member j of generation t in units of the time t good is $w_t^j(t) + [w_t^j(t+1)/r_t]$. (Think of r_t as the gross real rate of interest, *gross* because it is 1 plus the real rate of interest.) The total trades lenders desire as a group at each r_t can be represented by a *market supply curve* of the time t good, a curve which describes the desired saving, or lending, of the group heavily endowed with the time t good. I denote this supply curve $S(r)$. Similarly, the total trades borrowers desire as a group at each r_t can be represented by a *market demand curve* for the time t good, a curve which describes the desired dissaving, or borrowing, of the group heavily endowed with the time $t+1$ good. I denote this demand curve $D(r)$.

To find the $S(r)$ curve, I begin with one of the identical lenders. Figure 2 shows how much of the time t good one lender wants to trade when r_t has a particular value. The straight line is the upper boundary of all affordable bundles, the lender's *budget,* implied by that value of r_t. Assuming that the lender behaves competitively, as a price taker, her or his supply of the time t good at the particular value of r_t is the difference between how much of the good the lender has (the lender's endowment) and how much of the good the lender wants to consume (the lender's preferred consumption bundle) at that value of r_t. When faced with different values of r_t, the lender can afford different combinations of the two goods; for a higher r_t, for example, the lender's budget line tilts as in Figure 3. This changes the lender's preferred consumption bundle and so her or his desired trades. By facing the lender with different values of r_t, then, I can trace out how the lender's supply of the time t good depends on r_t. Since all lenders are identical, the $S(r)$ curve is simply the number of lenders in any generation times the supply of the time t good of the individual lender at each r_t. The $D(r)$ curve is obtained from an analogous examination of borrowers. Examples of the resulting $S(r)$ and $D(r)$ curves are shown in Figure 4.

Because generations are identical in this economy, the $S(r)$ and $D(r)$ curves describe competitive desired trades of lenders and borrowers in every period. The first date (the current date or the date when a policy is chosen) is, however, special. At $t=1$, the population of the economy consists of the members of generation 0 (the old) and the members of generation 1 (the young). The $S(r)$ and $D(r)$ curves describe the behavior of the members of generation 1 and successive generations. But those curves do not describe the behavior of generation 0 at $t=1$. The members of generation 0 are assumed to initially own among them some time 1 good and some assets, like currency, that are valued in terms of the current price level

Figures 2 and 3

A Lender's Supply of the Time *t* Good

Figure 2 **For a Particular r_t**

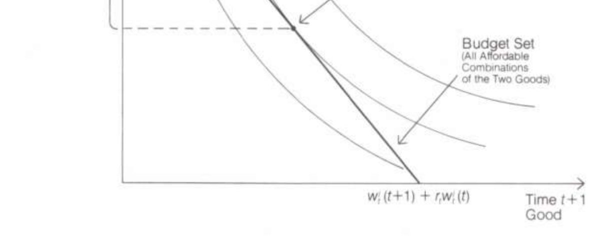
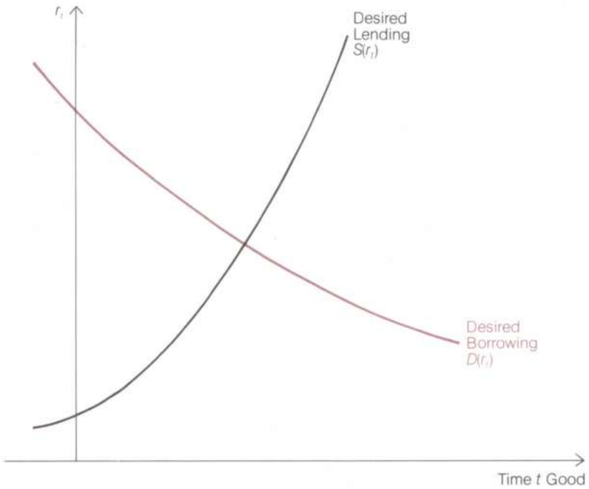


Figure 3 **For a Higher r_t**

Figure 4

Market Supply of and Demand for the Time *t* Good



(nominally denominated assets) which they offer to sell in order to be able to consume more of the time 1 good. Members of generation 0 act competitively to maximize their individual consumption of this good—that is, they supply all their assets at whatever is the market price (perfectly inelastically).

