

Chapter 24

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

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 for other goods and services, which is called **barter**.

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

Unit of Account

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

TABLE 8.1 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 per cone	2 packs of jelly beans
Jelly beans	\$1 per pack	2 sticks of gum
Gum	\$0.50 per stick	

Store of Value

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

Money in Canada Today

Money in Canada consists of

- Currency
- Deposits of individuals and businesses at banks and other depository institutions

Currency is the notes and coins held by households and firms.

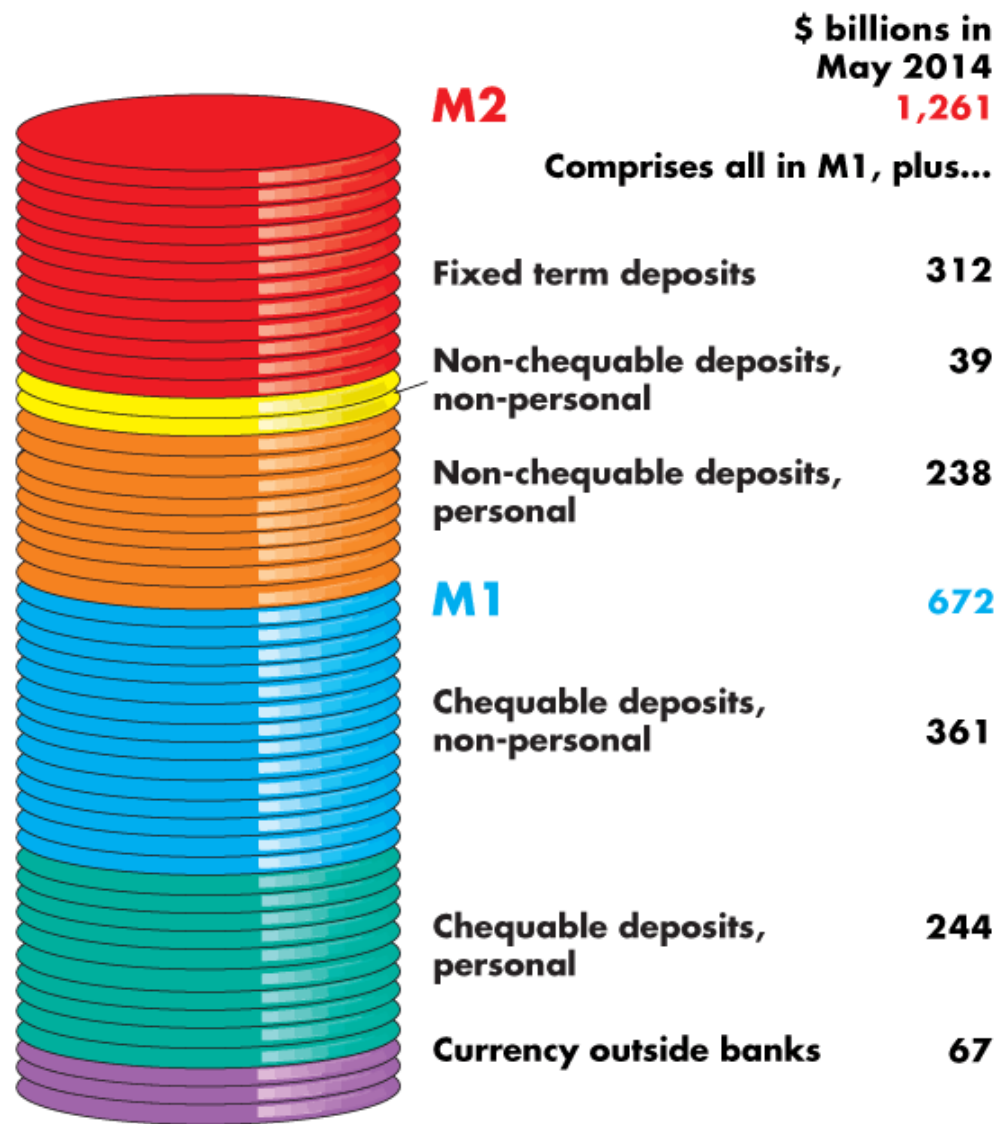
Deposits are money because the owners of the deposits can use them to make payments.

