Bank Deposits—How They Expand or Contract

Let us assume that expansion in the money stock is desired by the Federal Reserve to achieve its policy objectives. One way the central bank can initiate such an expansion is through purchases of securities in the open market. Payment for the securities adds to bank reserves. Such purchases (and sales) are called "open market operations."

How do open market purchases add to bank reserves and deposits? Suppose the Federal Reserve System, through its trading desk at the Federal Reserve Bank of New York, buys $10,000 of Treasury bills from a dealer in U.S. government securities.[3] In today's world of computerized financial transactions, the Federal Reserve Bank pays for the securities with an "electronic" check drawn on itself.[4] Via its "Fedwire" transfer network, the Federal Reserve notifies the dealer's designated bank (Bank A) that payment for the securities should be credited to (deposited in) the dealer's account at Bank A. At the same time, Bank A's reserve account at the Federal Reserve is credited for the amount of the securities purchase. The Federal Reserve System has added $10,000 of securities to its assets, which it has paid for, in effect, by ***creating*** a liability on itself in the form of bank reserve balances. These reserves on Bank A's books are matched by $10,000 of the dealer's deposits that did not exist before. *See illustration 1.*

How the Multiple Expansion Process Works

If the process ended here, there would be no "multiple" expansion, i.e., deposits and bank reserves would have changed by the same amount. However, banks are required to maintain reserves equal to only a fraction of their deposits. Reserves in excess of this amount may be used to increase earning assets — loans and investments. Unused or excess reserves earn no interest. Under current regulations, the reserve requirement against most transaction accounts is 10 percent.[5] Assuming, for simplicity, a uniform 10 percent reserve requirement against all transaction deposits, and further assuming that all banks attempt to remain fully invested, we can now trace the process of expansion in deposits which can take place on the basis of the ***additional*** reserves provided by the Federal Reserve System's purchase of U.S. government securities.

The expansion process may or may not begin with Bank A, depending on what the dealer does with the money received from the sale of securities. If the dealer immediately writes checks for $10,000 and all of them are deposited in other banks, Bank A loses both deposits and reserves and shows no net change as a result of the System's open market purchase. However, other banks have received them. Most likely, a part of the initial deposit will remain with Bank A, and a part will be shifted to other banks as the dealer's checks clear.

It does not really matter where this money is at any given time. The important fact is that ***these deposits do not disappear.*** They are in some deposit accounts at all times. All banks together have $10,000 of deposits and reserves that they did not have before. However, they are not required to keep $10,000 of reserves against the $10,000 of deposits. All they need to retain, under a 10 percent reserve requirement, is $1,000. The remaining $9,000 is "excess reserves." This amount can be loaned or invested. *See illustration 2.*

If business is active, the banks with excess reserves probably will have opportunities to loan the $9,000. Of course, they do not really pay out loans from the money they receive as deposits. If they did this, no additional money would be created. What they do when they make loans is to accept promissory notes in exchange for credits to the borrowers' transaction accounts. Loans (assets) and deposits (liabilities) both rise by $9,000. Reserves are unchanged by the loan transactions. But the deposit credits constitute new additions to the total deposits of the banking system. *See illustration 3.*

[3]Dollar amounts used in the various illustrations do not necessarily bear any resemblance to actual transactions. For example, open market operations typically are conducted with many dealers and in amounts totaling several billion dollars.

[4]Indeed, many transactions today are accomplished through an electronic transfer of funds between accounts rather than through issuance of a paper check. Apart from the timing of posting, the accounting entries are the same whether a transfer is made with a paper check or electronically. The term "check," therefore, is used for both types of transfers.

[5]For each bank, the reserve requirement is 3 percent on a specified base amount of transaction accounts and 10 percent on the amount above this base. Initially, the Monetary Control Act set this base amount — called the "low reserve tranche" — at $25 million, and provided for it to change annually in line with the growth in transaction deposits nationally. The low reserve tranche was $41.1 million in 1991 and $42.2 million in 1992. The Garn-St Germain Act of 1982 further modified these requirements by exempting the first $2 million of reservable liabilities from reserve requirements. Like the low reserve tranche, the exempt level is adjusted each year to reflect growth in reservable liabilities. The exempt level was $3.4 million in 1991 and $3.6 million in 1992.