From this description of the economy's three groups of people, I can deduce how the well-being of the members of each group is affected by the value of currency and the rates of return they face. The members of generation 0, the old at the first date, are better off the higher the value at time 1 of their assets because the higher is that value (the lower the price level) the greater is the amount of time 1 consumption they can obtain. From Figure 3, it is clear that lenders are better off the higher the rate of return that they face and that borrowers are better off the lower the rate of return at which they can borrow. (As the rate of return changes, the budget line pivots on the endowment point, which lets the individuals reach a higher or lower indifference curve, or level of preferred consumption.) My task in this paper is to show how these rates of return and the initial value of currency—and so these three groups of people—are affected by the choice of a government policy.

The Government

Since I want to analyze monetary policy, I take as given the government's fiscal policy as measured by the path of the real deficit net of interest. More precisely, I take as given real government expenditures and real taxes (and, hence, their difference), with interest payments excluded from expenditures. The requirement that any such deficit be financed can be represented by the cash flow constraint of the combined fiscal and monetary authority (comparable to the Treasury and the Federal Reserve in the United States):

$$(1)\qquad G_t = p_t(H_{t+1} - H_t) + p_t(P_tB_{t+1} - B_t)$$

for all $t \geq 1$. Here G_t, measured in units of the time t good, is the government's real deficit net of interest payments. On the right side of equation (1) are two terms, each corresponding to a way of financing this deficit: the first term is the value in terms of good t of the government's addition to the outstanding monetary base (new fiat money) and the second term is the value of its addition to its outstanding debt (new fiat bonds). Specifically, the variables on the right side of (1) are defined this way:

H_t = the monetary base (or high-powered money) that generation $t-1$ starts with at time t

p_t = the time t price of a unit of the monetary base in units of the time t consumption good ($1/p_t$ = the time t price level)

B_t = the nominal face value, in terms of the monetary base, of the maturing government bonds owned by members of generation $t-1$ at t

P_t = the price at t, in terms of the monetary base, of a bond which pays one unit of the monetary base at $t+1$ ($1/P_t = 1$ plus the nominal interest rate at t).

This version of the cash flow constraint assumes for simplicity that all of the government's borrowing and lending takes the form of one-period nominal discount bonds, each bond when issued being a title to one unit of the monetary base at the next date. For a given path of the real deficit net of interest, a given sequence $G_1, G_2, \ldots, G_t$, for all $t \geq 1$, I will study how the economy is affected by alternative sequences for H_{t+1} and B_{t+1} (choices for the paths of base money and bonds, or for open market operations) which satisfy equation (1). I label the choices of the H_{t+1} and B_{t+1} sequences *monetary policy.*

Fixing the deficit sequence G_t means that the government does not vary either its expenditures or explicit taxes in response to different choices for the sequences of H_{t+1} and B_{t+1}. This means that government expenditures and explicit taxes are assumed to be indexed, or expressed in real terms. It also means that any decrease in government interest payments that accompanies an open market purchase of government bonds—such as occurs in the United States when the Federal Reserve returns the interest payments it receives to the Treasury—is used neither to finance additional government expenditures nor to reduce other taxes.

Discussing monetary policy in the sense of open market operations would be pointless if the model were not consistent with (a) both the monetary base and bonds being held and being worth something in terms of the consumption good and (b) bonds selling at a discount, $P_t < 1$, so that they bear interest in a way that makes them genuinely different from the monetary base. As the model stands, it is consistent with (a), but not with (b).

Elsewhere I have argued that legal restrictions on private financial intermediaries are generally necessary for nominally denominated default-free securities to bear nominal interest rates that are significantly positive and for monetary policy to have a role (Wallace 1983). Put very briefly, the argument is that, without any such legal restrictions, substantial nominal interest rates present a profit opportunity which private financial intermediaries exploit by buying interest-bearing bonds and selling liabilities (for example, bearer bank notes) that compete with base money. If such *arbitrage* does not make the monetary base worthless, then it drives nominal interest rates down to a level which just covers its costs (of printing bearer notes, for example). Moreover, if these costs are the same for everyone—private intermediaries and the government—then different open market policies are innocuous.