Official Measures of Money

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

M1 consists of currency and checking deposits held by individuals and businesses.

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



Two Official Measures of Money

Are M1 and M2 Really Money?

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

Some components of M2 can easily be converted into a means of payment without loss in value. They are called liquid assets.

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

Because the deposits in M2 can be quickly and easily converted into a means of payment, they are counted as money.

Deposits are Money but Cheques Are Not

In defining money, we include, along with currency, deposits at banks and other depository institutions.

But we do not count the cheques that people write as money.

A cheque is an instruction to a bank to transfer money.

Credit Cards Are Not Money

Credit cards are not money.

A credit card enables the holder to obtain a loan, but it must be repaid with money.

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

Chartered Banks

A chartered bank is a 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.

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.

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

TABLE 24.2 Chartered Banks: Sources and Uses of Funds

	\$ billions April 2014	Percentage of deposits
Total funds	2,243	151.7
Sources		
Deposits	1,479	100.0
Borrowing	532	36.0
Own capital	232	15.7
Uses		
Reserves	28	1.9
Liquid assets	83	5.6
Securities	340	23.0
Loans	1,792	121.2

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

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

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.

Bank of Canada

- central bank - the public authority that supervises other banks and financial institutions, financial markets and the payments system, and conducts monetary policy.
- established in 1935.
- management structure:

The Bank of Canada is:

■ 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.

■ Banker to the 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

which means that it stands ready to make loans when the banking system as a whole is short of reserves.

The Bank of Canada's Balance Sheet

The Bank of Canada has two main assets

- (i) government securities, and
- (ii) loans to depository institutions

Its liabilities are

- (i) Bank of Canada notes, and
- (ii) depository institution deposits

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, coins, and depository institution deposits at the Bank of Canada.

TABLE 24.3 The Sources and Uses of the Monetary Base

Sources (billions of dollars)		Uses (billions of dollars)	
Government of Canada securities	64.7	Notes	64.5
Loans to depository institutions	<u>0</u>	Reserves of depository institutions	<u>0.2</u>
Monetary base	<u>64.7</u>	Monetary base	<u>64.7</u>

Source of data: Statistics Canada. The data are for June 2014.

The Conduct of Monetary Policy

The Bank of Canada's Policy Tools

To achieve its objectives, the BOC uses two main policy tools:

- Open market operations
- Bank rate

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

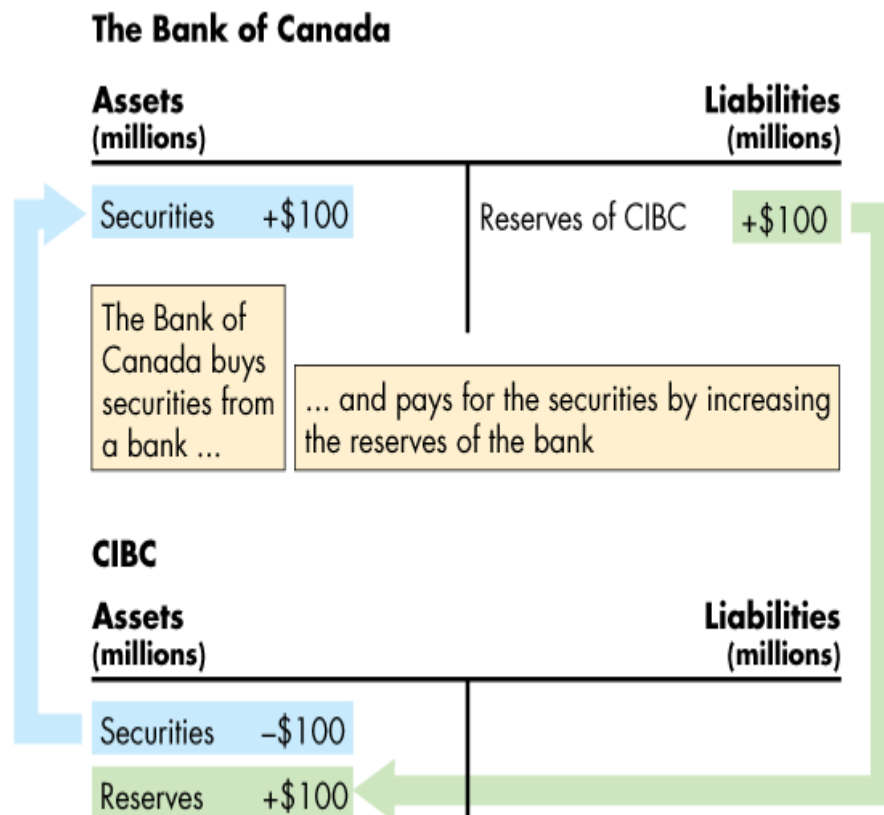
The interest rate on these loans is **bank rate**.

