# INTEREST RATES AND FEDERAL DEFICITS

*Roy H. Webb*

The relationship of Federal deficits and market interest rates has been the central theme of much recent discussion of economic policy. To many discussants it is axiomatic that Federal deficits determine interest rates. For example, as a bank chairman put it "[Deficits] are the major reason that our interest rates stay close to record high levels." (*American Banker* [5, p. 2]) And a trade group asserted, "More than anything else, it is the spectre of an overwhelming volume of deficit financing which haunts housing and financial markets." (*Wall Street Journal* [8, p. 8])

Those and similar statements tend to take the asserted deficit-interest rate relationship as self-evident, and thus do not include theory or evidence to support their claims. Yet a casual glance at recent American data fails to provide a clear contemporaneous link between deficits and interest rates. In fact, Figure 1 indicates that in 1975, when the deficit was at its highest level in several decades, there were neither high nor rising interest rates. While such evidence does not rule out any linkage of deficits and interest rates, at the very least the data suggest the existence of other important factors.

In order to clarify the effects of deficits, this article takes a closer look at the theoretical relation between fiscal actions and interest rates. Although the analysis indicates that a relation does exist, it also points out reasons that actual interest rate effects are likely to be less drastic than much of the current discussion assumes. Before presenting that analysis, however, it is useful to consider whether the reported Federal deficit is indeed a meaningful figure.

