

PARKIN  BADE

MACROECONOMICS

CANADA IN THE GLOBAL ENVIRONMENT TENTH EDITION





8

MONEY, THE PRICE LEVEL, AND INFLATION

After studying this chapter, you will be able to:

- ◆ Define money and describe its functions
- ◆ Explain the economic functions of banks
- ◆ Describe the structure and functions of the Bank of Canada
- ◆ Explain how the banking system creates money
- ◆ Explain what determines the quantity of money and interest rates
- ◆ Explain how the quantity of money influences the price level and the inflation rate

What is Money?

Money is any commodity or token that is generally acceptable as a means of payment.

A means of payment is a method of settling a debt.

Money has three other functions:

- Medium of exchange

- Unit of account

- Store of value

What is Money?

Medium of Exchange

A medium of exchange is an object that is generally accepted in exchange for goods and services.

In the absence of money, people would need to exchange goods and services directly, which is called barter.

Barter requires a double coincidence of wants, which is rare, so barter is costly.

What is Money?

Unit of Account

A unit of account is an agreed measure for stating the prices of goods and services.

Table 8.1 illustrates how money simplifies comparisons.

Store of Value

TABLE 24.1 The Unit of Account Function of Money Simplifies Price Comparisons

Good	Price in money units	Price in units of another good
Movie	\$8.00 each	2 cappuccinos
Cappuccino	\$4.00 each	2 ice-cream cones
Ice cream	\$2.00 per cone	2 packs of jelly beans
Jelly beans	\$1.00 per pack	2 sticks of gum
Gum	\$0.50 per stick	

As a store of value, money can be held for a time and later exchanged for goods and services.



TABLE 24.1 The Unit of Account Function
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Comparisons

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What is Money?

Money in Canada Today

Money in Canada consists of

Currency

Deposits at banks and other depository institutions

Currency is the notes and coins held by individuals and businesses.

What is Money?

Official Measures of Money

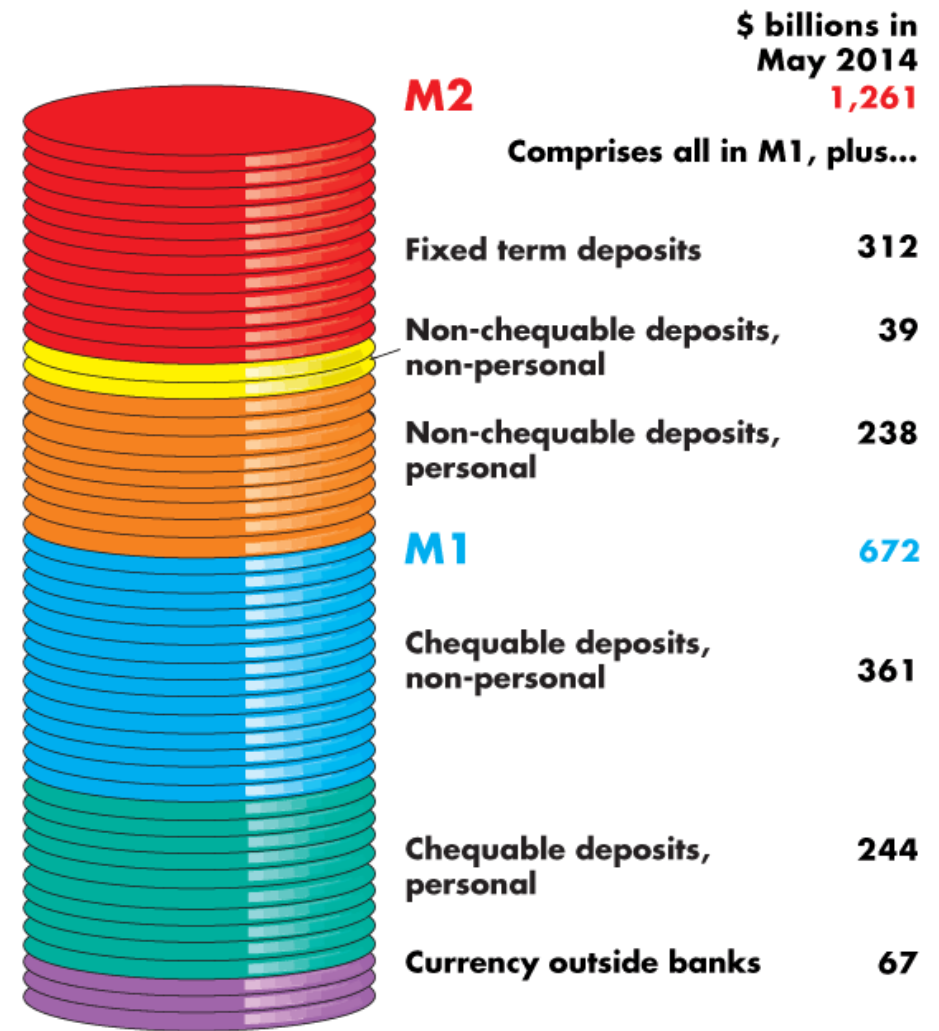
The two main official measures of money in Canada are M1 and M2.

M1 consists of currency held by individuals and businesses plus chequable deposits owned by individuals and businesses.

M2 consists of M1 plus all other deposits—non-chequable deposits and fixed term deposits.

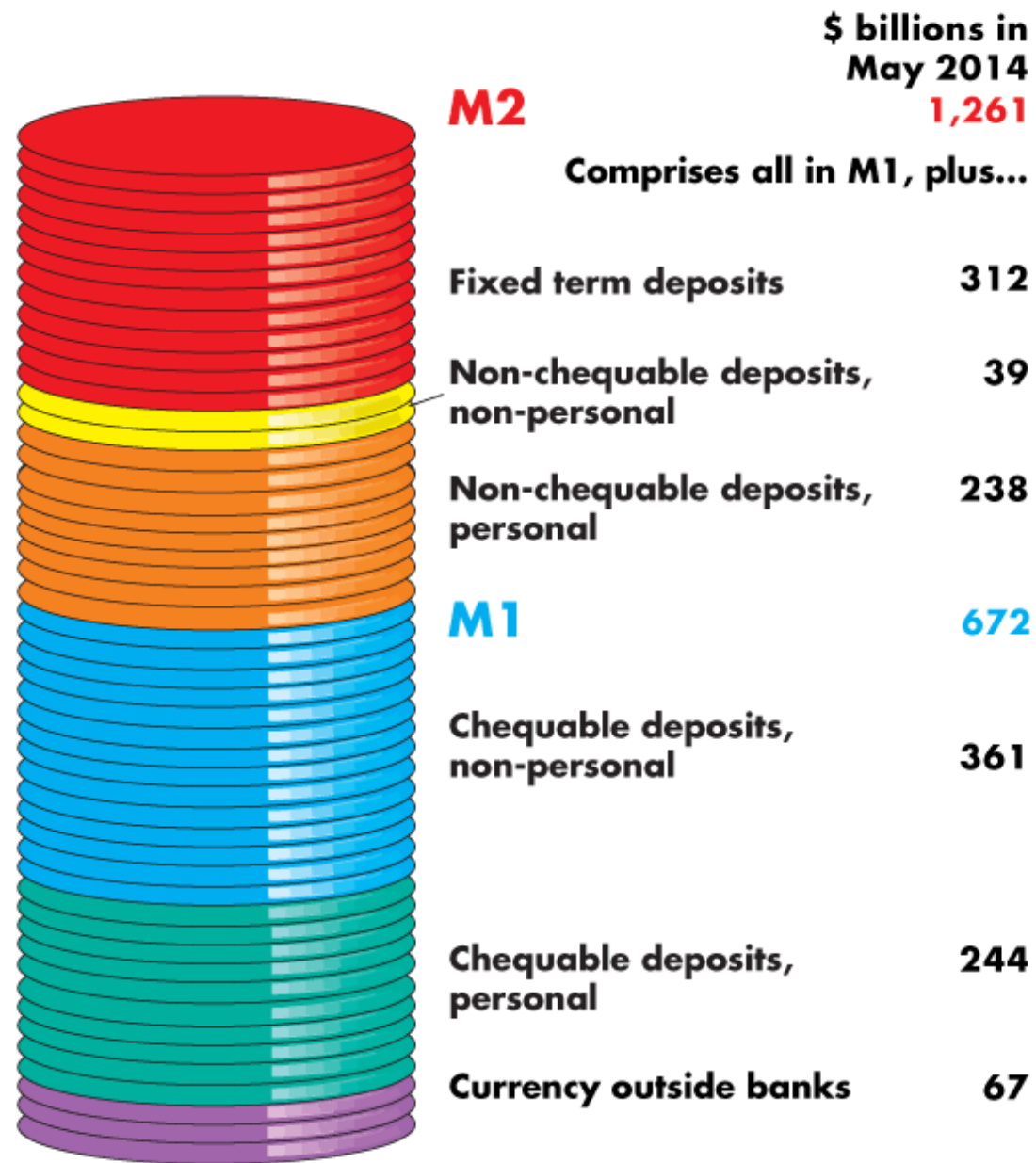
What is Money?

The figure illustrates the composition of M1 ... and M2.
It also shows the relative magnitudes of the components.



Two Official Measures of Money





Two Official Measures of Money

What is Money?

Are M1 and M2 Really Money?

All the items in M1 are means of payment. They are money.

Some savings deposits in M2 are not means of payments—they are called liquid assets.

Liquidity is the property of being instantly convertible into a means of payment with little loss of value.

Deposits are money, but cheques are not—a cheque is an instruction to a bank to transfer money.

Credit cards are not money. A credit card enables the holder to obtain a loan, but it must be repaid with money.

Depository Institutions

A depository institution is a firm that takes deposits from households and firms and makes loans to other households and firms.

Types of Depository Institutions

Deposits at three institutions make up the nation's money.

They are:

- Chartered banks

- Credit unions and caisses populaires

- Trust and mortgage loan companies

Depository Institutions

Chartered Banks

A chartered bank is a private firm private firm, chartered under the Bank Act of 1991 to receive deposits and make loans.

Credit Unions and Caisses Populaires

A credit union is a cooperative organization that operates under the Cooperative Credit Association Act of 1991 and that receives deposits from and makes loans to its members.

A caisse populaire is a similar type of institution that operates in Quebec.

Depository Institutions

What Depository Institutions Do

The goal of any bank is to maximize the wealth of its owners

To achieve this objective, the interest rate at which it lends exceeds the interest rate it pays on deposits.

But the banks must balance profit and prudence:

- Loans generate profit.

- Depositors must be able to obtain their funds when they want them.

Depository Institutions

A chartered bank puts the depositors' funds into four types of assets:

- Reserves—notes and coins in its vault or its deposit at the Bank of Canada

- Liquid assets—Canadian government Treasury bills and commercial bills

- Securities—longer-term Canadian government bonds and other bonds such as mortgage-backed securities

- Loans—commitments of fixed amounts of money for agreed-upon periods of time



Depository Institutions

Table 8.2 shows the sources and uses of funds in all chartered banks in April 2017.

TABLE 8.2 Chartered Banks: Sources and Uses of Funds

	\$ billions April 2017	Percentage of deposits
Total funds	2,723	122.1
Sources		
Deposits	2,241	100.0
Borrowing	108	4.8
Own capital	385	17.2
Uses		
Reserves	6	0.3
Liquid assets	240	10.7
Securities	357	16.0
Loans	2,127	95.3

Chartered banks get most of their funds from depositors and use most of them to make loans. They hold less than 1 percent of deposits as reserves but hold almost 11 percent of deposits as liquid assets.