To prevent such arbitrage from rendering monetary policy meaningless in my model, I assume that a reserve requirement is imposed directly on each private lender. This means that each lender must hold in the form of base money a fraction, λ, of any savings (bonds or loans). This requirement implies that the gross real return lenders face is not simply the return on the bonds or loans the lender buys or makes, but is rather a weighted average (denoted r_t^a): the quantity λ times the gross real return on base money (r_t^m) plus the quantity $(1-\lambda)$ times the gross real return on bonds or loans (r_t^l). Borrowers (dissavers), in contrast, face the same interest rate on their loans as does the government on its bonds (r_t^l). As we will see, the reserve requirement can produce a significantly positive nominal interest rate and an important role for monetary policy.

This kind of reserve requirement is intended to capture in a simple way the role that legal restrictions on private financial intermediaries play in actual economies. It accurately describes an economy in which all private lending or saving takes the form of bank or financial intermediary accounts which have a uniform reserve requirement. If these institutions operate competitively and costlessly, then the rate they pay on their liabilities, their deposits, is a weighted average of the rate they earn on reserves and the rate they earn on loans, the same weighted average described above as that facing private lenders in my model.

Equilibrium

I will be describing how this model economy evolves from $t=1$ on into the indefinite future under the assumption that it evolves as a perfect foresight competitive equilibrium. *Competitive* means that people in the economy treat prices as beyond their control when they choose quantities, behavior assumed above in deriving the $S(r)$ and $D(r)$ curves. *Perfect foresight* in the model means that anticipated rates of return on assets equal actual or realized rates of return or, equivalently, that at each date t, $t \geq 1$, the young correctly anticipate the price level at the next date. *Equilibrium* means that all markets clear at each date t.

Market clearing in the model should be thought of as a sequence of trades of money and bonds for goods, trades which at each date simultaneously satisfy the supplies and demands of people and the government. At $t=1$, the members of generation 0 (the old at $t=1$) own $H_1 + B_1$, H_1 being the monetary base they carried over from the last period and B_1 being the face value of the government bonds they purchased when they were young. They cash in those bonds and offer the sum $H_1 + B_1$ in exchange for time 1 goods. At the same time, the government offers new bonds, B_2, and new base money, $H_2 - H_1$. In addition, the borrowers of generation 1 offer their own securities, private IOUs. All of these are purchased by the lenders of generation 1 in an equilibrium. At the next date, $t=2$, the borrowers of generation 1 and the government repay their loans and a new set of transactions occurs similar to those at $t=1$ but, of course, involving different people. This process is repeated date after date.

The conditions for such market clearing can be expressed succinctly.

DEFINITION. *Given* λ, $H_1 + B_1 > 0$, *and sequences for* G_t *and* H_{t+1}, *an equilibrium consists of sequences for* p_t, P_t, r_t^m, r_t^l, r_t^a, *and* B_{t+1} *that for all* $t \geq 1$ *satisfy equations* (1) *and*