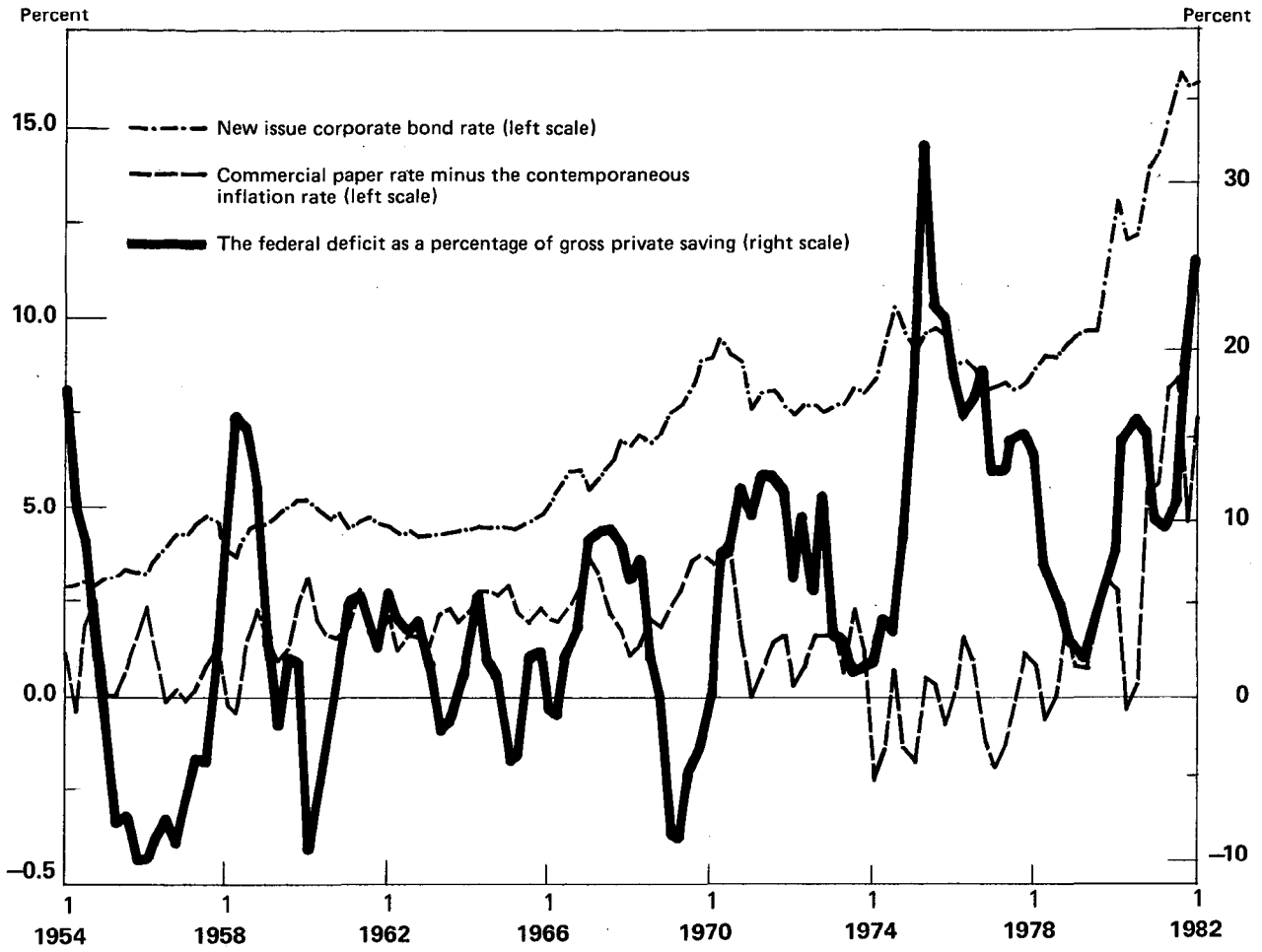
## Measuring Federal Debt

In general terms, the Federal debt is the outstanding volume of Federal obligations, whereas the deficit is the volume of expenditures minus tax receipts. As a matter of arithmetic, the deficit (over an interval of time) is exactly equal to the sum of changes in the debt and the monetary base. Assuming for simplicity that there is no change in the monetary base, the deficit is just the change in the debt. Note that the debt is a fixed number at any point in time, and is often referred to as a stock. The deficit, however, being the change in a stock, is only meaningful over an interval of time and is referred to as a flow. The stock-flow distinction is important to keep in mind in order to appraise the size of the debt or deficit over time. Comparisons of nominal magnitudes over time can be difficult to interpret due to growth in the price level, as well as fluctuations in real output. Therefore ratios of nominal variables are often used to provide some perspective. For example, the ratio of Federal debt to total debt compares stocks, while the ratio of the deficit to private saving compares flows. As Figure 1 indicates, the deficit-saving ratio in the fourth quarter of 1981 was slightly below 20 percent, compared to a much larger 33 percent in early 1975. In contrast, the $100 billion deficit reported for late 1981 appears much larger when considered by itself.

Once the stock-flow distinction is made, there are further ambiguities. Consider first the stock of Federal debt. Although usually stated at par value (that is, the price when issued), market value may be more relevant to individuals' financial decisions and thus to interest rates. By one estimate (data in this paragraph are from the Council of Economic Advisers [3]) the difference between market value and par value was $65 billion in 1980. Also, since the Federal government holds substantial financial assets, it may be the case that liabilities minus assets, i.e., net liabilities, could be more relevant than the commonly reported gross liabilities. In 1980, net liabilities of the Federal government were less than half of gross liabilities. But those figures ignore explicit and implicit promises of future Federal spending that may also affect the supplies of and the demands for financial assets, thereby affecting interest rates. For example, unfunded social security liabilities have been estimated at more than $4 trillion, not to mention government-guaranteed loans and deposit insurance from Federal agencies. Perhaps the present value of these spending commitments should be included in the reported Federal debt. The problem of whether or not to include them points up the lack of an unambiguous measure of the Federal debt.

Figure 1

## THE FEDERAL DEFICIT AND INTEREST RATES




And since the Federal deficit is the change in the stock of Federal debt minus the change in the monetary base, the meaning of reported deficits is also open to question.

Even assuming that the deficit is estimated without ambiguity, other problems remain. For one, the deficit is often compared with personal saving taken from the National Income and Product Accounts (NIPA). That estimate, however, is created as a residual—personal income minus outlays. Therefore any error in income or spending is magnified when saving is estimated. For example, had personal income in 1981 been underestimated by 1 percent and consumption estimated precisely, there would have been an 18 percent underestimate of personal saving.