Source of data: Statistics Canada, CANSIM Table 176-0011.



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Depository Institutions

Economic Benefits Provided by Depository Institutions

Depository institutions make a profit from the spread between the interest rate they pay on their deposits and the interest rate they charge on their loans.

Depository institutions provide four benefits:

- Create liquidity

- Pool risk

- Lower the cost of borrowing

- Lower the cost of monitoring borrowers

Depository Institutions

How Depository Institutions Are Regulated

Depository institutions engage in risky business.

To make the risk of failure small, depository institutions are required to hold levels of reserves and owners' capital equal to or that surpass the ratios laid down by regulation. If a Canadian bank fails, deposits are guaranteed up to \$100,000 per depositor per bank by the Canada Deposit Insurance Corporation.

Provincial government agencies regulate credit unions and caisses populaires.

Depository Institutions

Financial Innovation

The aim of financial innovation—the development of new financial products—is to lower the cost of deposits or to increase the return from lending.

Two influences on financial innovation are:

1. Economic environment
2. Technology

The Bank of Canada

The Bank of Canada is the central bank of Canada. A central bank is the public authority that regulates a nation's depository institutions and control the quantity of money.

The Bank of Canada is:

- < Banker to the banks and government
- < Lender of last resort
- < Sole issuer of bank notes

“ We are Canada’s central bank. We work to preserve the value of money by keeping inflation low and stable. ”

Policy Interest Rate

0.75%

12 Jul 2017

Total CPI Inflation

1.2%

Jul 2017

CPI-trim	1.3%	Jul 2017
CPI-median	1.7%	Jul 2017
CPI-common	1.4%	Jul 2017



Latest Webcast

Webcast of a press conference about the *Monetary Policy Report*.



News

Bank of Canada publishes its 2018 schedule for policy interest rate announcements and the release of the Monetary Policy Report

26 July 2017

Media Relations - Ottawa, Ontario

The Bank of Canada today published its 2018 schedule for policy interest rate announcements and the release of the



Exchange Rates

1.00 Canadian dollar

0.79 US dollar

The Bank of Canada

Banker to Banks and Government

The Bank of Canada accepts deposits from depository institutions that make up the payments system and the government of Canada.

Lender of Last Resort

The Bank of Canada is the lender of last resort, which means that it stands ready to make loans when the banking system as a whole is short of reserves.

Banks lend and borrow reserves from other banks in the overnight loans market.

The Bank of Canada

Sole Issuer of Bank Notes

The Bank of Canada is the only bank that is permitted to issue bank notes. The Bank of Canada has a monopoly on this activity.

The Bank of Canada's Balance Sheet

The Bank of Canada's assets are government securities and last-resort loans to banks.

Its liabilities are Bank of Canada notes and deposits of banks and the government.

The Bank of Canada

The Bank of Canada's Balance Sheet

On the Bank's balance sheet, the largest and most important asset is Canadian government securities.

The most important liabilities are Bank of Canada notes in circulation and banks' deposits.

The Bank of Canada

Monetary Base

The liabilities of the Bank of Canada (plus coins issued by the Canadian Mint) form the monetary base.

The monetary base is the sum of Bank of Canada notes outside the Bank of Canada, banks' deposits at the Bank of Canada, and coins held by households, firms, and banks.

To change the monetary base, the Bank of Canada conducts an open market operation, which is the purchase or sale of government of Canada securities by the Bank of Canada in the open market.

The Bank of Canada

Table 8.3 shows the sources and uses of the monetary base in June 2017.

The Bank of Canada's assets are the sources of monetary base.

The Bank of Canada's liabilities are its uses of monetary base.

TABLE 8.3 The Sources and Uses of the Monetary Base

Sources (billions of dollars)		Uses (billions of dollars)	
Government of Canada securities	87.5	Notes	87.0
Loans to depository institutions	<u>0</u>	Reserves of depository institutions	<u>0.5</u>
Monetary base	<u>87.5</u>	Monetary base	<u>87.5</u>

Source of data: Statistics Canada. The data are for June 2017.

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Source of data: Statistics Canada. The data are for June 2017.

The Bank of Canada

The Bank of Canada's Policy Tools

To achieve its objectives, the Fed uses three main policy tools:

- Open market operations

- Bank rate

The Bank of Canada

Open Market Operations

An open market operation is the purchase or sale of government securities by the Bank of Canada from or to a chartered bank or the public.

When the Bank of Canada buys securities, it pays for them with newly created reserves held by the banks.

When the Bank of Canada sells securities, they are paid for with reserves held by banks.

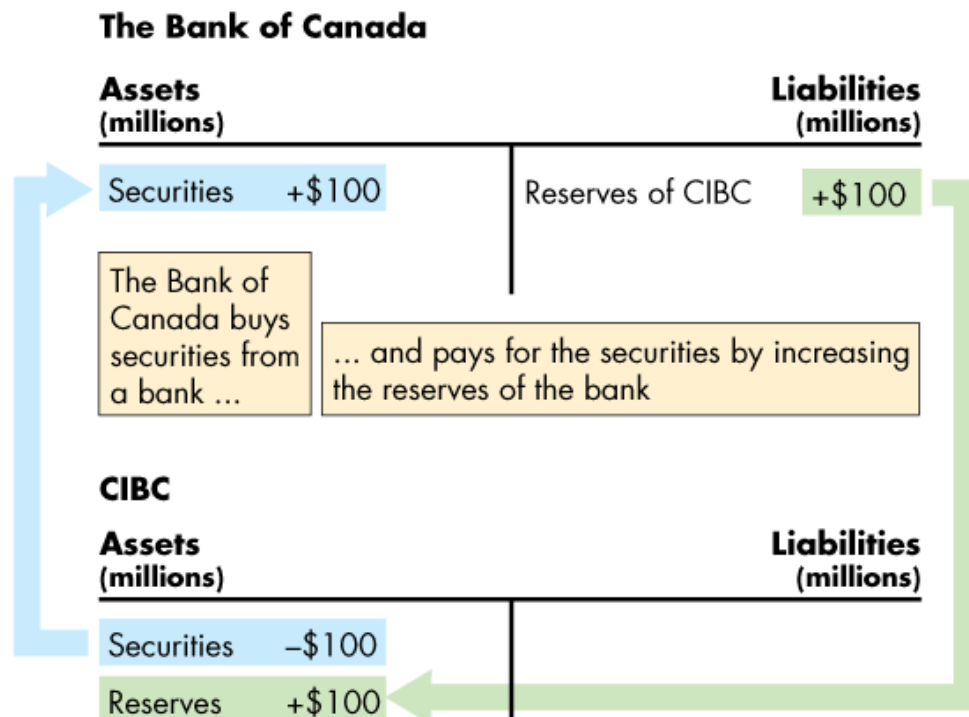
So open market operations influence banks' reserves.

The Bank of Canada

An Open Market Purchase

Figure 8.2 shows the effects of an open market purchase on the balance sheets of the Bank of Canada and CIBC.

The open market purchase increases bank reserves.



The Bank of Canada

Assets (millions)

Securities +\$100

The Bank of
Canada buys
securities from
a bank ...

... and pays for the securities by increasing
the reserves of the bank

Liabilities (millions)

Reserves of CIBC +\$100

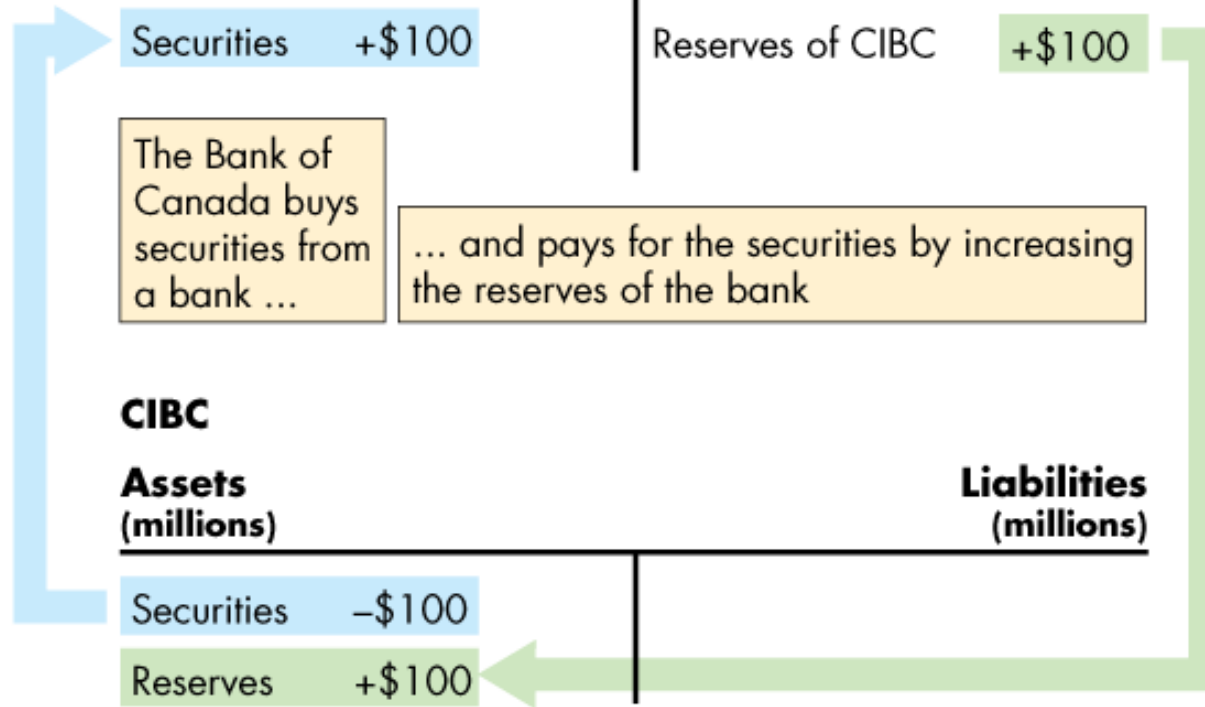
CIBC

Assets (millions)

Securities -\$100

Reserves +\$100

Liabilities (millions)

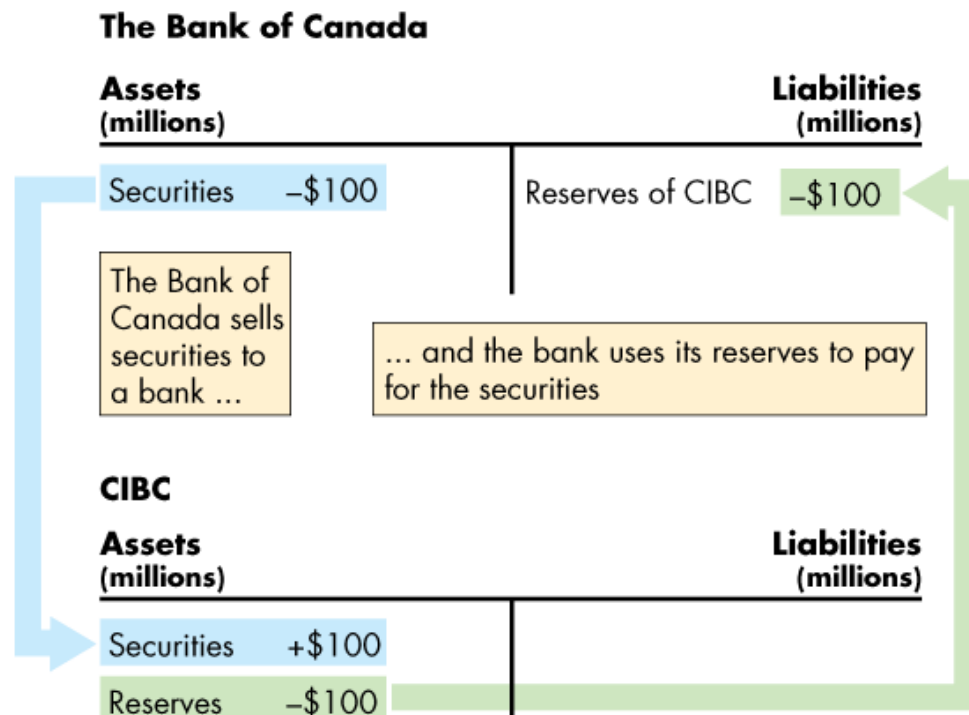


The Bank of Canada

An Open Market Sale

This figure shows the effects of an open market sale on the balance sheets of the Bank of Canada and CIBC.

