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Note on Money and Monetary Policy

Fiscal and monetary policy represent two fundamental tools of macroeconomics. In the 1930s, John Maynard Keynes focused attention on the power of countercyclical fiscal policy, an emphasis that dominated policy circles in the United States and elsewhere at least into the 1960s. Since then, however, policymakers in many countries have relied more heavily on monetary policy to manage the business cycle.

Changes in intellectual fashion and political calculation have driven this shift. Policymakers have learned that the legislative process is often too slow to allow for fiscal fine tuning, since the budget cannot always be adjusted fast enough in the face of rapidly changing economic circumstances. They have also discovered that fiscal policy suffers a systematic bias in favor of stimulus because national legislatures generally find it politically easier to run deficits than surpluses. Monetary policy, by contrast, may be less prone to such problems. Central banks can change policy relatively quickly in response to new conditions. Moreover, central banks are often insulated from domestic political pressures and so better able to impose economic restraint.

The Money Identity

In theory, monetary policy rests on a simple identity: economic output, measured in current dollars, equals the amount of money in circulation multiplied by how often that money changes hands. Economists will recognize this as

$$M \times V = P \times Q$$

in which M equals the money supply, V the velocity or turnover of money, P the price level, and Q the quantity of output. Each side of the identity equals nominal GDP; and Q, by itself, represents real GDP.

Like most identities, this one clarifies important relationships but also conceals difficult questions that require answers if it is to be used effectively: What is money? What determines its volume? How can we best measure it? And on what basis should we formulate monetary policy?

This note was prepared by Newcomen Fellow Wyatt Wells and Professor David A. Moss as the basis for class discussion rather than to illustrate either effective or ineffective handling of an administrative situation.

Money Creation

Money is any medium of exchange used in transactions. At different times it has consisted of sea shells, wampum, bullion, and gold or silver coins. But today most economists define money as the sum of currency and bank liabilities, such as checking and savings deposits. Under one conventional definition used in the United States, known as M1, the money supply equals currency in circulation plus demand deposits (i.e., checking accounts). Only the central bank has the power to create currency, the bills that we carry around in our pockets. Banks, however, can create demand deposits.

Suppose that an individual deposits $100 of currency into a checking account at his or her local bank. Although the bank is obligated to pay the depositor (or a designated third party) $100 on demand, the bank will probably turn around and lend out most of the $100—perhaps $80—to someone else. In this way, new money is created. The original depositor has a demand deposit worth $100 and the new borrower has currency worth $80. To put it another way, the bank has increased the supply of money to $180 on a monetary base of $100.

Money creation is an iterative process. The typical borrower will either turn around and deposit his or her loan in a bank or pay the money to someone else who in turn deposits it in a bank. Either way, a new demand deposit is created and the process begins again. If we assume that all money is redeposited and that banks lend 80 percent of what they take in as demand deposits, then the money supply will ultimately grow to $500 on a base of $100. The first bank takes in a deposit of $100 and loans out $80, which is then deposited in a second bank. The second bank then creates a demand deposit of $80 and loans out 80 percent of that, or $64, which is again redeposited. Of course this process has infinite iterations, but the first ten ($100 + $80 + $64 + $51.20 + $40.96 + $32.77 + $26.21 + $20.97 + $16.78 + $13.42) add up to almost $450.

We may calculate the money supply by multiplying the monetary base by the inverse of the leakage—that is, the proportion of money that is *not* recycled in the banking system. In the example above, the leakage is 20 percent, so the final money supply equals

$$\$100 \times 1/(0.20) = \$100 \times 5 = \$500.$$

The inverse of the leakage—in this case 5—is called the money multiplier.[1]

The size of the monetary base and the level of leakage, which determines the money multiplier, constitute the key variables in setting the money supply. The central bank can control the former and strongly influences the latter. Banks must, by American law, retain a certain proportion of their deposits on reserve, not loaning this money but keeping it either in cash or on deposit with the central bank. In the U.S. as in most other countries, the central bank sets the reserve requirement, placing an upper limit on the ability of banks to create credit. Although banks almost always hold more reserves than legally required, the sum of this excess is generally quite small.

In the example above, the monetary base equaled the total amount of currency in the system ($100). More formally, however, the monetary base equals the financial liabilities of the central bank. Currency generally represents the largest liability on its balance sheet, but the deposits of private banks, which tend to hold their reserves at the central bank, also constitute a major liability. The following is a simplified version of a central bank's balance sheet:

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[1] The money multiplier is not the same as the income multiplier, which is important to fiscal policy.

