



Modern Money Mechanics

A Workbook on Bank Reserves and Deposit Expansion

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The purpose of this booklet is to describe the basic process of money creation in a "fractional reserve" banking system. The approach taken illustrates the changes in bank balance sheets that occur when deposits in banks change as a result of monetary action by the Federal Reserve System — the central bank of the United States. The relationships shown are based on simplifying assumptions. For the sake of simplicity, the relationships are shown as if they were mechanical, but they are not, as is described later in the booklet. Thus, they should not be interpreted to imply a close and predictable relationship between a specific central bank transaction and the quantity of money.

The introductory pages contain a brief general description of the characteristics of money and how the U.S. money system works. The illustrations in the following two sections describe two processes: first, how bank deposits expand or contract in response to changes in the amount of reserves supplied by the central bank; and second, how those reserves are affected by both Federal Reserve actions and other factors. A final section deals with some of the elements that modify, at least in the short run, the simple mechanical relationship between bank reserves and deposit money.

Money is such a routine part of everyday living that its existence and acceptance ordinarily are taken for granted. A user may sense that money must come into being either automatically as a result of economic activity or as an outgrowth of some government operation. But just *how* this happens all too often remains a mystery.

What Is Money?

If money is viewed simply as a tool used to facilitate transactions, only those media that are readily accepted in exchange for goods, services, and other assets need to be considered. Many things — from stones to baseball cards — have served this monetary function through the ages. Today, in the United States, money used in transactions is mainly of three kinds — currency (paper money and coins in the pockets and purses of the public); demand deposits (non-interest-bearing checking accounts in banks); and other checkable deposits, such as negotiable order of withdrawal (NOW) accounts, at all depository institutions, including commercial and savings banks, savings and loan associations, and credit unions. Travelers checks also are included in the definition of transactions money. Since \$1 in currency and \$1 in checkable deposits are freely convertible into each other and both can be used directly for expenditures, they are money in equal degree. However, only the cash and balances held by the nonbank public are counted in the money supply. Deposits of the U.S. Treasury, depository institutions, foreign banks and official institutions, as well as vault cash in depository institutions are excluded.

This transactions concept of money is the one designated as M1 in the Federal Reserve's money stock statistics. Broader concepts of money (M2 and M3) include M1 as well as certain other financial assets (such as savings and time deposits at depository institutions and shares in money market mutual funds) which are relatively liquid but believed to represent principally investments to their holders rather than media of exchange. While funds can be shifted fairly easily between transaction balances and these other liquid assets, the money-creation process takes place principally through transaction accounts. In the remainder of this booklet, "money" means M1.

The distribution between the currency and deposit components of money depends largely on the preferences of the public. When a depositor cashes a check or makes a cash withdrawal through an automatic teller machine, he or she reduces the amount of deposits and increases the amount of currency held by the public. Conversely, when people have more currency than is needed, some is returned to banks in exchange for deposits.

While currency is used for a great variety of small transactions, most of the dollar amount of money payments in our economy are made by check or by electronic

transfer between deposit accounts. Moreover, currency is a relatively small part of the money stock. About 69 percent, or \$623 billion, of the \$898 billion total money stock in December 1991, was in the form of transaction deposits, of which \$290 billion were demand and \$333 billion were other checkable deposits.

What Makes Money Valuable?

In the United States neither paper currency nor deposits have value as commodities. Intrinsically, a dollar bill is just a piece of paper, deposits merely book entries. Coins do have some intrinsic value as metal, but generally far less than their face value.

What, then, makes these instruments — checks, paper money, and coins — acceptable at face value in payment of all debts and for other monetary uses? Mainly, it is the confidence people have that they will be able to exchange such money for other financial assets and for real goods and services whenever they choose to do so.

Money, like anything else, derives its value from its *scarcity* in relation to its usefulness. Commodities or services are more or less valuable because there are more or less of them relative to the amounts people want. Money's usefulness is its unique ability to command other goods and services and to permit a holder to be constantly ready to do so. How much money is demanded depends on several factors, such as the total volume of transactions in the economy at any given time, the payments habits of the society, the amount of money that individuals and businesses want to keep on hand to take care of unexpected transactions, and the foregone earnings of holding financial assets in the form of money rather than some other asset.