Moreover, some analysts contend that saving minus depreciation, or net saving, is a more relevant value. But NIPA depreciation is not a precise magnitude measuring actual transactions. Instead, a large number of assumptions are made in order to use gross investment data, which do represent actual transactions, to estimate the magnitudes of capital stocks (see Young and Musgrave [9, pp. 23-82]). Then depreciation patterns are also assumed and are applied to each constructed capital stock in order to estimate depreciation flows over specific time periods. Different assumptions can produce widely divergent estimates of capital stocks or depreciation flows. Yet there is little precise information concerning such factors as when and why firms discard capital assets, or how the productivity of various capital assets changes over time, and these are just some of the assumptions necessary to estimate capital stocks and depreciation patterns. Thus the resulting estimates of depreciation may well be substantially different from true depreciation, in turn making estimates of net saving subject to even greater measurement error than gross saving.

In short, there is no easy resolution of the many ambiguities involved in comparing the current Federal debt or deficit to historical values. That fact alone should caution readers against accepting strong claims unless proponents supply supporting data that can be meaningful despite the measurement problems detailed above. The analysis in the next section uses a simple theoretical model that abstracts from such complications.

## Traditional Theory

A traditional macroeconomic model is used in this section to illustrate why deficits could affect interest rates. Conventional models of this type invariably show that fiscal actions[1] have a larger impact on interest rates when the economy is operating near full capacity than when substantial unemployment exists. Thus in order to illustrate the maximum deficit-interest rate effect, a full employment version of an IS-LM model will be used in this section (see Patinkin [7, ch. 12]). This model abstracts from the business cycle by assuming that real output is fixed (at full capacity) while prices are allowed to vary.

Perhaps the easiest way to use the model is with a graph such as Figure 2a. The object of using such models is to attempt to determine the qualitative effects of shocks to the economy by observing changes in macroeconomic equilibrium in the graphical model. The downward sloping line in the graph, labeled the IS curve, illustrates the combinations of the price level and the interest rate for which the demand for commodities is equal to the full-employment quantity supplied. The upward sloping LM curve illustrates the price-interest rate combinations for which the demand for money is equal to the quantity supplied. At the point of intersection of the two curves, demand equals supply in both the commodity and money markets; such a point is called a macroeconomic equilibrium.

The model can be used to illustrate the effect of a higher deficit. To be more specific, assume that (1) Federal taxes are lowered, (2) Federal spending does not change, (3) the tax cut was not anticipated, (4) no further change in fiscal policy is anticipated, (5) the quantity of money does not change, and (6) the quantity of money is not anticipated to change in the future. (These assumptions isolate purely fiscal effects, avoiding monetary and expectational effects.)[2] The tax cut allows higher private spending; with government spending fixed, the result is a rightward shift in the IS curve in Figure 2a. Accordingly, the new equilibrium is characterized by a higher price level[3] and a higher interest rate.

## Interest Rates in an Open Economy

One reason for believing that the model given above may overstate the importance of fiscal actions is that the American economy is but one element (albeit an important element) in a much larger world economy with well-integrated financial markets. Consequently, it is useful to think of a single world interest rate which equates supply and demand for the total stock of private and public debt in the world economy. That world rate would be unaffected by fiscal actions in a small, open economy. To see this, imagine that after a tax cut the domestic rate in such a small economy were to rise above the world rate. Then domestic borrowers could borrow more cheaply in other markets, thereby lowering domestic credit demand. Similarly, foreign lenders could do better by lending in domestic markets, consequently increasing credit supply. These actions would tend to eliminate any divergence of foreign and domestic rates in the small economy. Due to its size, however, American fiscal actions can alter the nominal supplies and demands for debt enough to alter the world interest rate. Nonetheless a deficit of a given magnitude represents a smaller percentage increase in the stock of world debt than in the stock of American debt. Accordingly, it affects interest rates by a lesser amount than would be projected for only the domestic economy.