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.

An Open Market Purchase

The effects of an open market *purchase* on the balance sheets of the Bank of Canada and CIBC.

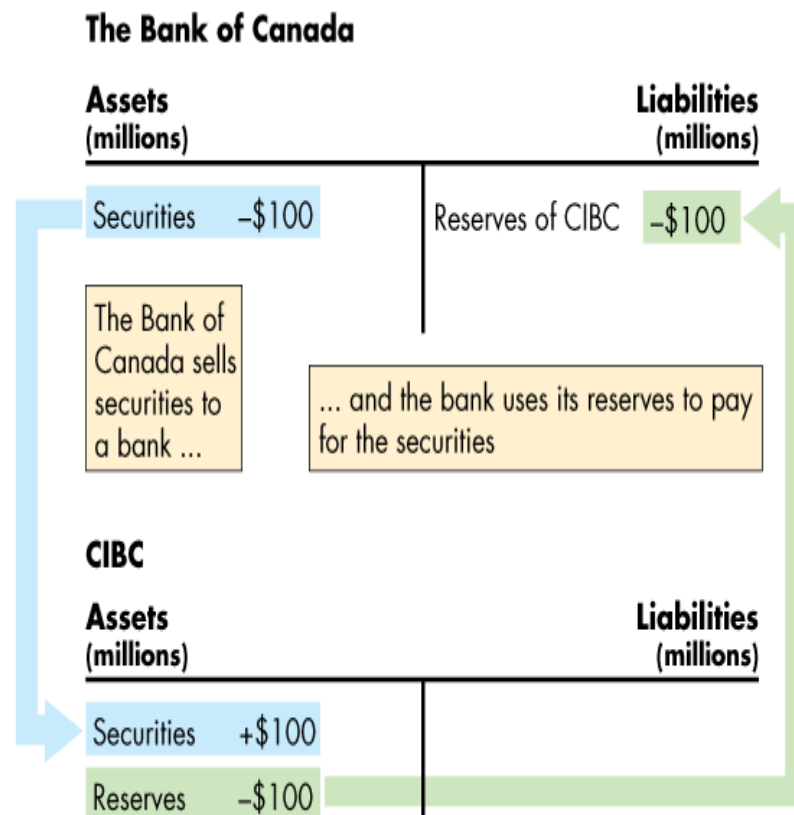
The open market purchase *increases* bank reserves.



An Open Market Sale

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.



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

The Monetary Base

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

$$\mathbf{MB = C + R}$$

Desired Reserves

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

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.

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.

If bank deposits increase, desired currency holding also increases.

Thus, when banks make loans that increase deposits, some currency leaves the banks.

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

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

The Money Creation Process and the Money Multiplier

The money creation process begins with an increase in the monetary base.

Suppose that the BOC conducts an open market operation in which it buys securities from a bank (say, Premier Bank).