Deposit Expansion

1 When the Federal Reserve Bank purchases government securities, bank reserves increase. This happens because the seller of the securities receives payment through a credit to a designated deposit account at a bank (Bank A) which the Federal Reserve effects by crediting the reserve account of Bank A.

FEDERAL RESERVE BANK

Assets		Liabilities	
U.S. government securities	+ 10,000	Reserve accounts: Bank A	+ 10,000

BANK A

Assets		Liabilities	
Reserves with F.R. Banks	+ 10,000	Customer deposit	+ 10,000

The customer deposit at Bank A likely will be transferred, in part, to other banks and quickly loses its identity amid the huge interbank flow of deposits.

2 As a result, all banks taken together now have "excess" reserves on which deposit expansion can take place.

Total reserves gained from new deposits		10,000
less: Required against new deposits (at 10 percent)		1,000
equals: Excess reserves		9,000

Expansion—Stage 1

3 Expansion takes place only if the banks that hold these excess reserves (Stage 1 banks) increase their loans or investments. Loans are made by crediting the borrower's deposit account, i.e., by creating additional deposit money.

STAGE 1 BANKS

Assets		Liabilities	
Loans	+ 9,000	Borrower deposits	+ 9,000

This is the beginning of the deposit expansion process. In the first stage of the process, total loans and deposits of the banks rise by an amount equal to the excess reserves existing before any loans were made (90 percent of the initial deposit increase). At the end of Stage 1, deposits have risen a total of $19,000 (the initial $10,000 provided by the Federal Reserve's action plus the $9,000 in deposits created by Stage 1 banks). *See illustration 4.* However, only $900 (10 percent of $9,000) of excess reserves have been absorbed by the additional deposit growth at Stage 1 banks. *See illustration 5.*

The lending banks, however, do not expect to retain the deposits they create through their loan operations. Borrowers write checks that probably will be deposited in other banks. As these checks move through the collection process, the Federal Reserve Banks debit the reserve accounts of the paying banks (Stage 1 banks) and credit those of the receiving banks. *See illustration 6.*

Whether Stage 1 banks actually do lose the deposits to *other* banks or whether any or all of the borrowers' checks are redeposited in these *same* banks makes no difference in the expansion process. If the lending banks *expect* to lose these deposits — and an equal amount of reserves — as the borrowers' checks are paid, they will not lend more than their excess reserves. Like the original $10,000 deposit, the loan-created deposits may be transferred to other banks, but they remain somewhere in the banking system. Whichever banks receive them also acquire equal amounts of reserves, of which all but 10 percent will be "excess."

Assuming that the banks holding the $9,000 of deposits created in Stage 1 in turn make loans equal to their excess reserves, then loans and deposits will rise by a further $8,100 in the second stage of expansion. This process can continue until deposits have risen to the point where all the reserves provided by the initial purchase of government securities by the Federal Reserve System are just sufficient to satisfy reserve requirements against the newly created deposits. *(See pages 10 and 11.)*

The individual bank, of course, is not concerned as to the stages of expansion in which it may be participating. Inflows and outflows of deposits occur continuously. Any deposit received is new money, regardless of its ultimate source. But if bank policy is to make loans and investments equal to whatever reserves are in excess of legal requirements, the expansion process will be carried on.

How Much Can Deposits Expand in the Banking System?

The total amount of expansion that can take place is illustrated on page 11. Carried through to theoretical limits, the initial $10,000 of reserves distributed within the banking system gives rise to an expansion of $90,000 in bank credit (loans and investments) and supports a total of $100,000 in new deposits under a 10 percent reserve requirement. The deposit expansion factor for a given amount of new reserves is thus the reciprocal of the required reserve percentage (1/.10 = 10). Loan expansion will be less by the amount of the initial injection. The multiple expansion is possible because the banks as a group are like one large bank in which checks drawn against borrowers' deposits result in credits to accounts of other depositors, with no net change in total reserves.

Expansion through Bank Investments

Deposit expansion can proceed from investments as well as loans. Suppose that the demand for loans at some Stage 1 banks is slack. These banks would then probably purchase securities. If the sellers of the securities were customers, the banks would make payment by crediting the customers' transaction accounts; deposit liabilities would rise just as if loans had been made. More likely, these banks would purchase the securities through dealers, paying for them with checks on themselves or on their reserve accounts. These checks would be deposited in the sellers' banks. In either case, the net effects on the banking system are identical with those resulting from loan operations.