A well-known analysis of the impact of fiscal actions in an open economy with flexible exchange rates was given by Mundell [6]. An adaptation of his analysis in Figure 2, shows the initial impact of a fiscal expansion to be a rightward shift of the IS curve, resulting in a higher domestic interest rate and price

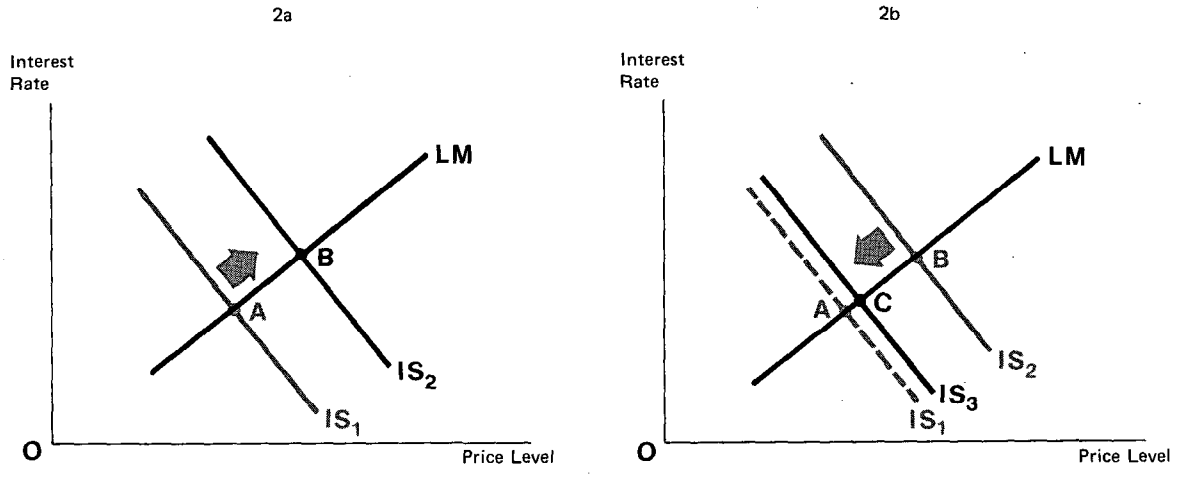
[1] This article abstracts from a persistent problem, namely the best single magnitude to describe a fiscal action. The deficit is mentioned throughout the article because of its prominence in current policy discussion. It can be a misleading indicator of fiscal policy, however (see Blinder and Solow [2, pp. 11-33]).

[2] By assuming no actual or anticipated money growth, the possibility of an anticipated, sustained inflation is also assumed away. That is, while a wide range of factors may cause one-time movements of the price level, as a practical matter a sustained increase in the money supply is the only source of price increases in the economy that is capable of a continual, rapid increase over a lengthy interval; accordingly, in the long run inflation is a monetary phenomenon. By omitting inflation, the model is simplified. But the omission of inflation also limits the model's current relevance.

[3] This analysis follows tradition by assuming that Federal taxes are lump-sum taxes. As a result, substitution effects of a tax change on the price level are not considered.

Figure 2

## QUALITATIVE EFFECTS OF A FEDERAL DEFICIT




*The rightward shift from $IS_1$ to $IS_2$ occurs due to a tax cut, as described in the text. As a result, the equilibrium values of the interest rate and price level also change as the economy moves from point A to point B. The leftward shift from $IS_2$ to $IS_3$ could occur if (1) government bonds are only partially perceived to be net wealth, or (2) the model represents a large, open economy.*

level. Assuming no immediate price change by foreign economies, a higher domestic price level would dampen exports while spurring imports. At the same time, foreigners would be more willing to purchase domestic bonds due to the interest rate differential. All in all, the move toward lower net exports would result in a leftward shift in the IS curve. The ultimate effect would be for the IS curve to shift back to its original position for a small economy. For a large economy, however, the leftward shift would not be complete to the extent that the increase in debt of the large economy raised the world's supply of debt and thus the interest rate.

