Money, Credit Constraints, and Economic Activity

By ALAN S. BLINDER AND JOSEPH E. STIGLITZ*

When government expenditures exceed current tax revenues, the resulting deficit must be financed either by issuing bonds, which imply obligations to levy future taxes, or by creating high-powered money. The choice between money and bonds is often thought to be of great moment for both real and nominal variables; that is, monetary policy matters.

There is by now a wide empirical consensus that monetary policy has effects on real variables like output and employment, but there is far less agreement about why this is so. The purpose of this paper is to take issue with some currently fashionable views of why money has real effects, and to suggest a new theory, or rather resurrect an old one—the loanable funds theory—and give it new, improved micro foundations.

I. Some New Irrelevance Theorems

In classical monetary theory, prices are fully flexible and the future tax liabilities implied by government bonds are fully discounted. In such a world, government spending has identical effects whether it is financed by bonds (thus creating a "deficit") or by current taxation, and an open-market purchase of bonds is equivalent to a money rain. Consequently, a swap of future for current taxes has neither real nor nominal effects, and a swap of money for bonds affects only the price level.

But these irrelevance theorems rest on micro foundations that are not well specified. For example, classical monetary theory presumably applies to a frictionless world of certainty and lump sum taxes, and mostly ignores the dynamic effects on real rates of return that arise when monetary policy changes the expected path of the price level.

If an explicitly dynamic, general equilibrium model in which people form (rational) expectations about the uncertain future is constructed, a number of irrelevance theorems about government financial policy can be established, provided that financial changes do not redistribute the tax burden (see Stiglitz, 1981). For example, let the government reduce current taxes, issue bonds, and sometime later raise taxes to retire the bonds. Not only will such a policy leave real consumption and investment by all individuals in all states of nature unchanged, but neither will it change any prices. The reason is Say's Law of Government Deficits: the increase in the supply of government debt gives rise to an identical increase in the demand.

Other irrelevance propositions can be established. For example, if the government changes the maturity structure of its debt, or exchanges indexed for nonindexed bonds, such changes will be irrelevant because of exactly offsetting changes in the demands for different government securities. Similarly, a change in the rate of inflation that is matched by a change in the nominal interest paid on government debt does not disturb equilibrium in any market.

Some of these irrelevance results are familiar. Others contrast sharply with the implications of traditional portfolio theory. For example, a standard argument holds that a change in the maturity structure of the government debt will require a change in the term structure of interest rates to equilibrate the demands and supplies of different types of bonds. But this argument ignores the tacit, and exactly offsetting, changes in liabilities implied by the structure of taxes across time and states of nature. Perhaps individuals also ignore the implied tax changes. But to use this as a major theoretical underpinning of the effectiveness of monetary policy is to ground the theory in irrationality, an

*Princeton University. We gratefully acknowledge financial support from the National Science Foundation and helpful discussions with Benjamin Friedman, Bruce Greenwald, Laurence Kotlikoff, and Andrew Weiss. A longer version of this paper appears as an NBER working paper.

TABLE 1 — *F* TESTS OF IRRELEVANCE PROPOSITIONS[a]

	Equation explaining:		
	Nominal *GNP* Growth	Inflation Rate	Real *GNP* Growth
Hypothesis: All $b_i = 0$	6.9[b]/9.2[b]	3.5[c]/2.8	2.6/4.0[c]
Hypothesis: All $c_i = 0$	10.5[b]/14.6[b]	3.5[c]/4.2[c]	2.6/2.4

[a]Results from regressions with 3 lags are reported before the slash; results from regressions with 2 lags are reported after the slash.
[b]denotes significant at 1 percent level.
[c]denotes significant at 5 percent level.

anathema to economists of the Modern School.

II. The Irrelevance of Irrelevance Theorems

If these irrelevance theorems are correct, then neither swaps between current and future taxes (nonmonetized budget deficits) nor open-market operations (creation of high-powered money) should matter.

To put these notions to a crude test, standard "causality" tests were run by regressing three critical U.S. time-series on their own lagged values, lagged values of changes in bank reserves, and lagged values of changes in government debt. Specifically, the regressions took the form:

$$\Delta X/X = a(L)(\Delta X/X) + b(L)(\Delta R/R) + c(L)(\Delta D/D) + e,$$

where Δ is the first-difference operator; $a(L)$, $b(L)$, and $c(L)$ are polynomials in the lag operator; R is bank reserves; D is the government debt; and X is alternatively nominal *GNP* (Y), real *GNP* (y), or the *GNP* deflator (P).[1] Regressions were run with the maximum lag set alternatively at two or three years.