The BOC pays for the securities with newly created bank reserves.

Premier Bank now has more reserves (\$100) but the same amount of deposits, so they have excess reserves.

Instead of keeping the \$100 in their vault or deposit at the BOC, suppose that Premier Bank decided to loan all of it to an individual and the individual in turn deposit the \$100 to Bank A.

Excess reserves = Actual reserves – Desired reserves.

*** Assume that the desired reserve ratio is 0.10 and the currency-deposit ratio is 0 ***

Bank A will now find itself with a \$100 deposit. What to do with it?

- \$10 of which needs to be kept in reserve and \$90 can be loaned out.
- Bank A decided to loan the \$90 to another individual and the individual in turn deposit the \$90 to Bank B.

Bank B now has a \$90 deposit: need to keep \$9 in reserve and loan the remaining \$81.

<u>Bank</u>	<u>Increase in Deposits (\$)</u>
Premier Bank	0.00
Bank A	100.00
Bank B	90.00
Bank C	81.00
.	
.	
.	
Total for all banks	1000.00

Let R/D = desired reserve ratio

$$\begin{aligned}
 M &= \$100 + (1 - R/D) * \$100 + (1 - R/D) * (1 - R/D) * \$100 + (1 - R/D) * (1 - R/D) * (1 - R/D) * \$100 + \dots \\
 &= \$100 + (1 - R/D) * \$100 + (1 - R/D)^2 * \$100 + (1 - R/D)^3 * \$100 + \dots \\
 &= \$100 * [1 + (1 - R/D) + (1 - R/D)^2 + (1 - R/D)^3 + \dots] \\
 &= \$100 * [1 / R/D]
 \end{aligned}$$

$$M = MB * (\text{money multiplier})$$

Define

money as the sum of currency and chequable deposits:

$$M = C + D$$

monetary base as the sum of currency and reserves:

$$MB = C + R$$

Take the ratio: $M/MB = (C + D) / (C + R)$

Divide both numerator and denominator of the right-hand side by D :

$$M/MB = (C/D + 1) / (C/D + R/D)$$

where C/D is the currency-deposit ratio or currency drain ratio

R/D is reserve-deposit ratio or desired reserve ratio

Therefore, $M = MB * [(C/D + 1) / (C/D + R/D)]$

The **money multiplier** m is $(C/D + 1) / (C/D + R/D)$.

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 BOC increases the monetary base by \$100,000 and the quantity of money increases by \$250,000, the money multiplier is 2.5.

In general,

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

The Price Level

Nominal money is the amount of money measured in dollars.

Real money equals nominal money \div 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 *Nominal* Interest Rate

The nominal interest rate is the opportunity cost of holding wealth in the form of money.