### Deficits and Consumer Behavior

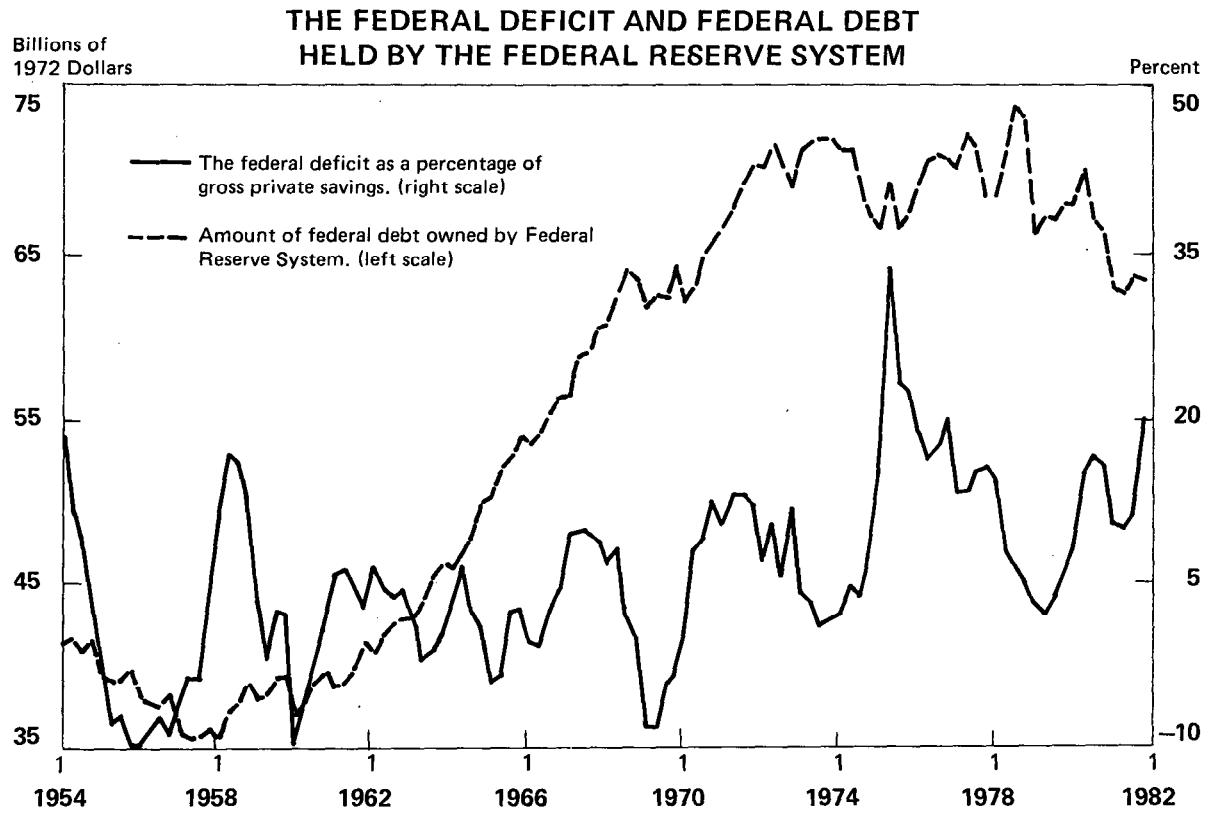
It is also possible for consumer behavior to offset some or all of the impact of a fiscal action (see, for example, Barro [1, pp. 1095-1118]). The basic idea is that consumption is based on consumers' permanent disposable income—which can be reduced either by current taxes or by future taxes. That is, when the government sells a bond, its buyer evidently believes that the present value of future interest payments and eventual principal repayment is at least as large as the current price of the bond. But if future debt service payment will be generated by future taxes, then (in a suitably simplified world) the present value of additional future tax obligations would be equal to the current price of a government bond. Therefore, financing a given level of government spending would lower aggregate permanent disposable income by the same amount, regardless of whether the spending were to be financed by current taxes or by current debt promising future taxes. And if aggregate disposable income did not change, neither would aggregate demand, the price level, nor the interest rate.

### Other Effects of Policy Anticipations

A key assumption of the preceding section was that current deficits would lead to higher taxes in the future. Another possibility is that a higher deficit today would generate growth in the money supply in the future (for example, see McCallum [4]). Although Figure 3 does not reveal a simple historical relation between the deficit and Federal Reserve holdings of government debt, concerns about future monetary actions should not be summarily dismissed. There are historical examples in which a government reached a fiscal impasse, caused by political pressure groups inducing the government to spend at a high level without collecting sufficient taxes to avoid a sustained monetary acceleration. That is not to say that any single large deficit indicates that such a fiscal impasse is imminent. Rather, attention should be focused on whether likely future deficits imply levels of Federal debt that are consistent with monetary stability.