$$(2) \qquad S(r_t^a) - D(r_t^l) = p_t(H_{t+1} + P_t B_{t+1})$$

$$(3) \qquad r_t^a \equiv \lambda r_t^m + (1-\lambda) r_t^l$$

$$(4) \qquad r_t^m = p_{t+1}/p_t$$

$$(5) \qquad r_t^l = p_{t+1}/p_t P_t$$

$$(6) \qquad r_t^l \geq r_t^m$$

$$(7) \qquad p_t H_{t+1} \geq \lambda S(r_t^a)$$

with at least (6) *or* (7) *at equality.*

Equation (2) says that saving evaluated at the weighted average of the returns on base money and loans minus dissaving, or private borrowing, evaluated at the return on loans must equal the value of government liabilities. Equations (3), (4), and (5) define the return facing savers and contain our perfect foresight assumptions, namely, that the returns that determine choices at t match the actual returns. Inequalities (6) and (7) and the accompanying proviso are related to the reserve requirement. Inequality (6) says that the return on loans is at least as great as that on base money. If it were not, then unlimited gains could be made by borrowing and using the proceeds to acquire base money, activities which would not violate the reserve requirement. That being so, no equilibrium can violate (6). Inequality (7) expresses the reserve requirement: the value of base money must be at least as great as the established fraction times (gross) saving (or the value of the saving that lenders must hold as base money). The proviso arises in this way. If $r_t^l > r_t^m$, then wealth maximization implies that lenders hold no more than the minimum required amount of base money, which is to say that (7) holds at equality. Alternatively, if the value of base money exceeds the amount required to be held $[p_t H_{t+1} > \lambda S(r_t^a)]$, then wealth maximization implies that the return on base money is as great as the return on securities, which is (6) at equality.

Instead of trying to study all equilibria possible in this economy, I will assume that the real deficit net of interest, G_t, is a nonnegative constant, G, and focus on a small subset of equilibria, those for which real variables are constant through time. I will call these equilibria, which are relatively easy to describe, *stationary equilibria*. Stationary equilibria can also be distinguished according to whether or not (6) holds at strict inequality. Denoting constant values of r_t^m and r_t^l, respectively, r^m and r^l, I call an equilibrium in which $r^l > r^m$ a *binding equilibrium* and one in which $r^l = r^m$ a *nonbinding equilibrium,* where the words *binding* and *nonbinding* refer to whether or not the reserve requirement is actually constraining the choices of lenders.

The study of stationary equilibria is simplified by noting that in this economy attention can be limited to paths of fiat money and bonds, H_{t+1} and B_{t+1}, for which the ratio B_{t+1}/H_{t+1} is a constant, which I denote β. In a binding stationary equilibrium, the ratio B_{t+1}/H_{t+1} is necessarily a constant for all $t \geq 1$.[3] In a nonbinding stationary equilibrium, B_{t+1}/H_{t+1} need not be constant, but there is no harm in assuming that it is. As long as the paths of H_{t+1} and B_{t+1} are consistent with a nonbinding stationary equilibrium, there are paths with $B_{t+1}/H_{t+1} = \beta$, for some β, which are also consistent with the same stationary equilibrium. I will limit this monetary policy parameter, β, to be greater than -1.[4]

With the paths of H_{t+1} and B_{t+1} limited in this way, I can define a stationary equilibrium as follows.

DEFINITION. *Given* λ, $H_1 + B_1 > 0$, G, *and* β, *a stationary*

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[3]To prove this, divide equation (2) by equation (7) at equality to get $[S(r^a) - D(r^l)]/\lambda S(r^a) = 1 + (P_t B_{t+1}/H_{t+1})$. From equation (3), $P_t = r_t^m / r_t^l = r^m / r^l$, a constant; thus, B_{t+1}/H_{t+1} is necessarily a constant.

[4]A negative β for the United States would correspond to a situation in which little or no government debt was held outside the Federal Reserve and in which the Fed was a creditor to the private sector by way of loans to banks and others.

Note that the reserve requirement, λ, and β are genuinely different policy instruments in that the set of (r^m, r^l) outcomes achievable by varying both λ and β cannot be obtained by fixing β arbitrarily and varying only λ. [For example, if β in equation (20) below is set at zero, then equations (19) and (20) generate a one-dimensional set of outcomes in the (r^m, r^l) plane as λ is varied. By varying both β and λ, a two-dimensional set of outcomes is achievable.] This implies that if alternative stationary equilibria for different settings of β and λ are interpreted as generating a three-dimensional utility possibility frontier—utilities of the current old, of lenders, and of borrowers—then some points achievable by varying both β and λ are not achievable by fixing β arbitrarily and varying only λ.

equilibrium consists of scalars (numbers) r^m, r^l, r^a, h, b, and p that satisfy

(8) $G = (1-r^m)h + (1-r^l)b$

(9) $S(r^a) - D(r^l) = h + b$

(10) $r^a = \lambda r^m + (1-\lambda)r^l$

(11) $r^l \geqslant r^m$

(12) $h \geqslant \lambda S(r^a)$

(13) $G = S(r^a) - D(r^l) - p_1(H_1+B_1)$

where either (11) *or* (12) *must hold at equality and where h denotes a constant real value of the monetary base, p_tH_{t+1}, and b denotes a constant real value of government bonds, $p_tP_tB_{t+1}$.*

Note that (8) is a stationary version of the government's cash flow constraint, equation (1), and that (13) comes from that constraint for the first date, $t=1$. For constant real sequences, this definition and the earlier one are equivalent.[5]

Although I am mainly interested in binding stationary equilibria, understanding of the model will be enhanced by a brief study of nonbinding equilibria.