The open market sale decreases bank reserves.



The Bank of Canada

Assets (millions)

Securities -\$100

The Bank of
Canada sells
securities to
a bank ...

Liabilities (millions)

Reserves of CIBC -\$100

... and the bank uses its reserves to pay
for the securities

CIBC

Assets (millions)

Securities +\$100

Reserves -\$100

Liabilities (millions)

The Bank of Canada

Bank Rate

The Bank of Canada makes short-term loans, typically one-day loans, to major depository institutions when the banking system is short of reserves.

The interest rate on these loans is called bank rate.

Bank rate acts as an anchor for other short-term interest rates and is closely related to the Bank's target for the overnight loans rate.

How Banks Create Money

Creating Deposits by Making Loans

Banks create deposits when they make loans and the new deposits created are new money.

The quantity of deposits that banks can create is limited by three factors:

- The monetary base

- Desired reserves

- Desired currency holding

How Banks Create Money

The Monetary Base

The monetary base is the sum of Bank of Canada notes, coins, and banks' deposits at the Bank of Canada.

The size of the monetary base limits the total quantity of money that the banking system can create because

1. Banks have desired reserves
 2. Households and firms have desired currency holdings
- And both these desired holdings of monetary base depend on the quantity of money.

How Banks Create Money

Desired Reserves

A bank's actual reserves consists of notes and coins in its vault and its deposit at the Bank of Canada.

The desired reserve ratio is the ratio of the bank's reserves to total deposits that a bank plans to hold.

The desired reserve ratio exceeds the required reserve ratio by the amount that the bank determines to be prudent for its daily business.

How Banks Create Money

Desired Currency Holding

People hold some fraction of their money as currency.

So when the total quantity of money increases, so does the quantity of currency that people plan to hold.

Because desired currency holding increases when deposits increase, currency leaves the banks when they make loans and increase deposits.

This leakage of reserves into currency is called the currency drain.

The ratio of currency to deposits is the currency drain ratio.

How Banks Create Money

The Money Creation Process

Money creation process begins with an increase in the monetary base.

The Bank of Canada conducts an open market operation in which it buys securities from banks.

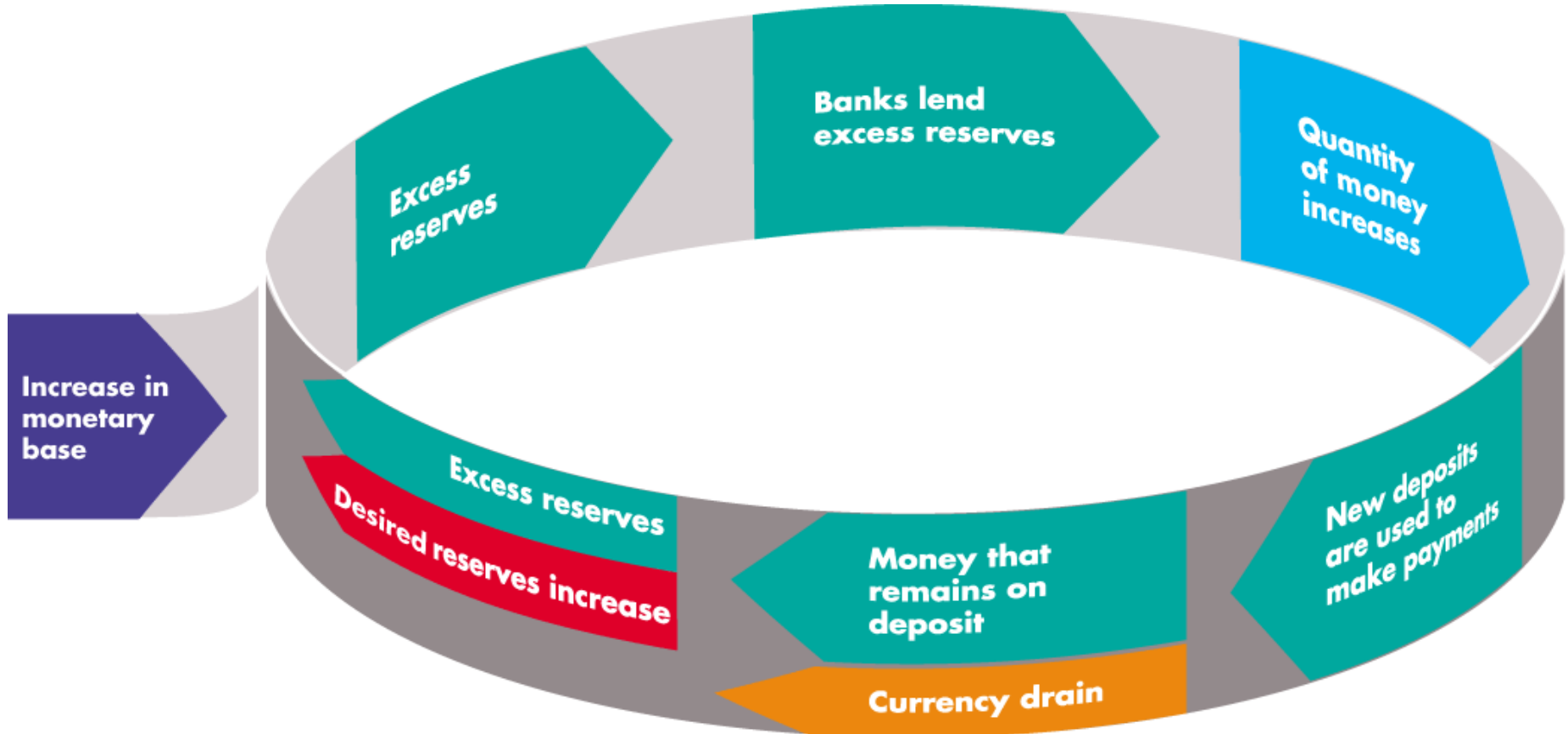
The Bank of Canada pays for the securities with newly created bank reserves.

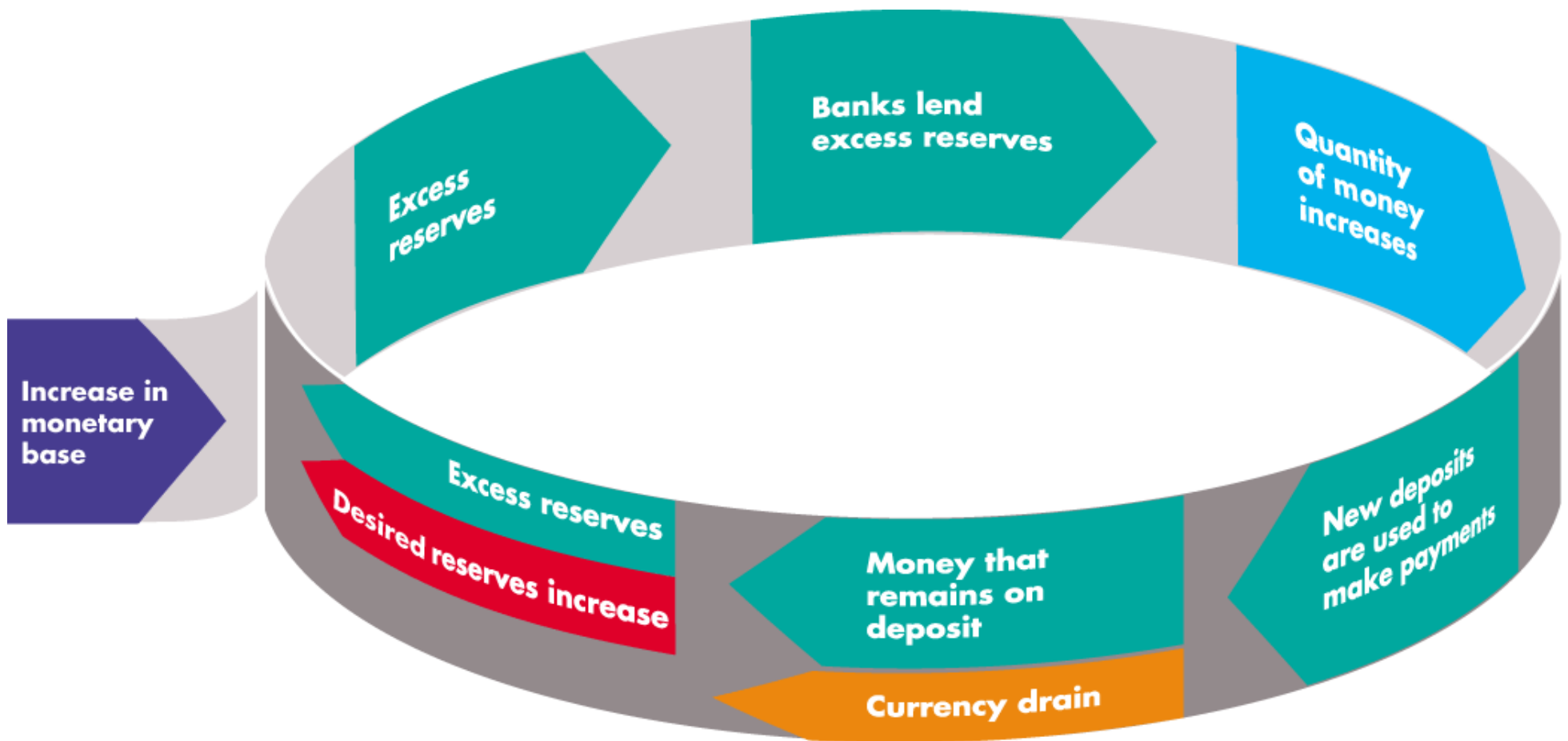
Banks now have more reserves but the same amount of deposits, so they have excess reserves.

Excess reserves = Actual reserves – desired reserves.

How Banks Create Money

Figure 8.3 illustrates one round in how the banking system creates money by making loans.





How Banks Create Money

The Money Multiplier

The money multiplier is the ratio of the change in the quantity of money to the change in the monetary base. For example, if the Bank of Canada increases the monetary base by \$100,000 and the quantity of money increases by \$250,000, the money multiplier is 2.5.

The quantity of money created depends on the desired reserve ratio and the currency drain ratio.

The smaller these ratios, the larger is the money multiplier.

The Money Market

How much money do people want to hold?

The Influences on Money Holding

The quantity of money that people plan to hold depends on four main factors:

The price level ↑

The nominal interest rate

Real GDP ↑

Financial innovation

money
↑

The Money Market

The Price Level

A rise in the price level increases the quantity of nominal money but doesn't change the quantity of real money that people plan to hold.

Nominal money is the amount of money measured in dollars.

Real money equals $\text{Nominal money} \div \text{Price level}$.