Control of the *quantity* of money is essential if its value is to be kept stable. Money's real value can be measured only in terms of what it will buy. Therefore, its value varies inversely with the general level of prices. Assuming a constant rate of use, if the volume of money grows more rapidly than the rate at which the output of real goods and services increases, prices will rise. This will happen because there will be more money than there will be goods and services to spend it on at prevailing prices. But if, on the other hand, growth in the supply of money does not keep pace with the economy's current production, then prices will fall, the nation's labor force, factories, and other production facilities will not be fully employed, or both.

Just how large the stock of money needs to be in order to handle the transactions of the economy without exerting undue influence on the price level depends on how intensively money is being used. Every transaction deposit balance and every dollar bill is a part of somebody's spendable funds at any given time, ready to move to other owners as transactions take place. Some holders spend money quickly after they get it, making these funds available for other uses. Others, however, hold money for longer periods. Obviously, when some money remains idle, a larger total is needed to accomplish any given volume of transactions.

Who Creates Money?

Changes in the quantity of money may originate with actions of the Federal Reserve System (the central bank), depository institutions (principally commercial banks), or the public. The major control, however, rests with the central bank.

The actual process of money creation takes place primarily in banks.¹ As noted earlier, checkable liabilities of banks are money. These liabilities are customers' accounts. They increase when customers deposit currency and checks and when the proceeds of loans made by the banks are credited to borrowers' accounts.

In the absence of legal reserve requirements, banks can build up deposits by increasing loans and investments so long as they keep enough currency on hand to redeem whatever amounts the holders of deposits want to convert into currency. This unique attribute of the banking business was discovered many centuries ago.

It started with goldsmiths. As early bankers, they initially provided safekeeping services, making a profit from vault storage fees for gold and coins deposited with them. People would redeem their "deposit receipts" whenever they needed gold or coins to purchase something, and physically take the gold or coins to the seller who, in turn, would deposit them for safekeeping, often with the same banker. Everyone soon found that it was a lot easier simply to use the deposit receipts directly as a means of payment. These receipts, which became known as notes, were acceptable as money since whoever held them could go to the banker and exchange them for metallic money.

Then, bankers discovered that they could make loans merely by giving their promises to pay, or bank notes, to borrowers. In this way, banks began to create money. More notes could be issued than the gold and coin on hand because only a portion of the notes outstanding would be presented for payment at any one time. Enough metallic money had to be kept on hand, of course, to redeem whatever volume of notes was presented for payment.

Transaction deposits are the modern counterpart of bank notes. It was a small step from printing notes to making book entries crediting deposits of borrowers, which the borrowers in turn could "spend" by writing checks, thereby "printing" their own money.

¹ In order to describe the money-creation process as simply as possible, the term "bank" used in this booklet should be understood to encompass all depository institutions. Since the Depository Institutions Deregulation and Monetary Control Act of 1980, all depository institutions have been permitted to offer interest-bearing transaction accounts to certain customers. Transaction accounts (interest-bearing as well as demand deposits on which payment of interest is still legally prohibited) at all depository institutions are subject to the reserve requirements set by the Federal Reserve. Thus all such institutions, not just commercial banks, have the potential for creating money.

What Limits the Amount of Money Banks Can Create?

If deposit money can be created so easily, what is to prevent banks from making too much — more than sufficient to keep the nation's productive resources fully employed without price inflation? Like its predecessor, the modern bank must keep available, to make payment on demand, a considerable amount of currency and funds on deposit with the central bank. The bank must be prepared to convert deposit money into currency for those depositors who request currency. It must make remittance on checks written by depositors and presented for payment by other banks (settle adverse clearings). Finally, it must maintain legally required reserves, in the form of vault cash and/or balances at its Federal Reserve Bank, equal to a prescribed percentage of its deposits.

The public's demand for currency varies greatly, but generally follows a seasonal pattern that is quite predictable. The effects on bank funds of these variations in the amount of currency held by the public usually are offset by the central bank, which replaces the reserves absorbed by currency withdrawals from banks. (Just how this is done will be explained later.) For all banks taken together, there is no net drain of funds through clearings. A check drawn on one bank normally will be deposited to the credit of another account, if not in the same bank, then in some other bank.