4 As a result of the process so far, total assets and total liabilities of all banks together have risen 19,000.

ALL BANKS

Assets		Liabilities	
Reserves with F.R. Banks	+ 10,000	Deposits: Initial	+ 10,000
Loans	+ 9,000	Stage 1	+ 9,000
Total	+ 19,000	Total	+ 19,000

5 Excess reserves have been reduced by the amount required against the deposits created by the loans made in Stage 1.

Total reserves gained from initial deposits		10,000
less: Required against initial deposits	1,000	
less: Required against Stage 1 deposits	900	1,900
equals: Excess reserves		8,100

Why do these banks stop increasing their loans and deposits when they still have excess reserves?

6 . . . because borrowers write checks on their accounts at the lending banks. As these checks are deposited in the payees' banks and cleared, the deposits created by Stage 1 loans and an equal amount of reserves may be transferred to other banks.

STAGE 1 BANKS

Assets		Liabilities	
Reserves with F.R. Banks	- 9,000	Borrower deposits	- 9,000

FEDERAL RESERVE BANK

Assets		Liabilities	
		Reserve accounts:	
		Stage 1 banks	- 9,000
		Other banks	+ 9,000

OTHER BANKS

Assets		Liabilities	
Reserves with F.R. Banks	+ 9,000	Deposits	+ 9,000

Deposit expansion has just begun!

7 Expansion continues as the banks that have excess reserves increase their loans by that amount, crediting borrowers' deposit accounts in the process, thus creating still more money.

STAGE 2 BANKS

Assets		Liabilities	
Loans	+ 8,100	Borrower deposits	+ 8,100

8 Now the banking system's assets and liabilities have risen by 27,100.

ALL BANKS

Assets		Liabilities	
Reserves with F.R. Banks	+ 10,000	Deposits: Initial	+ 10,000
Loans:		Stage 1	+ 9,000
Stage 1	+ 9,000	Stage 2	+ 8,100
Stage 2	+ 8,100		
Total	+ 27,100	Total	+ 27,100

9 But there are still 7,290 of excess reserves in the banking system.

Total reserves gained from initial deposits			10,000
less: Required against initial deposits	1,000		
less: Required against Stage 1 deposits	900		
less: Required against Stage 2 deposits	810	....	2,710
equals: Excess reserves			7,290

to Stage 3 banks

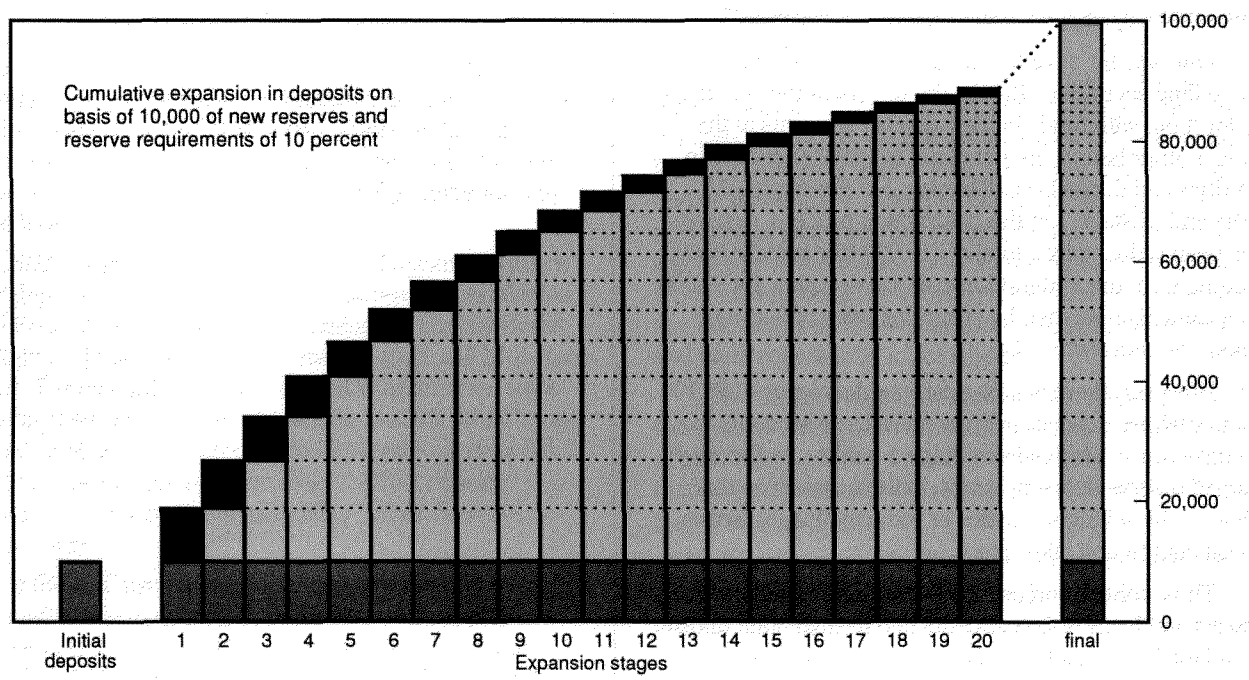
10 As borrowers make payments, these reserves will be further dispersed, and the process can continue through many more stages, in progressively smaller increments, until the entire 10,000 of reserves have been absorbed by deposit growth. As is apparent from the summary table on page 11, more than two-thirds of the deposit expansion potential is reached after the first ten stages.