The quantity of nominal money demanded is proportional to the price level—a 10 percent rise in the price level increases the quantity of nominal money demanded by 10 percent.

The Money Market

The *Nominal* Interest Rate

The nominal interest rate is the opportunity cost of holding wealth in the form of money rather than an interest-bearing asset.

A rise in the nominal interest rate on other assets decreases the quantity of real money that people plan to hold.

Real GDP

An increase in real GDP increases the volume of expenditure, which increases the quantity of real money that people plan to hold.

The Money Market

Financial Innovation

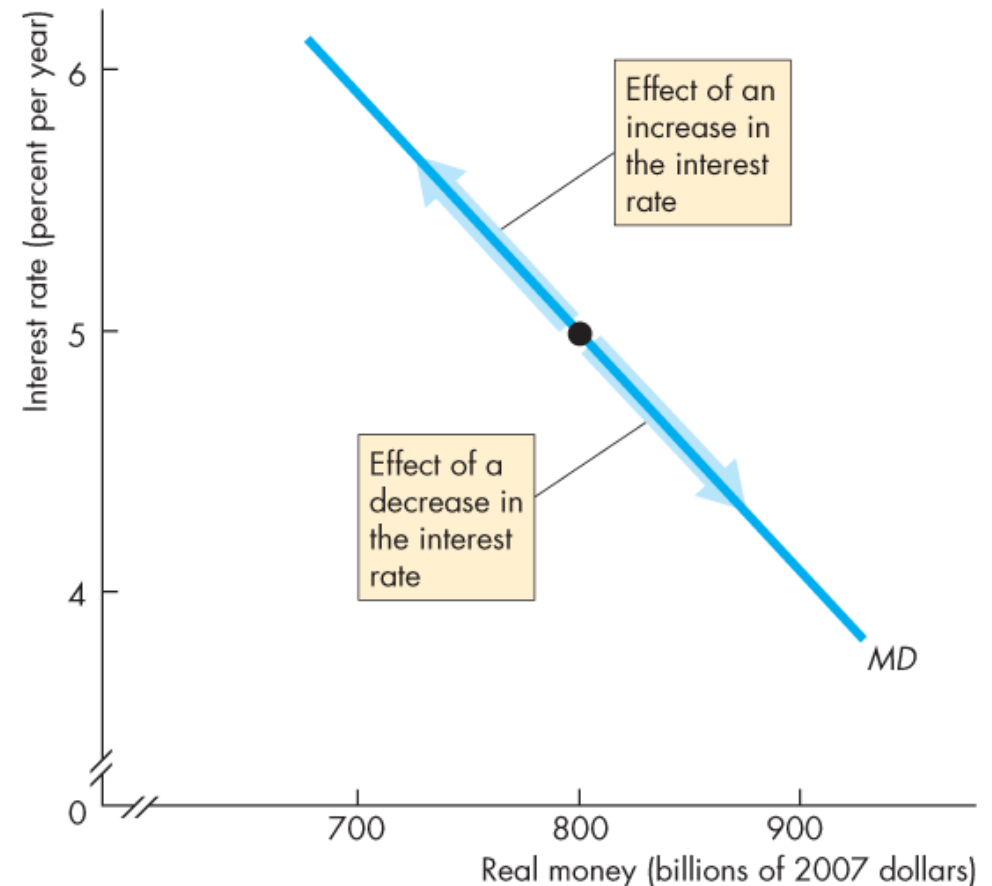
Financial innovation that lowers the cost of switching between money and interest-bearing assets decreases the quantity of real money that people plan to hold.

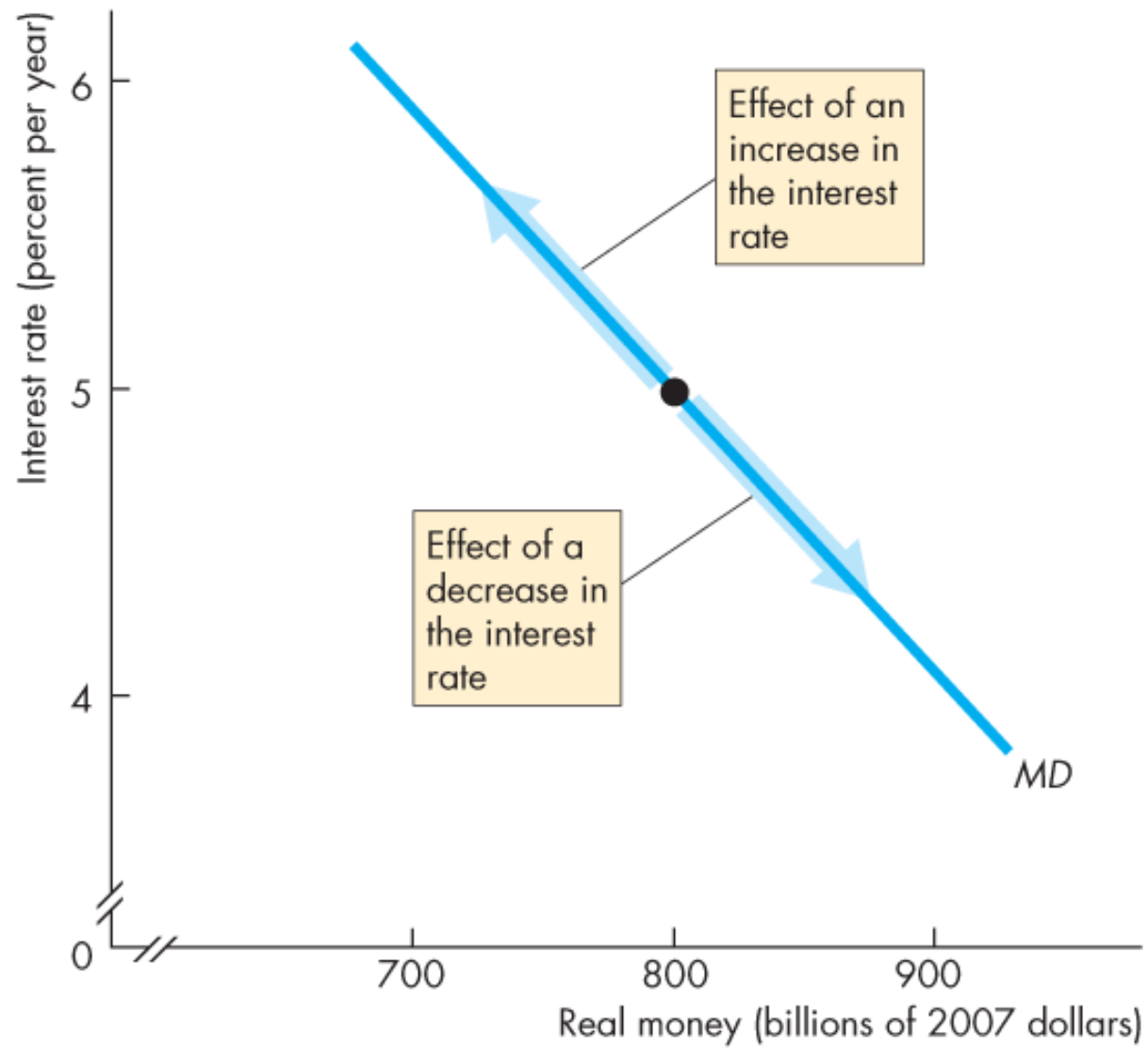
The Demand for Money

The demand for money is the relationship between the quantity of real money demanded and the nominal interest rate when all other influences on the amount of money that people wish to hold remain the same.

The Money Market

Figure 8.4 illustrates the demand for money curve. A rise in the interest rate brings a decrease in the quantity of real money demanded. A fall in the interest rate brings an increase in the quantity of real money demanded.