These operating needs influence the minimum amount of reserves an individual bank will hold voluntarily. However, as long as this minimum amount is less than what is legally required, operating needs are of relatively minor importance as a restraint on aggregate deposit expansion in the banking system. Such expansion cannot continue beyond the point where the amount of reserves that all banks have is just sufficient to satisfy legal requirements under our "fractional reserve" system. For example, if reserves of 20 percent were required, deposits could expand only until they were five times as large as reserves. Reserves of \$10 million could support deposits of \$50 million. The lower the percentage requirement, the greater the deposit expansion that can be supported by each additional reserve dollar. Thus, the legal reserve ratio together with the dollar amount of bank reserves are the factors that set the upper limit to money creation.

What Are Bank Reserves?

Currency held in bank vaults may be counted as legal reserves as well as deposits (reserve balances) at the Federal Reserve Banks. Both are equally acceptable in satisfaction of reserve requirements. A bank can always obtain reserve balances by sending currency to its Reserve Bank and can obtain currency by drawing on its reserve balance. Because either can be used to support a much larger volume of deposit liabilities of banks, currency in circulation and reserve balances together are often referred to as "high-powered money" or the "monetary base." Reserve balances and vault cash in banks, however, are not counted as part of the money stock held by the public.

For individual banks, reserve accounts also serve as working balances.² Banks may increase the balances in their reserve accounts by depositing checks and proceeds from electronic funds transfers as well as currency. Or they may draw down these balances by writing checks on them or by authorizing a debit to them in payment for currency, customers' checks, or other funds transfers.

Although reserve accounts are used as working balances, each bank must maintain, on the average for the relevant reserve maintenance period, reserve balances at the Reserve Bank and vault cash which together are equal to its required reserves, as determined by the amount of its deposits in the reserve computation period.

Where Do Bank Reserves Come From?

Increases or decreases in bank reserves can result from a number of factors discussed later in this booklet. From the standpoint of money creation, however, the essential point is that the reserves of banks are, for the most part, liabilities of the Federal Reserve Banks, and net changes in them are largely determined by actions of the Federal Reserve System. Thus, the Federal Reserve, through its ability to vary both the total volume of reserves and the required ratio of reserves to deposit liabilities, influences banks' decisions with respect to their assets and deposits. One of the major responsibilities of the Federal Reserve System is to provide the total amount of reserves consistent with the monetary needs of the economy at reasonably stable prices. Such actions take into consideration, of course, any changes in the pace at which money is being used and changes in the public's demands for cash balances.

The reader should be mindful that deposits and reserves tend to expand simultaneously and that the Federal Reserve's control often is exerted through the marketplace as individual banks find it either cheaper or more expensive to obtain their required reserves, depending on the willingness of the Fed to support the current rate of credit and deposit expansion.

While an individual bank can obtain reserves by bidding them away from other banks, this cannot be done by the banking system as a whole. Except for reserves borrowed temporarily from the Federal Reserve's discount window, as is shown later, the supply of reserves in the banking system is controlled by the Federal Reserve.

Moreover, a given increase in bank reserves is not necessarily accompanied by an expansion in money equal to the theoretical potential based on the required ratio of reserves to deposits. What happens to the quantity of

²Part of an individual bank's reserve account may represent its reserve balance used to meet its reserve requirements while another part may be its required clearing balance on which earnings credits are generated to pay for Federal Reserve Bank services.

money will vary, depending upon the reactions of the banks and the public. A number of slippages may occur. What amount of reserves will be drained into the public's currency holdings? To what extent will the increase in total reserves remain unused as excess reserves? How much will be absorbed by deposits or other liabilities not defined as money but against which banks might also have to hold reserves? How sensitive are the banks to policy actions of the central bank? The significance of these questions will be discussed later in this booklet. The answers indicate why changes in the money supply may be different than expected or may respond to policy action only after considerable time has elapsed.

In the succeeding pages, the effects of various transactions on the quantity of money are described and illustrated. The basic working tool is the "T" account, which provides a simple means of tracing, step by step, the effects of these transactions on both the asset and liability sides of bank balance sheets. Changes in asset items are entered on the left half of the "T" and changes in liabilities on the right half. For any one transaction, of course, there must be at least two entries in order to maintain the equality of assets and liabilities.