Nonbinding Stationary Equilibrium

Here, by definition, the returns on fiat money and bonds are equal, so in determining an equilibrium I seek a common value of r^m and r^l, which I will call simply r. According to equations (8) and (9), this r must satisfy

(14) $G = (1-r)\,[S(r)-D(r)]$

which is one equation in the unknown r. From equation (13), this r and p_1 must satisfy

(15) $G = [S(r)-D(r)] - p_1(H_1+B_1)$

where, recall, H_1+B_1 is positive and is a given initial condition—the nominal wealth of the members of generation 0, the old at the first date. Finally, any r and positive p_1 satisfying equations (14) and (15) must also satisfy equation (12), the reserve requirement.[6] Note that equation (9) and the definitions of β, h, and b imply that $S(r)-D(r)=h(\beta+1)$, or $h=[S(r)-D(r)]/(\beta+1)$. Hence, equation (12) is satisfied if and only if

(16) $[S(r)-D(r)]\,/\,(\beta+1) \geqslant \lambda S(r)$.

Since $S(r)-D(r)>0$, a sufficiently small β, one near enough to -1, will imply that (16) is satisfied, while a sufficiently large β will rule that out.

To summarize, a nonbinding stationary equilibrium exists if, given G, there exist an r and a positive p_1 that satisfy equations (14) and (15) and if, given β, condition (16) is satisfied. There are, then, two separate reasons why such an equilibrium may not exist. One is that, given G, $S(r)-D(r)$ may not be large enough at r's that do not exceed 1 to satisfy equations (14) and (15). The other is that β may be too large to satisfy condition (16). In either case, I would look for a binding stationary equilibrium.

Binding Stationary Equilibrium

I begin the study of binding equilibria by finding two equations in the two rates of return, r^m and r^l, that must hold. Since $r^l > r^m$ in a binding equilibrium, inequality (12) must hold at equality. Substituting from it at equality and equation (9) into equation (8), I get the first equation, namely,

(17) $$G = (1-r^m)\lambda S(r^a) + (1-r^l)[(1-\lambda)S(r^a) - D(r^l)].$$

The second equation, which is obtained by dividing equation (9) by (12) at equality, is

(18) $[S(r^a)-D(r^l)]\,/\,\lambda S(r^a) = 1 + (\beta r^m/r^l)$.

Since $r^a=\lambda r^m+(1-\lambda)r^l$, equations (17) and (18) are two equations in two unknowns, r^m and r^l. If I can find a pair (r^m,r^l) satisfying equations (17) and (18) and $r^l \geqslant r^m$, then using that pair I would find p_1 from equation (13).

A Simple Special Case: Fixed Saving

Because equations (17) and (18) are complicated for gen-

[5]Equivalence means that, for given scalars satisfying equations (8)–(13), there are corresponding sequences satisfying (1)–(7) and that, for given constant real sequences satisfying (1)–(7), there are corresponding scalars satisfying (8)–(13).