How a current deficit might affect anticipations of future monetary and fiscal policy is thus a key issue.

Figure 3




If the Federal Reserve were to monetize Federal deficits, then the Fed's holdings of government debt would rise sharply when deficits increased. It is difficult, however, to see evidence of such behavior in this graph.

Most analyses based on the IS-LM framework, whether as simple as the model employed above or as complex as the major econometric models, evade the question of policy anticipations. But modeling the formation and evolution of policy anticipations has proved difficult, except for strongly restricted special cases. One small step is to include policy anticipations in the conventional model by letting current private bond demand be affected by the perceived risk of future inflationary policy. Thus a policy that would invalidate current anticipations (such as the unanticipated deficit introduced above) could (1) increase the perceived likelihood of a policy fostering higher inflation in the future, thereby (2) lowering current net private bond demand, and consequently (3) raising the current interest rate more than predicted by the simple model.

## Back-of-the-Envelope Estimation

In the appendix, the responsiveness of interest rates to a one-time change in the nominal value of government debt is shown (at least, within the simple IS-LM model that ignores policy anticipations) to depend upon the responsiveness of individuals' (both domestic and foreign) net demand for bonds with respect to the interest rate and the interest response of money demand. The specific expression is given by equation 6. An interesting exercise is to use that equation to calculate a rough estimate for the change in interest rates resulting from a change in the Federal debt. Under the assumption that net bond demand is somewhat responsive to interest rates while money demand is slightly responsive,[4] a 1 percent change in the stock of Federal debt would only result in a 1 percent change in the interest rate. In order to get an idea of the magnitudes involved,

[4] More precisely, let the interest elasticity of net bond demand be equal to 0.95, and the interest elasticity of money demand be equal to −0.05. The latter is consistent with many econometric estimates. The interest elasticity of net bond demand is not often estimated, however. Since U. S. government debt, corporate debt, and foreign debt are close substitutes, a substantial interest elasticity of net bond demand appears reasonable. The exact parameter value is uncertain, however, and others may not agree as to what is reasonable.

consider a $100 billion government deficit when the stock of Federal debt is $1 trillion, and the interest rate is 15 percent (the numbers approximate recent values). If the deficit were reduced to zero, the upper limit would imply only a 150 basis point decline in the interest rate. These calculations are only illustrative, however, in that they ignore any effect of changed anticipations of future policy and, in addition, abstract from measurement problems connected with the Federal debt.

## Conclusion

Interest rates serve the purpose of equating the supply of lending and the demand for borrowing. Federal borrowing demands, although important, are only a single element in the supply-demand framework. Thus it is easy to overstate the responsiveness of interest rates to the current Federal deficit by failing to consider demands for and supplies of credit by individuals, firms, and foreign governments. Even if the importance of the current deficit is often overstated, however, it could be important to consider the effects of current deficits on individuals' anticipations of future fiscal and monetary policies.

Accordingly, while simply reducing the current level of the deficit would probably not lower interest rates substantially, important policy considerations remain. For one, fiscal actions can affect incentives for private sector borrowing and lending; thus a policy designed to lower credit demand and increase supply could lower interest rates. Recently discussed examples include limiting the tax deductibility of interest paid, expanding opportunities to receive tax-free interest, and reducing Federal subsidies for borrowing.

It is appropriate at this point to consider anticipations of future policy actions. A major concern is that current and prospective fiscal actions will lead to a monetary acceleration in the future. And to the extent that individuals' anticipations of future monetary policy include some likelihood that high and variable rates of inflation will be fostered, the supply of long-term credit will be restricted. Reducing that likelihood in private anticipations could be accomplished by a monetary rule—that is, an economic strategy to achieve low inflation that is publicly announced (in full detail), well understood by the general public, credible, verifiable, and perceived as being difficult for policymakers to change or circumvent regardless of fiscal actions. Such a rule would break any link between current deficits and anticipations of future monetary growth and, thereby, could reduce any risk premium in current interest rates that reflects the probabliity of future inflation. Since monetary actions do not currently conform to the requirements for a monetary rule listed above, it should be emphasized that the design and implementation of such a rule would not be a trivial task. However, it is difficult to see any quicker way to restore a high degree of confidence in future monetary actions.