Real GDP

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

Financial Innovation

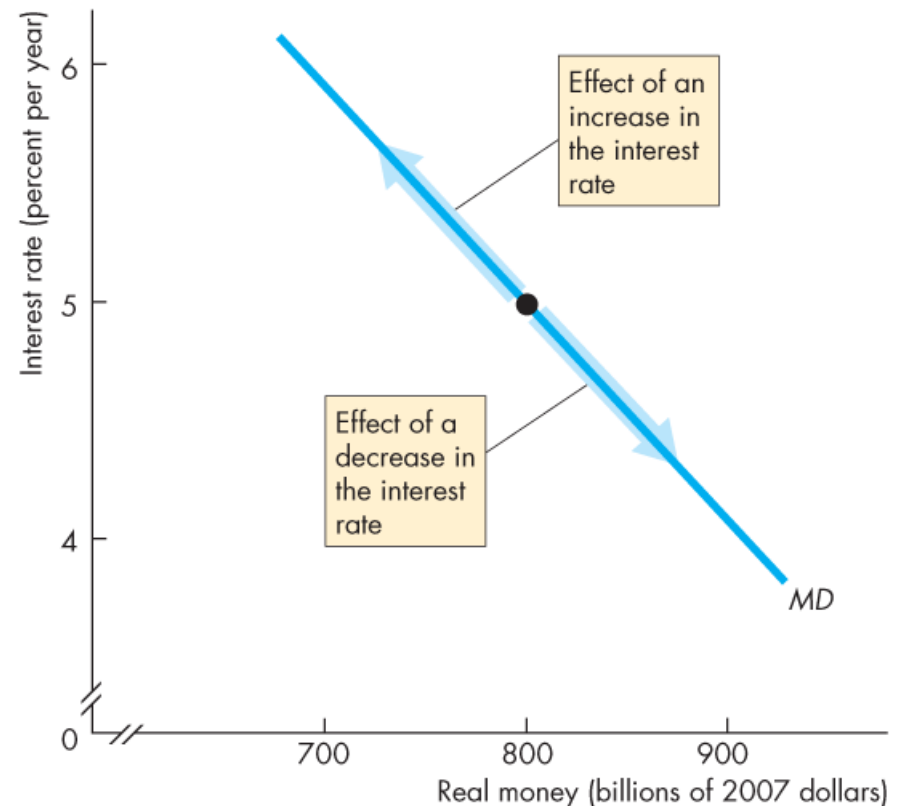
Financial innovation that lowers the cost of switching between money and interest-bearing assets decreases the quantity of real money that people plan to hold.

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.

A rise in the interest rate brings a decrease in the quantity of real money demanded.

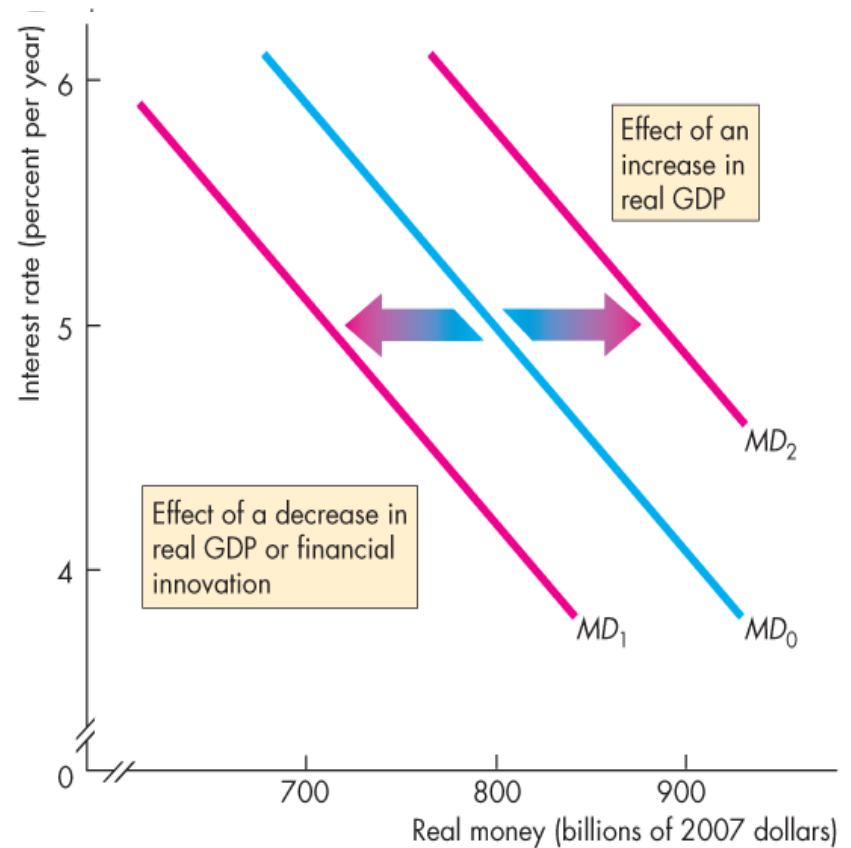
A fall in the interest rate brings an increase in the quantity of real money demanded.



Shifts in the Demand for Money Curve

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.