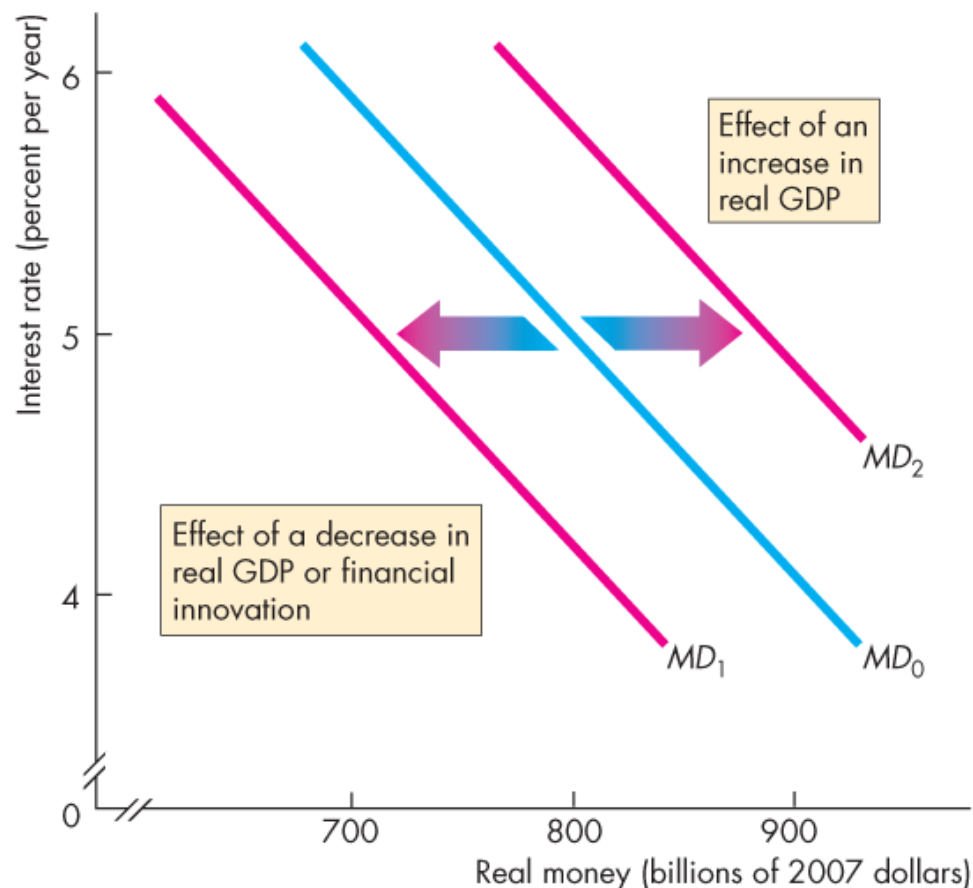


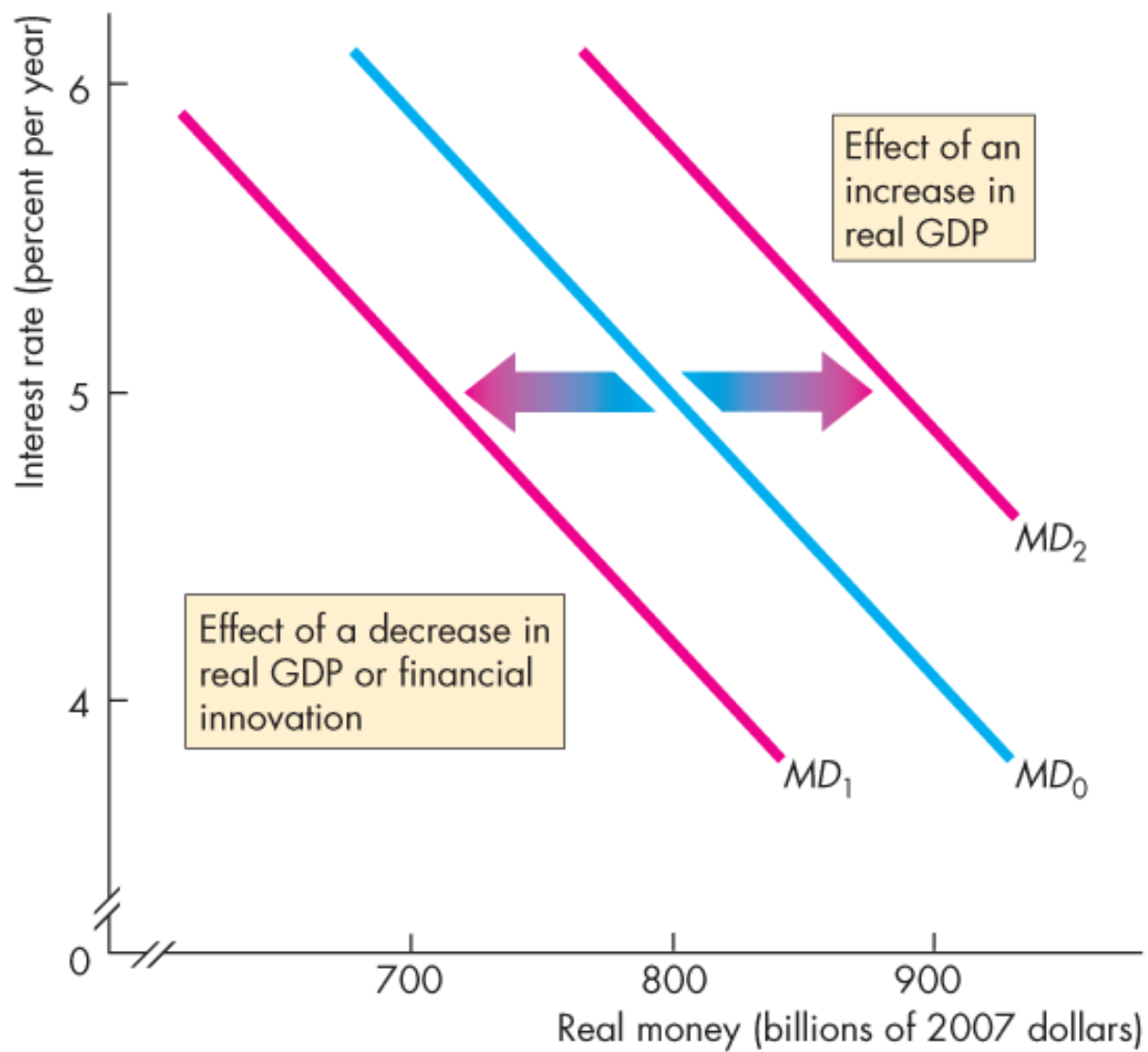


The Money Market

Shifts in the Demand for Money Curve

Figure 8.5 shows that a decrease in real GDP or a financial innovation decreases the demand for money and shifts the demand curve leftward. An increase in real GDP increases the demand for money and shifts the demand curve rightward.





The Money Market

Money Market Equilibrium

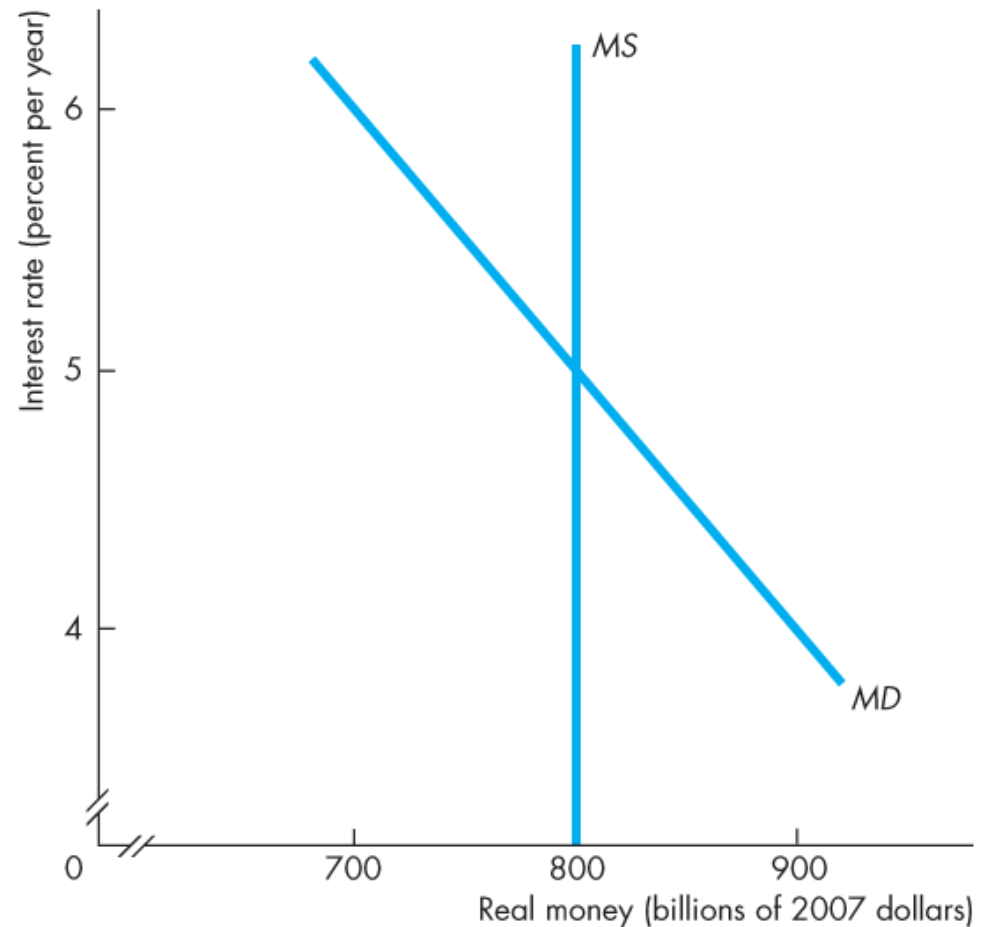
Money market equilibrium occurs when the quantity of money demanded equals the quantity of money supplied. Adjustments that occur to bring about money market equilibrium are fundamentally different in the short run and the long run.

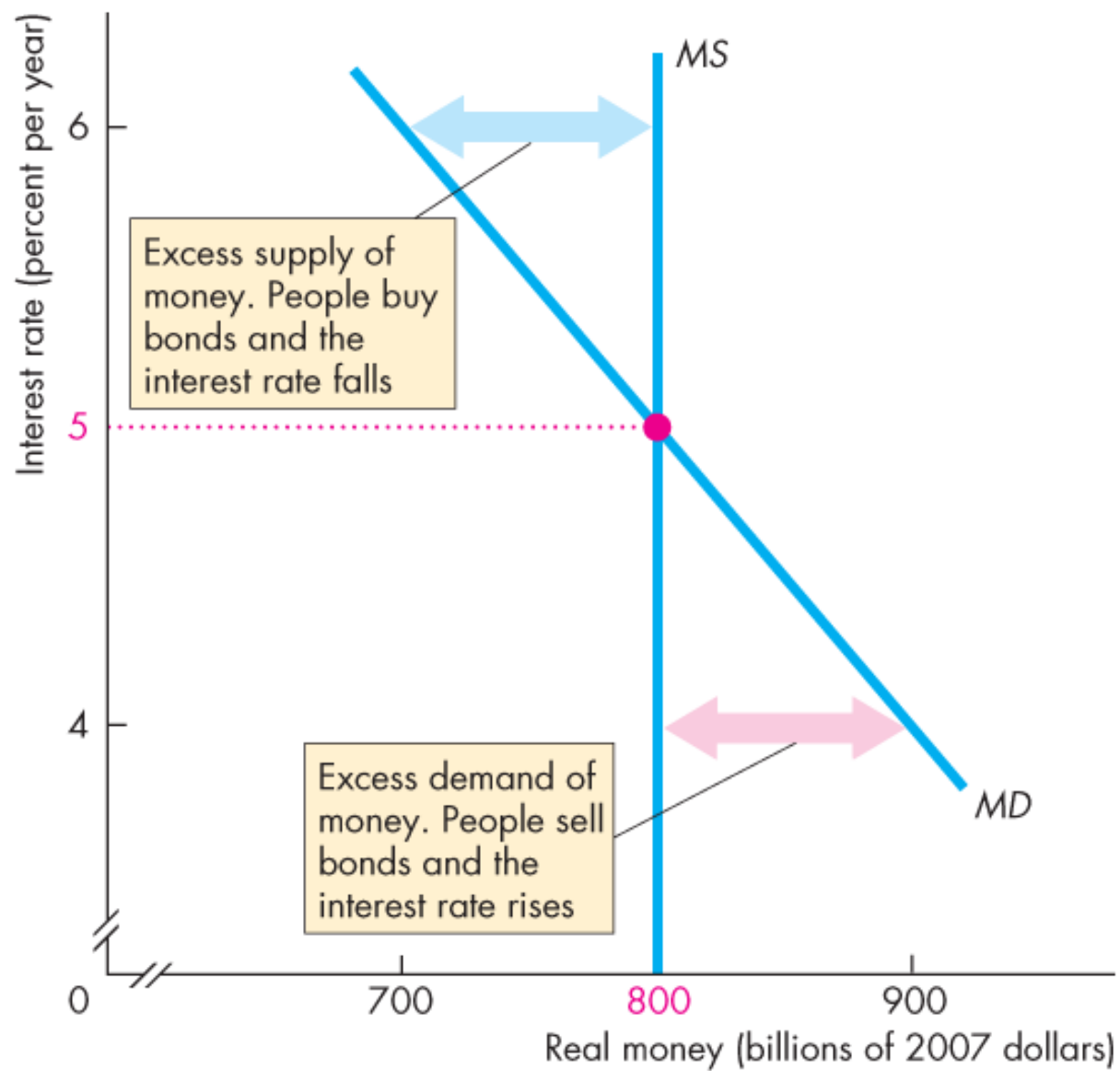
The Money Market

Short-Run Equilibrium

Figure 8.6 shows the demand for money.

Suppose that the Bank of Canada wants the interest rate to be 5 percent a year. The Bank adjusts the quantity of money each day so that the quantity of real money is \$800 billion.