## References


1. Barro, Robert. "Are Government Bonds Net Wealth?" *Journal of Political Economy* (November/December 1974).

2. Blinder, Alan, and Robert Solow. "Analytical Foundations of Fiscal Policy," in *The Economics of Public Finance.* Washington: Brookings Institution, 1974.

3. Council of Economic Advisers. *Annual Report.* Washington: Government Printing Office, 1982.

4. McCallum, Bennett T. "Are Bond-Financed Deficits Inflationary?" Unpublished manuscript. May 1982.

5. "McGillicuddy: Deficits Do Matter." *American Banker,* March 11, 1982.

6. Mundell, Robert. "Capital Mobility and Stabilization Policy under Fixed and Flexible Exchange Rates." *Canadian Journal of Economics and Political Science* (November 1963).

7. Patinkin, Don. *Money, Interest, and Prices.* 2nd ed. New York: Harper and Row, 1965.

8. "Thrift Industry Urges Cut in U. S. Deficit." *The Wall Street Journal,* March 4, 1982.

9. Young, Alan, and John Musgrave. "Estimation of Capital Stock in the United States," in Dan Usher, ed., *The Measurement of Capital.* Chicago: University of Chicago Press, 1980.

## APPENDIX

The purpose of this appendix is to derive the elasticity of the interest rate with respect to government bond issue. There are three markets: commodity, money, and bonds. When supply equals demand in the money and bond markets, we know by Walras' Law that the commodity market clears. Market clearing in the money market is represented by

$$(1) \quad \frac{M}{P} = L(Y,R)$$

where M is the quantity of money (fixed by the monetary authority), P is the commodity price level, L is the demand for real money balances, Y is the level of real output, and R is the bond interest rate.

The real quantity of government bonds is represented as $\frac{B}{RP}$, where B is the number of government bonds (a bond is a credible promise to pay \$1 per year forever), R is the rate of interest (consequently $\frac{1}{R}$ is the nominal price of a bond), and thus $\frac{B}{R}$ is the nominal market value of government bonds.

Real net demand for bonds, Z, is defined as

$$(2) \quad Z(Y,R) \equiv H(Y,R) - J(Y,R)$$

where H is the private real demand for bands and J is the private real supply of bonds (the private sector will include foreign individuals if an integrated world bond market is assumed). Since $H_R$ $(= \frac{\partial H}{\partial R})$ is positive and $J_R$ is negative, $Z_R$ is unambiguously positive. Market clearing is represented as

$$(3) \quad \frac{B}{RP} = Z(Y,R).$$

To look at growth rates, take logs of (1) and (3) and differentiate, holding M and Y (at its full-employment level) constant. Small letters will represent growth rates (i.e., $m = \frac{dM}{M}$), and $\epsilon_{I,J}$ is the elasticity of I with respect to J.

From (1),

$$-p = \frac{1}{L} L_R \, dR$$

$$\text{or (note } \frac{1}{L} L_R \, dR = (\frac{R}{L} L_R) \frac{dR}{R})$$

$$(4) \quad p = -\epsilon_{L,R} r.$$

From (3),

$$b - r - p = \frac{1}{Z} Z_R \, dR \quad \text{or}$$

$$(5) \quad p = b - (1 + \epsilon_{Z,R}) \, r.$$

Combining (4) and (5) yields

$$-\epsilon_{L,R} \, r = b - (1 + \epsilon_{Z,R}) \, r$$

and therefore,

$$(6) \quad \epsilon_{R,B/R} \equiv \frac{r}{b-r} = \frac{1}{\epsilon_{Z,R} - \epsilon_{L,R}}.$$

Since this model does not include continuing inflation, there is no distinction between nominal and real interest rates.