Money Market Equilibrium

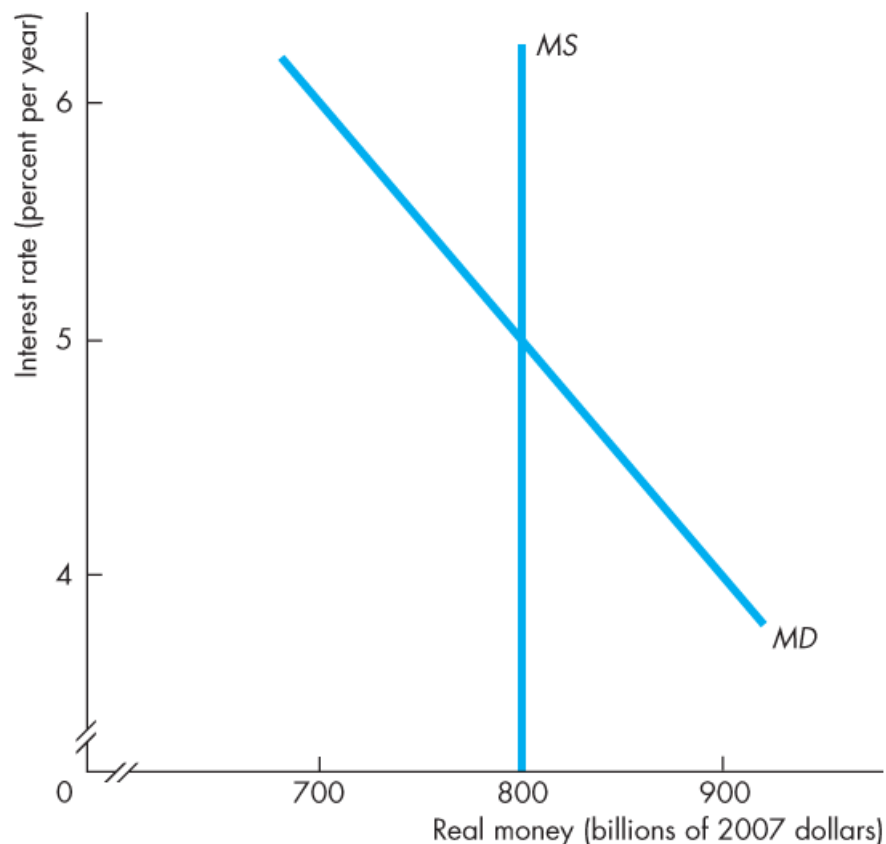
Money market equilibrium occurs when the quantity of money demanded equals the quantity of money supplied.

Adjustments that occur to bring about money market equilibrium are fundamentally different in the short run and the long run.

Short-Run Equilibrium

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.