[6]Note that any such r does not exceed 1 and is such that $S(r)-D(r)>G \geqslant 0$.

eral functions $S(r)$ and $D(r)$, I will examine in detail only a special case—one in which the saving of lenders is a constant level, S^*, that does not depend on the rate of return lenders face.[7] This assumption lets me solve equation (17) or r^m to get

$$(19) \quad r^m = [(\lambda S^* - G) / \lambda S^*] + \{(1 - r^l)[(1-\lambda)S^* - D(r^l)] / \lambda S^*\}$$

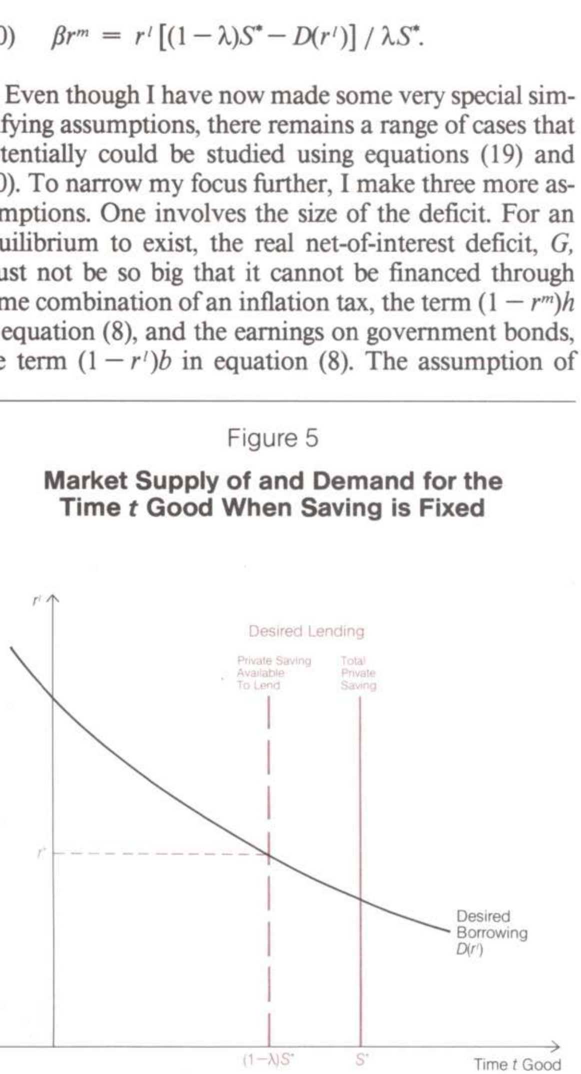
and to solve equation (18) for βr^m to get

$$(20) \quad \beta r^m = r^l [(1-\lambda)S^* - D(r^l)] / \lambda S^*.$$

Even though I have now made some very special simplifying assumptions, there remains a range of cases that potentially could be studied using equations (19) and (20). To narrow my focus further, I make three more assumptions. One involves the size of the deficit. For an equilibrium to exist, the real net-of-interest deficit, G, must not be so big that it cannot be financed through some combination of an inflation tax, the term $(1 - r^m)h$ in equation (8), and the earnings on government bonds, the term $(1 - r^l)b$ in equation (8). The assumption of constant saving implies a simple (sufficient) condition, which I adopt, that assures that G is not too big: the deficit is less than the monetary base in a binding equilibrium, or $G < \lambda S^*$. This assumption assures that the deficit could be financed by issues of base money only, with $b = 0$. Another, less critical assumption concerns the rate of return r^l that would clear the private credit market in the absence of government borrowing or lending, that is, with $\beta = 0$. This is the value of r^l which satisfies $(1 - \lambda)S^* = D(r^l)$. I denote this r^l value r^* and assume that $r^* > 1$ (see Figure 5). Finally, I assume that all the pairs (r^m, r^l) that satisfy equation (19) are such that $r^l > r^m$. This is to assume that, no matter what β is, there is no nonbinding equilibrium. These assumptions and $G > 0$ imply that the locus of pairs (r^m, r^l) that satisfy equation (19) is as sketched in Figure 6.

Figure 5

Market Supply of and Demand for the Time *t* Good When Saving is Fixed



I can study the role of monetary policy in this special economy by adding to Figure 6's sketch of equation (19) sketches of several loci of pairs (r^m, r^l) that satisfy equation (20)—one for $\beta < 0$, one for $\beta = 0$, and one for $\beta > 0$. On Figure 6, the corresponding equilibrium values of r^m and r^l are labeled as the points E^-, E^0, and E^+. Note that the locus implied by equation (20) passes through the horizontal axis at $r^l = r^*$ and that it swings further to the right as β increases. This means that the larger is β, the larger is r^l. Moreover, r^l and p_1 are similarly related: the higher is r^l, the higher is p_1, or the lower is the price level at $t = 1$. This follows directly from equation (13) upon setting $S(r^a) = S^*$.