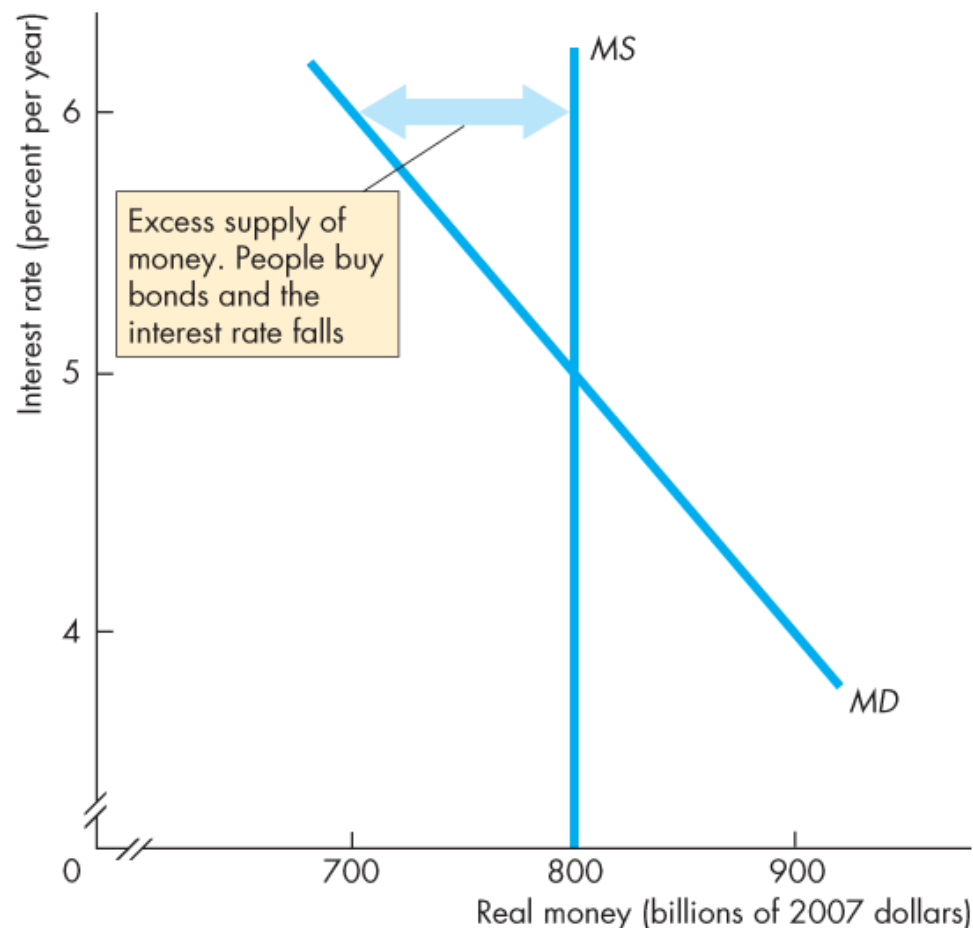




The Money Market

If the interest rate exceeds the 5 percent a year, ... the quantity of money that people are willing to hold is less than the quantity supplied.

They try to get rid of their “excess” money they are holding by buying bonds. This action lowers the interest rate.

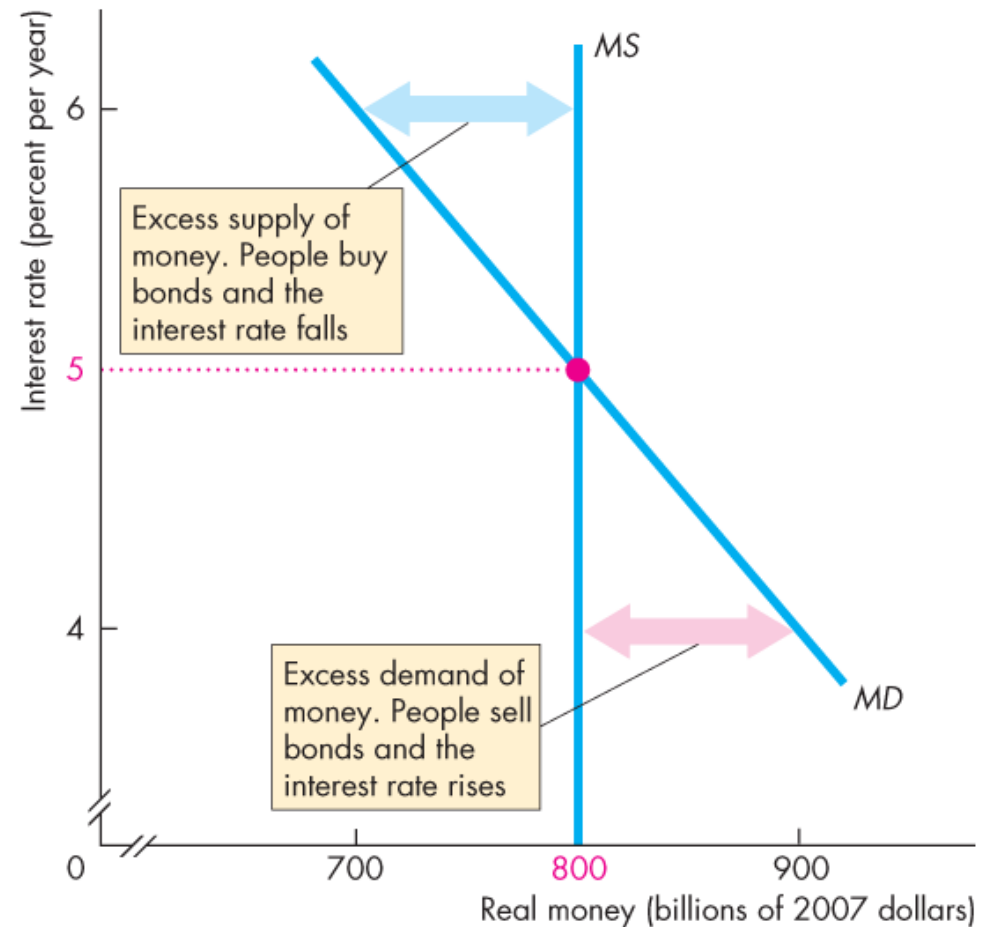


The Money Market

If the interest rate is below 5 percent a year, ... the quantity of money that people want to hold exceeds the quantity supplied.

They try to get more money by selling bonds.

This action raises the interest rate.



The Money Market

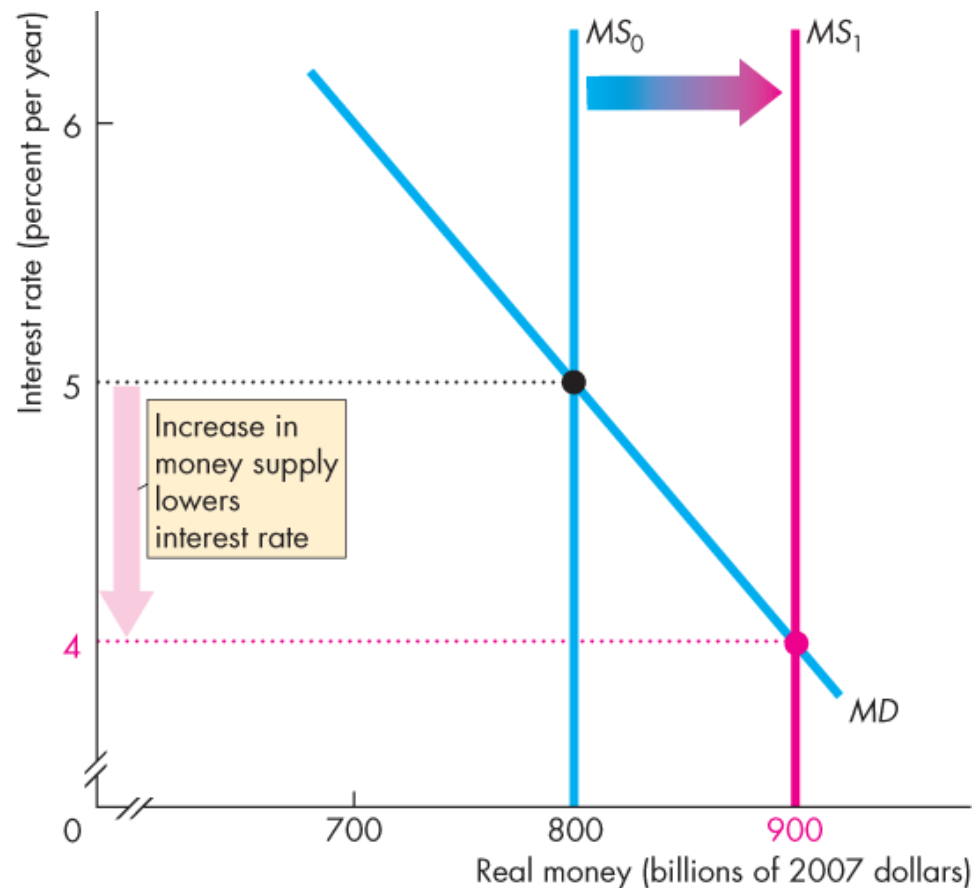
The Short-Run Effect of a Change in the Quantity of Money

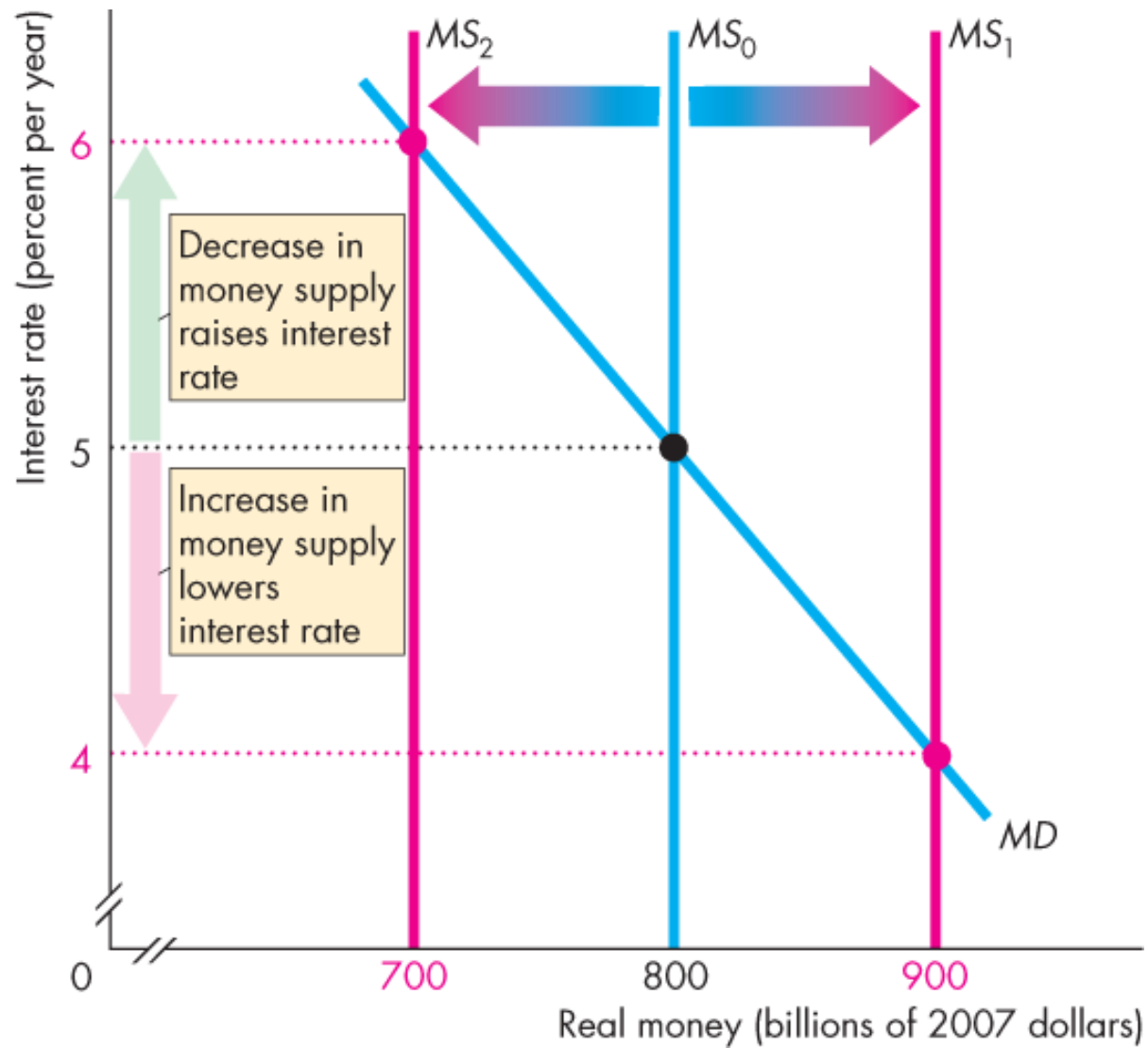
Initially, the interest rate is 5 percent a year.