ASSETS	LIABILITIES
$10 gold	$80 currency (outside the central bank)
$10 foreign exchange	$20 private bank deposits
$80 government bonds	

In this example, the monetary base (i.e., the liabilities of the central bank) equals $80 plus $20, or $100.

Central Bank Tools

Most central banks have three tools to affect the money supply. First, the central bank generally determines reserve requirements. By decreasing the reserve requirement it increases the money multiplier and thus expands the money supply. Conversely, by increasing the reserve requirement it decreases the money multiplier and thus contracts the money supply. Because changes in reserve requirements can produce dramatic shifts in the availability of credit, however, the Fed rarely uses this power.

A second tool is the so-called discount rate. Private banks may borrow funds directly from the central bank at the "discount window." Such loans add directly to the existing monetary base by increasing private bank reserves, laying the foundation for an expansion of the money supply. The term "discount window" originated with the practice of private banks selling short-term notes to the central bank at a discount. The central bank determines the size of the discount— that is, the discount rate. By lowering this rate, the central bank makes borrowing more attractive to private banks, and by raising it, it discourages such borrowing.

The third, and in many cases most important, tool of the central bank is open market operations, which involve the buying and selling of government securities. When the central bank purchases government obligations from private parties, it injects liquidity into the economy and increases the monetary base. When the central bank sells securities, it pulls liquidity out of the economy and thus reduces the monetary base. Open market operations represent the primary policy instrument of the U.S. Federal Reserve System.

Velocity of Money

Although we have thus far described money as the sum of currency in circulation and demand deposits, which is commonly known as M1, other definitions exist as well. In the United States, for example, M2 consists of M1 plus time deposits under $100,000. The point is that not all money is equal, at least from the perspective of monetary policy. Whereas people tend to spend currency and funds in their checking accounts fairly rapidly, funds in savings accounts or certificates of deposit often remain undisturbed for some time. As economists put it, the velocity or turnover (V) of these different types of money varies. Thus, the impact upon the economy of creating $1 billion in checking accounts and $1 billion in savings accounts is quite different. Central banks, however, cannot control exactly where money goes in the financial system. Further complicating the picture, financial innovations can render traditional measures like M1 and M2 less relevant. For instance, money market accounts and credit cards finance many of the transactions within the economy, but they do not figure into conventional definitions of money.

The question of the velocity, or turnover, of money constitutes one of the most important divisions among economists on monetary policy. Many economists believe that the propensity of

consumers to hold money is inherently unstable. For instance, when the future is uncertain people are likely to store money in savings, whereas bright prospects encourage consumers to dip into their savings to buy things. Proponents of the monetarist school of economics, however, contend that velocity is stable or at least predictable. This belief allows them to assert that the central bank can control the size of the economy in current dollars (i.e., nominal GDP) by manipulating the supply of money according to some formula.

Monetary Policy and the Real Economy

Although monetary policy has substantial influence over the size of the economy in current dollars, its control over how that figure breaks down into prices (P) and real output (Q) is quite limited. These factors generally depend on conditions in the real economy which central bankers must take into account when setting policy—the flexibility of prices, the confidence of consumers and business, the labor market, and so on. These matters have immense practical implications. During a recession, for instance, an expansive monetary policy might well spark a sharp jump in output (Q) without having much effect on prices (P), whereas in a boom the exact same policy might well push inflation sharply higher without having much impact on real production.

The money supply, of course, has considerable impact on interest rates. Interest rates are, in a sense, the price of money, and an increase in the supply of money tends to reduce interest rates. Likewise, a reduction in the money supply tends to force rates higher. Many economists conceive of interest rates as the primary mechanism through which changes in the money supply affect the real economy.

As a practical matter, central bank policy concentrates at least as much on interest rates as on the money supply itself. The total stock of money is nearly impossible to determine quickly whereas interest rates are widely advertised within the financial sector. Central banks often use open market operations to stabilize short-term interest rates around a desired point, buying government bonds if rates go too high and selling them if they drop too low. The central bank selects targets for interest rates because it believes they will yield desirable outcomes in the realms of monetary growth, economic output, and prices. This is usually true even when the central bank has explicit targets for monetary aggregates like M1. It manipulates interest rates on a day-to-day basis to achieve its medium-term monetary objectives.

Not surprisingly, most officials intimately involved with monetary policy consider it as much an art as a science.