If open-market operations were irrelevant, then changes in reserves should not "cause" any of the left-hand variables, once we control for changes in debt; that is, all the b's should be zero. In the case of nominal *GNP*, this hypothesis is easily rejected with F values of 6.9 and 9.2 (see Table 1). But for real *GNP* and prices, the evidence is mixed. In each case, one regression rejects the irrelevance proposition while the other does not.

If pure swaps between current and future taxes were irrelevant, then changes in debt should not "cause" any of the left-hand variables, once we control for changes in reserves, that is, all the c's should be zero. The regressions for nominal *GNP* overwhelmingly reject this hypothesis (with F values of 10.5 and 14.6). And the regressions for inflation also reject it, though less decisively. However, we cannot reject the hypothesis that nonmonetized deficits are irrelevant for real *GNP* growth.

On balance, the evidence calls the strong forms of the irrelevance theorems into question and suggests a need to examine the assumptions that underlie them. Full rationality has already been mentioned. Equally obvious is the assumption that all taxes are lump sum; no one ever claimed that swaps among distorting taxes would be neutral.

The theorems also assume that taxes are distributionally neutral. It is well known that changes in the distribution of income and wealth across individuals can have real effects. Analogously, redistributing the tax burden across generations can have real effects if individuals have no heirs or fail to incorporate fully their heirs' welfare into their own utility functions. While these effects are probably present, one wonders about their empirical importance. Is redistribution across generations really the driving force behind monetary policy?

[1]Time was measured in fiscal years, and the sample period covered 1952–81. The term R is adjusted bank reserves, as calculated by the Federal Reserve Bank of St. Louis, and ΔD is the increase in government indebtedness to the public during the fiscal year. For more detailed results, see Blinder (1982).

The irrelevance theorems also ignore the difference between interest-bearing government debt and non-interest-bearing money, which is held for transactions purposes. Traditional monetary theory has focused on this difference. Surely paper money and checking balances have advantages in transactions over other potential media of exchange. But are these advantages sufficiently large to explain the effectiveness of monetary policy by arguing, for example, that a contrived scarcity of the medium of exchange will constrain economic activity? In Italy, when there was a shortage of small change, candy became a medium of exchange. And now, with computerized banking, it should be relatively easy for velocity to change quickly to compensate for any shortage of money. Recent innovations like CMA's suggest that the transactions costs of providing a medium of exchange paying a market rate of interest cannot be very large. We believe that only regulation and lack of full rationality prevented checking accounts from paying slightly less than market interest rates for so long.

Another assumption pertains to the informational content of monetary or debt policy: the irrelevance theorems assume that policy actions do not change peoples' beliefs about the different states of nature. But if the government has superior information (which it does not make public), and uses this information in formulating policy, then policy might have real effects because of the information it conveys to the private sector. In addition, if monetary policy has a random element, individuals will have trouble distinguishing between price movements that are the consequence of real shocks and those that are the consequence of monetary shocks. This, too, can give money the power to influence real variables.

But can these informational issues be empirically important? We are skeptical. In addition to the weekly money supply number, a firm can look at its inventories, sales data, the national unemployment rate, and many other facts and figures that help it distinguish between real and nominal shocks. Besides, at low and moderate rates of inflation, people always know the current price level within a very small margin of error, and therefore can easily convert any absolute price into a relative one with great accuracy. It therefore seems implausible that the issues emphasized by the new classical macroeconomics can rationalize sizable effects of monetary policy on output.

A final, and very critical, assumption that underlies the irrelevance theorems is that capital markets are perfect. But people cannot borrow freely at the government's interest rate, and for a very good reason: they might default. The probability of default, and the informational imperfections that it implies, lie at the heart of our alternative theory of how monetary policy works.

III. Imperfect Information and Credit Rationing

Imperfect information about the probability of default has several fundamental implications for the nature of capital markets. First, it gives rise to institutions—like banks—that specialize in acquiring information about default risk. Such information is valuable. A lender with superior information can more easily distinguish between good and bad risks, thereby raising his own net (of default losses) rate of return. But such information is very specific (knowing that Company *A* is a good risk may tell us little about Company *B*) and, for a variety of reasons, is also difficult to sell.