It should be understood that the stages of expansion occur neither simultaneously nor in the sequence described above. Some banks use their reserves incompletely or only after a considerable time lag, while others expand assets on the basis of expected reserve growth. The process is, in fact, continuous and may never reach its theoretical limits.

Thus through stage after stage of expansion, "money" can grow to a total of 10 times the new reserves supplied to the banking system . . .

	Assets				Liabilities
	Reserves				
	Total	[Required]	[Excess]	Loans and Investments	Deposits
Initial reserves provided	10,000	*1,000*	*9,000*	--	10,000
Expansion — Stage 1	10,000	*1,900*	*8,100*	9,000	19,000
Stage 2	10,000	*2,710*	*7,290*	17,100	27,100
Stage 3	10,000	*3,439*	*6,561*	24,390	34,390
Stage 4	10,000	*4,095*	*5,905*	30,951	40,951
Stage 5	10,000	*4,686*	*5,314*	36,856	46,856
Stage 6	10,000	*5,217*	*4,783*	42,170	52,170
Stage 7	10,000	*5,695*	*4,305*	46,953	56,953
Stage 8	10,000	*6,126*	*3,874*	51,258	61,258
Stage 9	10,000	*6,513*	*3,487*	55,132	65,132
Stage 10	10,000	*6,862*	*3,138*	58,619	68,619
.	.	.	.	.	.
.	.	.	.	.	.
.	.	.	.	.	.
Stage 20	10,000	*8,906*	*1,094*	79,058	89,058
.	.	.	.	.	.
.	.	.	.	.	.
.	.	.	.	.	.
Final stage	10,000	*10,000*	*0*	90,000	100,000

. . . as the new deposits created by loans at each stage are added to those created at all earlier stages and those supplied by the initial reserve-creating action.



How Open Market Sales Reduce Bank Reserves and Deposits

Now suppose some reduction in the amount of money is desired. Normally this would reflect temporary or seasonal reductions in activity to be financed since, on a year-to-year basis, a growing economy needs at least some monetary expansion. Just as purchases of government securities by the Federal Reserve System can provide the basis for deposit expansion by adding to bank reserves, sales of securities by the Federal Reserve System reduce the money stock by absorbing bank reserves. The process is essentially the reverse of the expansion steps just described.

Suppose the Federal Reserve System sells $10,000 of Treasury bills to a U.S. government securities dealer and receives in payment an "electronic" check drawn on Bank A. As this payment is made, Bank A's reserve account at a Federal Reserve Bank is reduced by $10,000. As a result, the Federal Reserve System's holdings of securities and the reserve accounts of banks are both reduced $10,000. The $10,000 reduction in Bank A's deposit liabilities constitutes a decline in the money stock. *See illustration 11.*

Contraction Also Is a Cumulative Process

While Bank A may have regained part of the initial reduction in deposits from other banks as a result of interbank deposit flows, all banks taken together have $10,000 less in both deposits and reserves than they had before the Federal Reserve's sales of securities. The amount of reserves freed by the decline in deposits, however, is only $1,000 (10 percent of $10,000). Unless the banks that lose the reserves and deposits had excess reserves, they are left with a reserve deficiency of $9,000. *See illustration 12.* Although they may borrow from the Federal Reserve Banks to cover this deficiency temporarily, sooner or later the banks will have to obtain the necessary reserves in some other way or reduce their needs for reserves.