If the Bank increases the quantity of money, people will be holding more money than the quantity demanded.

So they buy some bonds.

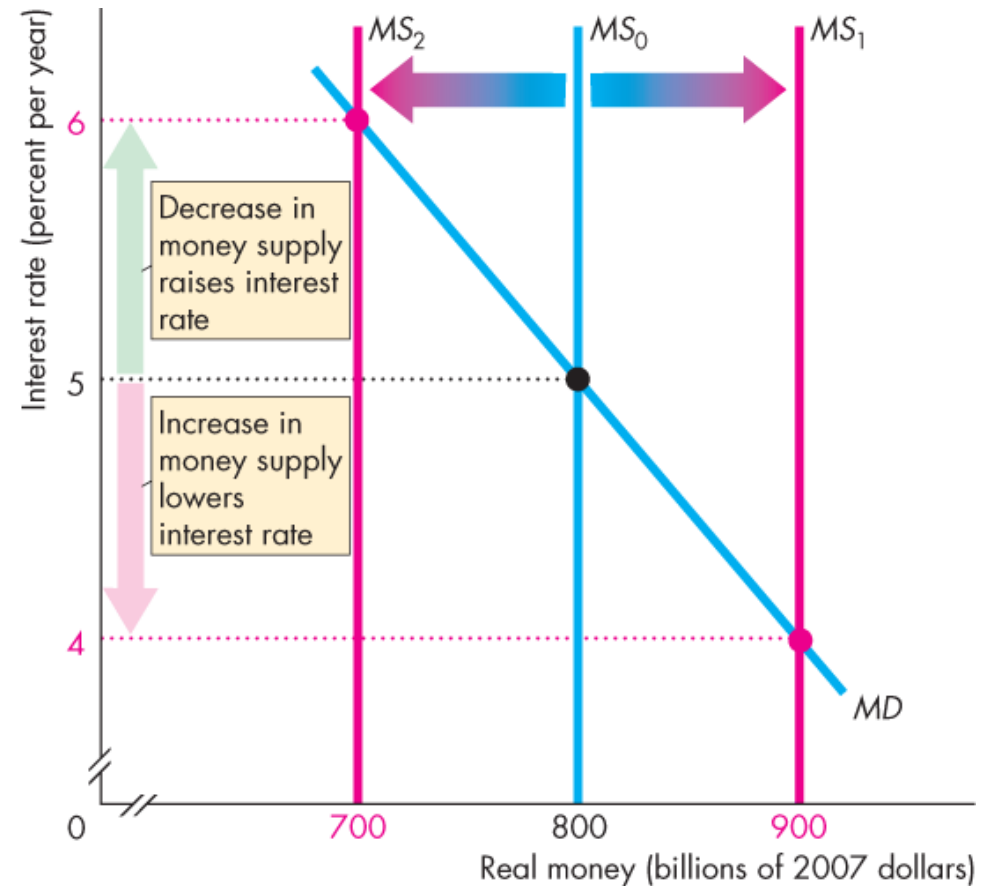
The increased demand for bonds raises the bond price and lowers the interest rate.





The Money Market

Initially, the interest rate is 5 percent a year. If the Bank decreases the quantity of money, people will be holding less money than the quantity demanded. So they sell bonds. The increased supply of bonds lowers the bond price and raises the interest rate.



The Money Market

Long-Run Equilibrium

In the long run, the loanable funds market determines the real interest rate.

Nominal interest rate equals the equilibrium real interest rate plus the expected inflation rate.

In the long run, real GDP equals potential GDP, so the only variable left to adjust in the long run is the price level.

The Money Market

The price level adjusts to make the quantity of real money supplied equal to the quantity demanded.

If in long-run equilibrium, the Bank of Canada increases the quantity of money, the price level changes to move the money market to a new long-run equilibrium.

In the long run, nothing real has changed.

Real GDP, employment, quantity of real money, and the real interest rate are unchanged.

In the long run, the price level rises by the same percentage as the increase in the quantity of money.

The Money Market

The Transition from the Short Run to the Long Run

Start in full-employment equilibrium:

If the Bank of Canada increases the quantity of money by 10 percent, the nominal interest rate falls.

As people buy bonds, the real interest rate falls.

As the real interest rate falls, consumption expenditure and investment increase. Aggregate demand increases.

With the economy at full employment, the price level rises.

The Money Market

As the price level rises, the quantity of real money decreases.

The nominal interest rate and the real interest rate rise. As the real interest rate rises, expenditure plans are cut back and eventually the original full-employment equilibrium is restored.

In the new long-run equilibrium, the price level has risen 10 percent but nothing real has changed.

The Quantity Theory of Money

The quantity theory of money is the proposition that, in the long run, an increase in the quantity of money brings an equal percentage increase in the price level.

The quantity theory of money is based on the velocity of circulation and the equation of exchange.

The velocity of circulation is the average number of times in a year a dollar is used to purchase goods and services in GDP.

The Quantity Theory of Money

Calling the velocity of circulation V , the price level P , real GDP Y , and the quantity of money M :

$$V = PY \div M.$$

The equation of exchange states that

$$MV = PY.$$

The equation of exchange becomes the quantity theory of money if M does not influence V or Y .

So in the long run, the change in P is proportional to the change in M .

The Quantity Theory of Money

Expressing the equation of exchange in growth rates:

Money growth rate + = Inflation rate + Rate of
velocity change Real GDP growth

Rearranging:

Inflation rate = Money growth rate + Rate of velocity change
 [?] Real GDP growth

In the long run, velocity does not change, so

Inflation rate = Money growth rate [?] Real GDP growth



Mathematical Note: The Money Multiplier

To see how the process of money creation works, suppose that the desired reserve ratio is 10 percent and the currency drain ratio is 50 percent of deposits.

The process starts when all banks have zero excess reserves and the Bank of Canada increases the monetary base by \$100,000.

The figure in the next slide illustrates the process and keeps track of the numbers.

Mathematical Note: The Money Multiplier

The bank with excess reserves of \$100,000 loans them.
Of the amount loaned, \$33,333 drains from the bank as currency and \$66,667 remains on deposit.
Currency drain is 50 percent of deposits.