Second, banks will devise nonprice mechanisms for screening out untrustworthy borrowers. As Stiglitz and Andrew Weiss have argued, reacting to excess demand for loans by raising the rate of interest may lower the bank's expected return because of adverse effects on the mix of applicants, and by inducing borrowers to undertake riskier projects. Thus credit rationing arises as an equilibrium phenomenon, an observation that plays a crucial role in the theory we develop here.

Third, banks will try to devise contracts that provide strong incentives not to default. This may lead to contingency contracts in which both the rate charged and the availability of credit at a later date depend on the borrower's previous performance. In conjunction with the specialized knowledge

mentioned above, this type of contract ties particular borrowers to particular lenders, that is, creates a "customer market" of the sort described by Arthur Okun. Thus, although the credit market is "competitive" in the usual sense (free entry, many buyers and sellers), lenders will view different borrowers as highly imperfect substitutes, and borrowers will have the same attitudes about different lenders—at least in the short run. There may, in particular, be classes of borrowers (like small businesses) for whom denial of credit by "their" bank has the effect of making credit inaccessible.

IV. The Effectiveness of Monetary Policy

We are now prepared to see how monetary policy affects real activity in this model. Consider what happens if the central bank sells bonds in the open market, causing a drain of reserves from the banking system.

If banks were essentially "loaned up" before, they will have to contract their loan supply. Some borrowers will not have their loans renewed. As we have just argued, many of these borrowers will be unable to secure credit from other banks. Investment activities will be curtailed and, if the loans were providing working capital, even current operations may have to be reduced. Thus tight money can depress real economic activity. Note also that, because of credit rationing, all this may happen with little increase in interest rates. So the effectiveness of monetary policy in this model does not rely on large interest elasticities, which often cannot be found empirically.

Two important questions remain. First, what stops prices from falling so fast that neither the real supply of credit nor real output has to decline, thereby robbing monetary policy of its real effects? Second, why do borrowers that are denied credit by the banks not turn elsewhere, for example, to the auction market?

The first question is as old as monetary theory itself, and bedevils any attempt to provide a deep explanation of the real effects of monetary policy. Part of the answer is simple and quite general: expected price changes affect the expected returns on holding financial assets (such as money), and therefore have real effects.[2] But we have just expressed doubts about the empirical importance of interest elasticities of this sort.

The rest of the answer has to do with the fact—the unexplained fact—that many long-term contracts without complete indexation exist. We do not have a good explanation for this phenomenon. Neither does anyone else.[3] But that does not imply that the consequences of nominal rigidities should be ignored. This paper seeks to explain how monetary policy works in the presence of such rigidities.

The second question is more specific to our approach. Recall that we rejected the transactions mechanism as an explanation for the real effects of money on the grounds that there were too many close substitutes. Analogously, our theory would not hold up if close substitutes for bank credit were readily available. Are there close substitutes?

If information were perfect (or cheaply acquired), then a reduction in bank credit would be offset by an increase in nonbank credit. Central bank policy would change the locus of borrowing, but would change neither the total volume of credit nor who gets it. However, we have argued that costly and specialized information is the essence of the credit market, so that good substitutes for bank credit do not exist, at least in the short run.

What about the market for commercial paper, for example? For some large firms (like General Motors) this is a real option, and they use it. For these firms, curtailments of bank credit may be offset by expansions of open market credit. But the fact of the matter is that for many firms, including all the small ones, commercial paper is simply not an option; if the banks are forced to

[2]Real effects can be avoided only by an exactly offsetting change in the nominal interest rate on financial assets. Naturally, this cannot occur in the case of currency.

[3]The analogy between the short-run rigidities imposed by multiperiod nominal wage contracts and those imposed by multiperiod nominal loan contracts should be apparent. For one attempt to explain why wages and interest rates may not be fully indexed, see Blinder (1977).

contract, they end up credit constrained. Thus, like Stiglitz and Andrew Weiss, we view the credit market as divided into clienteles. Very-low-risk borrowers can use the open market, and are rationed only by price. Very-high-risk borrowers cannot get credit at any price. Those in between may encounter quantity constraints, and this rationing becomes more severe when the central bank drains reserves from the banking system.