This special economy thus displays some of the difficult welfare choices policymakers face: the tighter is monetary policy (in the form of a larger β), the worse off are borrowers and the better off are the initial holders of nominal assets, the members of generation 0. Since there is a substantial range where r^m and r^l move in opposite directions in response to a larger β, I cannot determine in general how a larger β affects their weighted average, r^a, the return facing lenders.

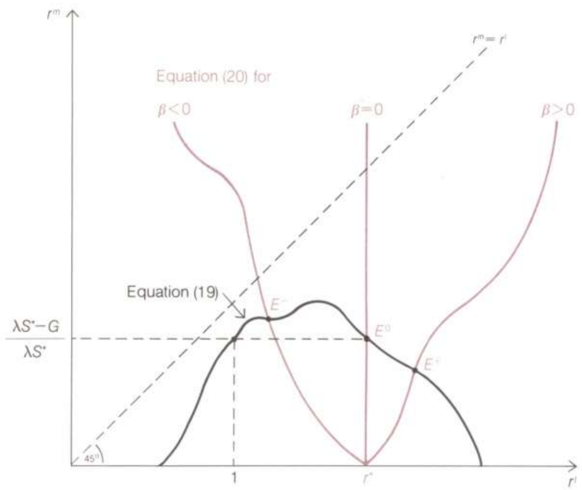
In several respects, Figure 6—in particular, a position like E^+ in Figure 6—seems quite close to the situation facing the Federal Reserve today. There is a net-of-interest deficit, $G > 0$; the government is a net debtor, $\beta > 0$; and real interest rates are significantly positive, $r^l > 1$.[8]

[7]One pair of assumptions that would make $S(r)$ a constant is that lenders have no endowment when they are old and that their indifference curves are those implied by a utility function of the Cobb-Douglas form.

[8]In a growing economy, the relevant comparison is between r^l and 1 plus the average growth rate.

Figure 6

Alternative Equilibria When Saving is Fixed



According to the model, an easing of monetary policy from such a position, a decline in β, would lower the real interest rate, r^l, and lower the (steady-state) inflation rate. According to the model, the main price to be paid for this would be a one-time rise in the price level. Considering the different ways different types of people would be affected by such changes, the Fed's choices today do, indeed, seem difficult.

Concluding Remarks

Although the simple model economy I have described differs in innumerable ways from the actual economy, it does not do so in a way that exaggerates the difficulty of the choices facing those who determine monetary policy. The specification cannot easily be changed in a plausible way so as to produce a monetary policy that will benefit everybody. One way to get closer to such unanimity is to drop borrowers from the model by assuming that everyone in each generation is a lender. But such a specification seems most implausible. In such a model, there is nothing that corresponds to active private credit markets—to mortgage lending, for example. My model is more realistic than that, though it is admittedly simple. It has only three types of people, for example, and abstracts entirely from business cycles, from the international debt crisis, and from the fact that there are many countries whose monetary policies affect one another. Despite the minimal diversity of self-interest in the model, however, it clearly says that different monetary policies affect different people differently. Rather than exaggerating the difficulty of the choices facing policymakers, therefore, my model almost certainly understates it.[9]

[9]The model can be used to analyze questions other than those I addressed here. It can be used to study, for example, the effect of varying the magnitude of the reserve requirement or the effect of paying interest on required reserves or the effect of giving a special status to government bonds, say, by allowing holdings of them to qualify as reserves or by levying a lower reserve requirement against holdings of them than against holdings of private securities.

Although the model can also be used to study fiscal policy, doing so requires additional assumptions. Different levels of explicit taxes, besides implying different levels of G in the obvious way, imply different $S(r)$ and $D(r)$ curves. Different levels of real government purchases also imply different $S(r)$ and $D(r)$ curves unless these purchases are assumed to provide services the quantities of which do not affect the way individuals rank alternative bundles of private consumption.

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