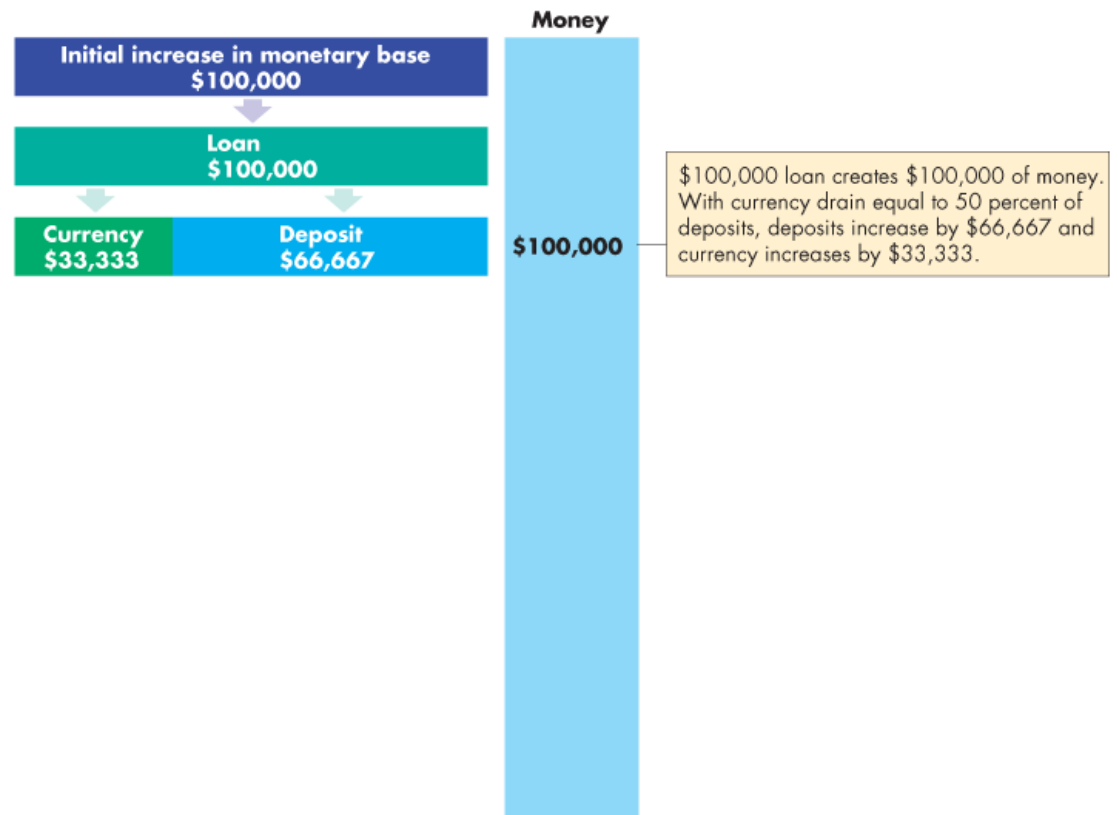


Figure 1 The Money Creation Process



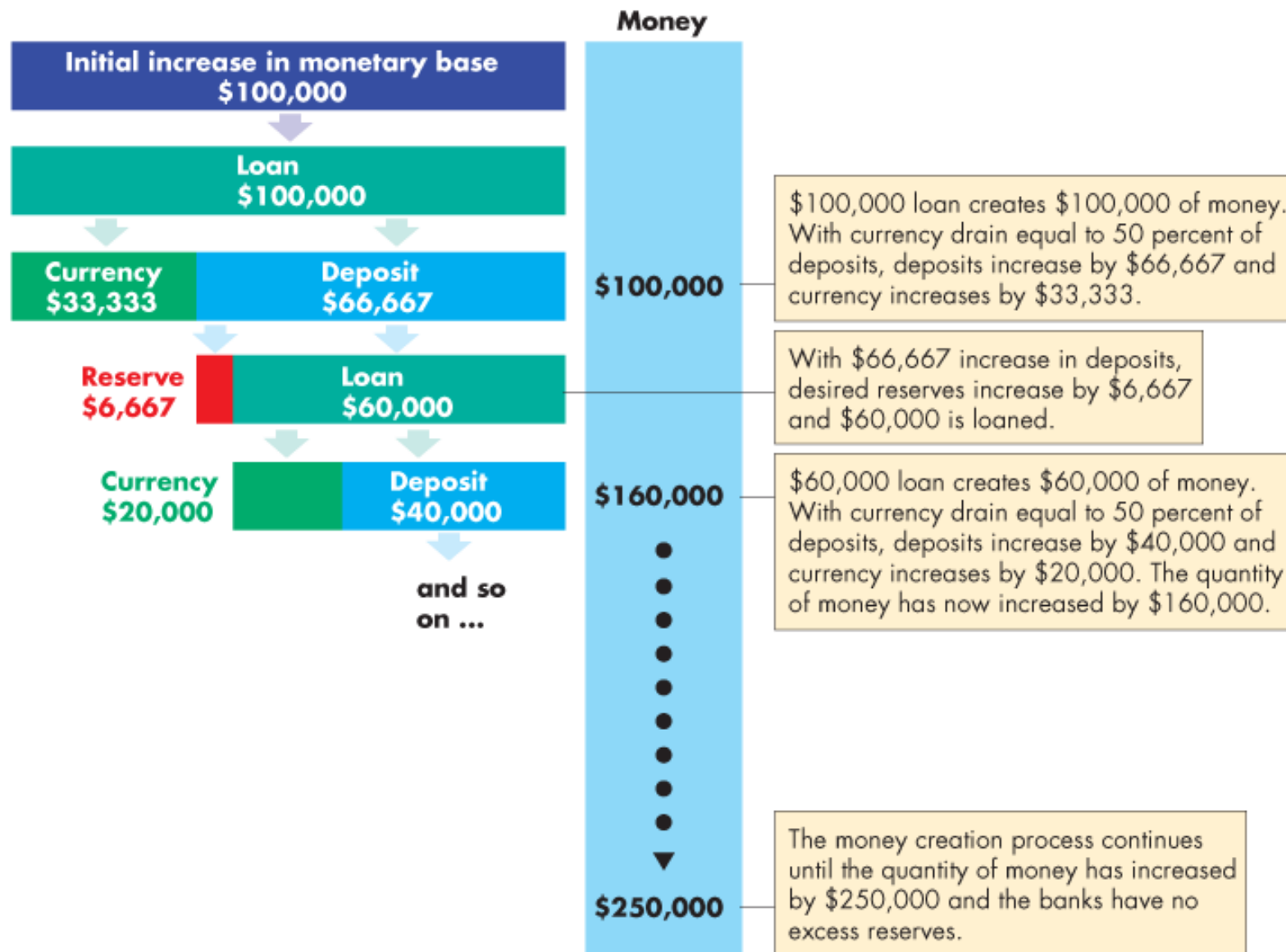


Figure 1 The Money Creation Process

Mathematical Note: The Money Multiplier

The bank's reserves and deposits have increased by \$66,667, so the bank keeps \$6,667 (10 percent of deposits) as reserves and loans out \$60,000.

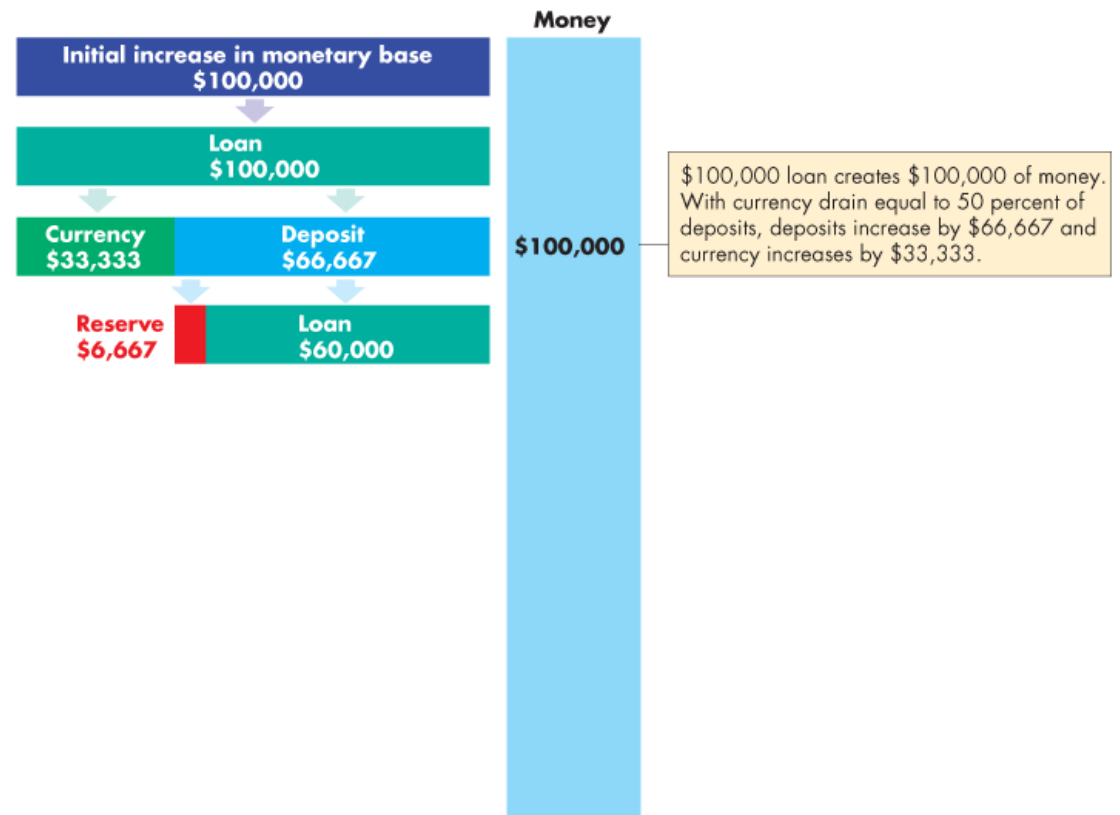


Figure 1 The Money Creation Process

Mathematical Note: The Money Multiplier

\$20,000 drains off as currency and \$40,000 remains on deposit. Again, the currency drain is 50 percent of deposits.

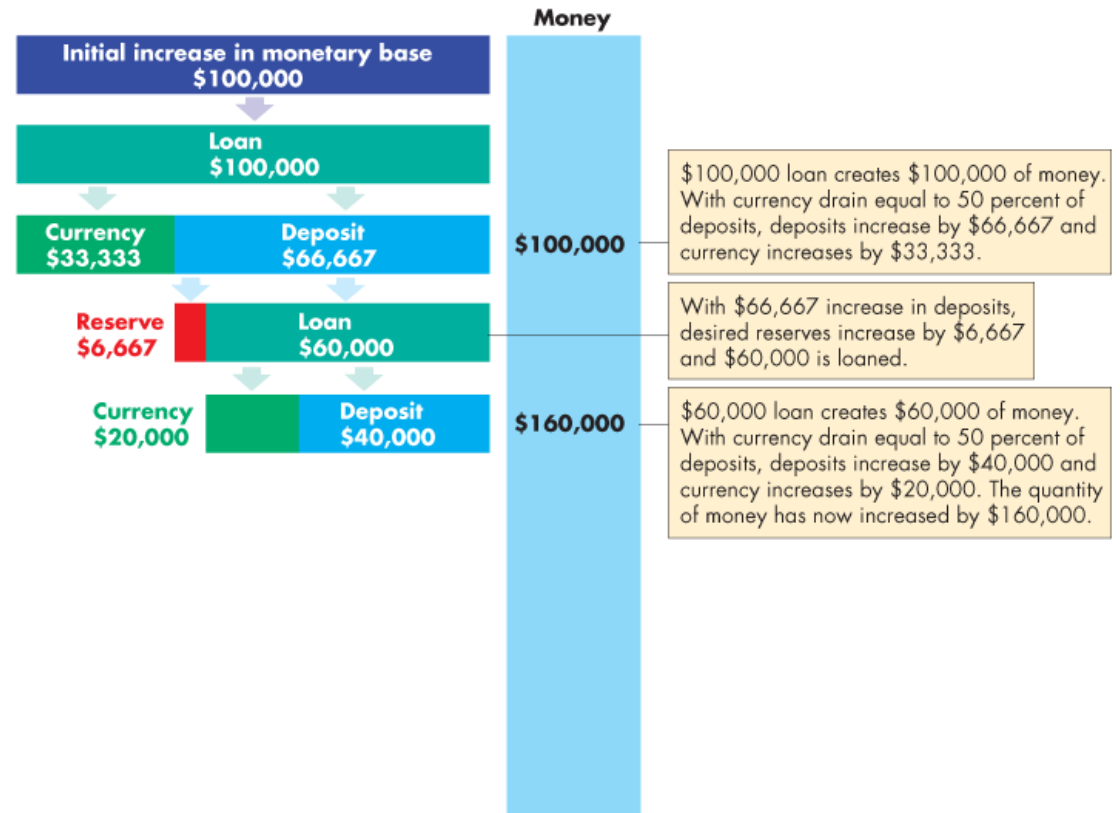


Figure 1 The Money Creation Process

Mathematical Note: The Money Multiplier

The process repeats until the banks have created enough deposits to eliminate the excess reserves. The \$100,000 increase in monetary base has created \$250,000 of money.

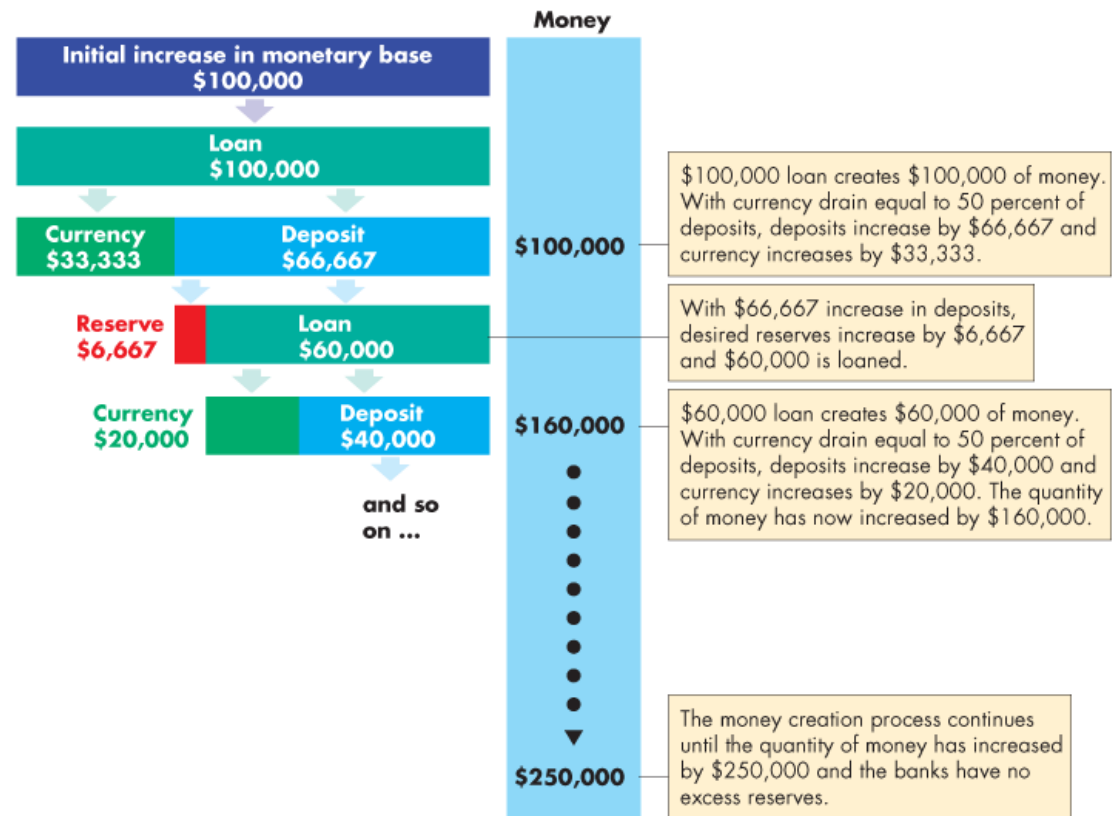


Figure 1 The Money Creation Process

Mathematical Note: The Money Multiplier

The size of the money multiplier depends on

< The currency drain ratio (C/D)

< The desired reserve ratio (R/D)

Money multiplier = $(1 + C/D)/(C/D + R/D)$

In our example, C/D is 0.5 and R/D is 0.1, so

$$\begin{aligned}\text{Money multiplier} &= (1 + 0.5)/(0.1 + 0.5) \\ &= (1.5)/(0.6) \\ &= 2.5\end{aligned}$$