Notice that the segmentation of credit markets should become particularly severe during recessions, when even large, well-known firms face the possibility of default. Since investors assume that banks have superior knowledge about their customers, a firm that comes to the open market because it was rationed by its bank will be viewed as a bad risk, and therefore either charged a higher interest rate or denied access to the market.

Not much has been said so far about money; the emphasis has been on credit. To relate the two, consider a typical bank with equal liabilities (deposits, D, and net worth) equal to assets (reserves, R, loans, L, and government bonds, B). Under a system of fraction reserve banking in which lending institutions also provide the medium of exchange (deposits), L and D will be closely related. Take our previous example in which the central bank makes an open market sale of government bonds: B rises and R falls by an equal amount. Banks then find themselves short on reserves and, as mentioned above, must contract L. But if R and D are held in fixed proportion, then the decline in deposits—and therefore in the money supply—must match the decline in loans.

Thus, while we have two competing theories—one based on credit, the other on money—that are conceptually distinct, the data will have difficulty distinguishing between them because credit and money normally are highly collinear. Given an institutional structure in which the same institutions supply loans and the medium of exchange, devising tests to distinguish between the "credit" theory and the "money" theory is no easy matter. And we do not pretend to have done this. However, we can make some suggestive remarks.

First, Benjamin Friedman has documented the facts that (a) a broad measure of credit (far broader than bank credit) does just as well as money in forecasting future movements in nominal *GNP*, and (b) credit is just about as closely related to the Fed's instruments as is any of the monetary aggregates.

Second, Ben Bernanke's study of detailed data from the Great Depression suggests that the decline in money was too small to account for the sharp drop in output, but that a proxy for credit stringency does rather well.

Third, the particular factors that have led to the breakdown of the demand function for money in recent years—deregulation and financial innovation—ought not to have destroyed the demand function for credit, according to the arguments presented here. In a period of rapid financial innovation, the ability of the central bank to curtail economic activity by causing a scarcity of the medium of exchange should be severely limited. Yet the Fed seems to have caused a severe disruption of economic activity, and has even done so without reducing the growth rate of money very much. We suggest that restrictions on the availability of credit, via the mechanisms discussed here, may provide a better explanation of how the Fed killed the economy.[4]

Finally, we should observe that, just as financial innovation has impaired the link between money and economic activity, further innovation might impair the link between bank credit and the economy. According to our arguments, it is the unique position of banks in the credit system that gives the central bank such strong leverage over the real economy. But if banks prove to be an unreliable source of funds, alternative institutions may arise that serve the same functions as banks. If such institutions do develop, the effectiveness of monetary policy might be seriously reduced.

[4]During the four years from 1978 through 1981, the December-to-December growth rate of what we currently call $M1$ fell gradually from 8.3 to 6.4 percent, which hardly suggests a savage monetary squeeze. However, the growth rate of commercial bank loans fell from 18.1 to 6.4 percent.

REFERENCES

Bernanke, Ben, "Nonmonetary Effects of the Financial Collapse in the Propagation of the Great Depression," *American Economic Review*, June 1983, *73*.

Blinder, Alan S., "On The Monetization of Deficits," Working Paper No. 1052, National Bureau of Economic Research, December 1982.

_____, "Indexing the Economy Through Financial Intermediation," in Karl Brunner and Alan H. Meltzer, eds., *Stabilization of The Domestic and International Economy*, Vol. 5, Carnegie-Rochester Conferences on Public Policy, *Journal of Monetary Economics*, Suppl. 1977.

Friedman, Benjamin M., "The Roles of Money and Credit in Macroeconomic Analysis," Working Paper No. 831, National Bureau of Economic Research, December 1981.

Okun, Arthur M., *Prices and Quantities: A Macroeconomic Analysis*, Washington: The Brookings Institution, 1981.

Stiglitz, Joseph E., "On the Relevance or Irrelevance of Public Financial Policy: Indexation, Price Rigidities and Optimal Monetary Policy," paper presented to a conference at Rio de Janeiro, December 1981.

_____ **and Andrew Weiss,** "Credit Rationing in Markets with Imperfect Information," *American Economic Review*, June 1981, *71*, 393–410.