One way for a bank to obtain the reserves it needs is by selling securities. But, as the buyers of the securities pay for them with funds in their deposit accounts in the same or other banks, the net result is a $9,000 decline in securities and deposits at all banks. *See illustration 13.* At the end of Stage 1 of the contraction process, deposits have been reduced by a total of $19,000 (the initial $10,000 resulting from the Federal Reserve's action plus the $9,000 in deposits extinguished by securities sales of Stage 1 banks). *See illustration 14.*

However, there is now a reserve deficiency of $8,100 at banks whose depositors drew down their accounts to purchase the securities from Stage 1 banks. As the new group of reserve-deficient banks, in turn, makes up this deficiency by selling securities or reducing loans, further deposit contraction takes place.

Thus, contraction proceeds through reductions in deposits and loans or investments in one stage after another until total deposits have been reduced to the point where the smaller volume of reserves is adequate to support them. The contraction multiple is the same as that which applies in the case of expansion. Under a 10 percent reserve requirement, a $10,000 reduction in reserves would ultimately entail reductions of $100,000 in deposits and $90,000 in loans and investments.

As in the case of deposit expansion, contraction of bank deposits may take place as a result of either sales of securities or reductions of loans. While some adjustments of both kinds undoubtedly would be made, the initial impact probably would be reflected in sales of government securities. Most types of outstanding loans cannot be called for payment prior to their due dates. But the bank may cease to make new loans or refuse to renew outstanding ones to replace those currently maturing. Thus, deposits built up by borrowers for the purpose of loan retirement would be extinguished as loans were repaid.

There is one important difference between the expansion and contraction processes. When the Federal Reserve System adds to bank reserves, expansion of credit and deposits ***may*** take place up to the limits permitted by the minimum reserve ratio that banks are required to maintain. But when the System acts to reduce the amount of bank reserves, contraction of credit and deposits ***must*** take place (except to the extent that existing excess reserve balances and/or surplus vault cash are utilized) to the point where the required ratio of reserves to deposits is restored. But the significance of this difference should not be overemphasized. Because excess reserve balances do not earn interest, there is a strong incentive to convert them into earning assets (loans and investments).

Deposit Contraction

11 When the Federal Reserve Bank sells government securities, bank reserves decline. This happens because the buyer of the securities makes payment through a debit to a designated deposit account at a bank (Bank A), with the transfer of funds being effected by a debit to Bank A's reserve account at the Federal Reserve Bank.

FEDERAL RESERVE BANK

Assets		Liabilities	
U.S. government securities	- 10,000	Reserve accounts: Bank A	- 10,000

BANK A

Assets		Liabilities	
Reserves with F.R. Banks	- 10,000	Customer deposit	- 10,000

This reduction in the customer deposit at Bank A may be spread among a number of banks through interbank deposit flows.

12 The loss of reserves means that all banks taken together now have a reserve deficiency.

Total reserves lost from deposit withdrawal	10,000
less: Reserves freed by deposit decline (at 10 percent)	1,000
equals: Deficiency in reserves against remaining deposits.	9,000

Contraction—Stage 1

13 The banks with the reserve deficiencies (Stage 1 banks) can sell government securities to acquire reserves, but this causes a decline in the deposits and reserves of the buyers' banks.

STAGE I BANKS

Assets		Liabilities	
U.S. government securities	- 9,000		
Reserves with F.R. Banks	+ 9,000		

FEDERAL RESERVE BANK

Assets		Liabilities	
		Reserve accounts:	
		Stage I banks	+ 9,000
		Other banks	- 9,000

OTHER BANKS

Assets		Liabilities	
Reserves with F.R. Banks	- 9,000	Deposits	- 9,000

14 As a result of the process so far, assets and total deposits of all banks together have declined 19,000. Stage 1 contraction has freed 900 of reserves, but there is still a reserve deficiency of 8,100.

ALL BANKS

Assets		Liabilities	
Reserves with F.R. Banks	- 10,000	Deposits: Initial	- 10,000
		Stage I	- 9,000
U.S. government securities	- 9,000		
Total	- 19,000	Total	- 19,000

Further contraction must take place!