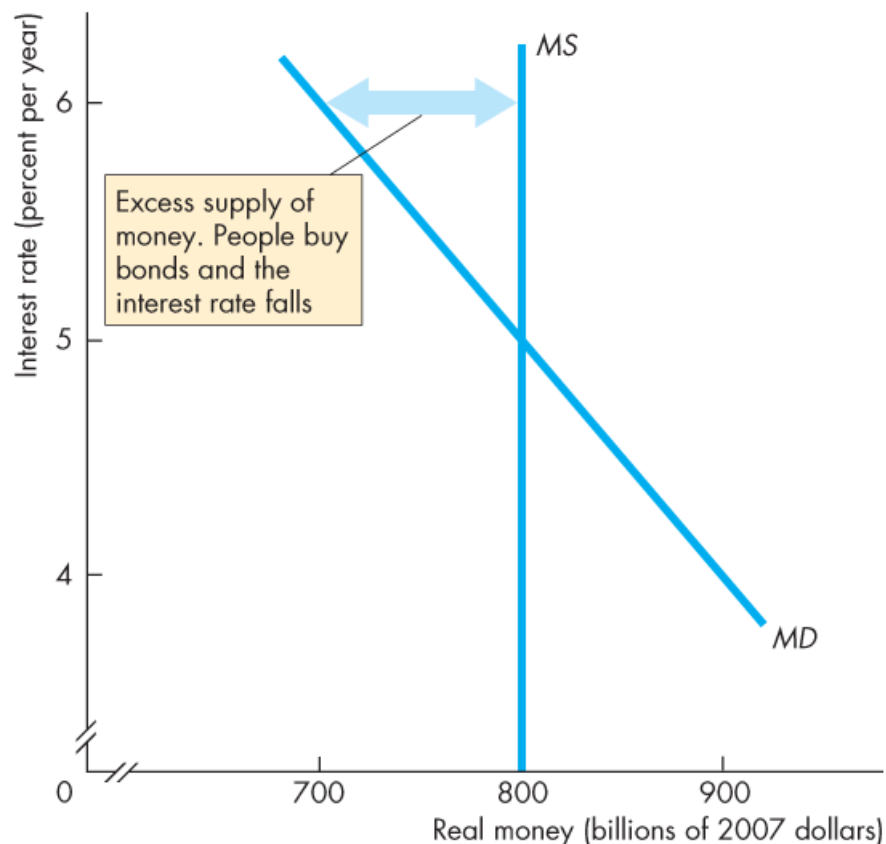


If the interest rate exceeds the 5 percent a year, ...

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.

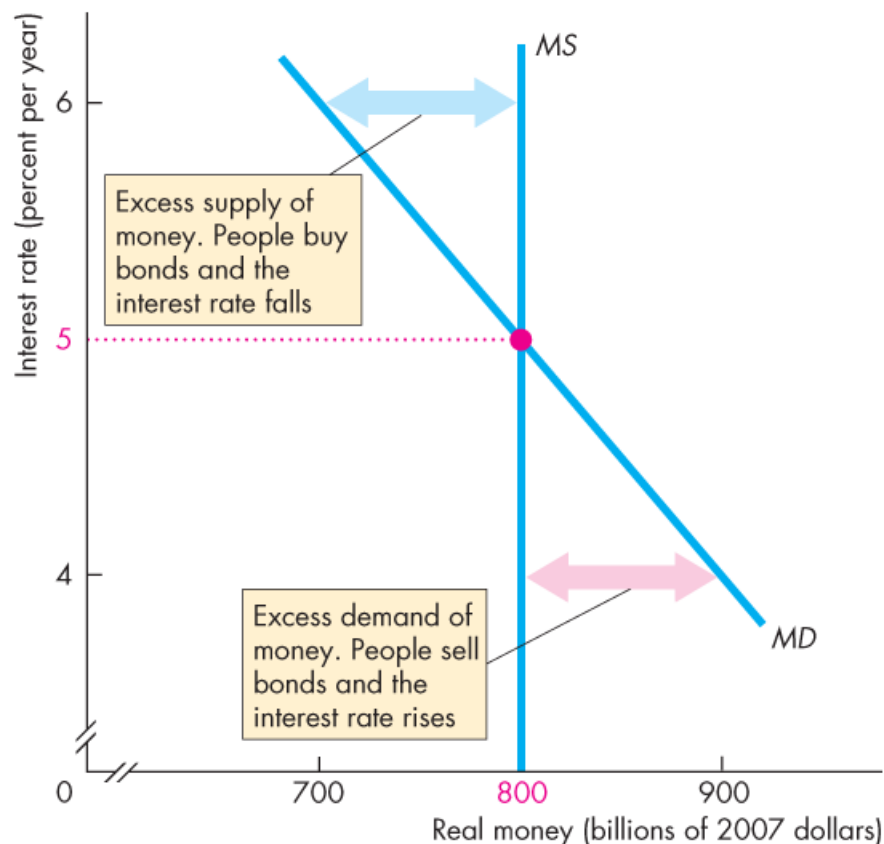


If the interest rate is below 5 percent a year, ...

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.



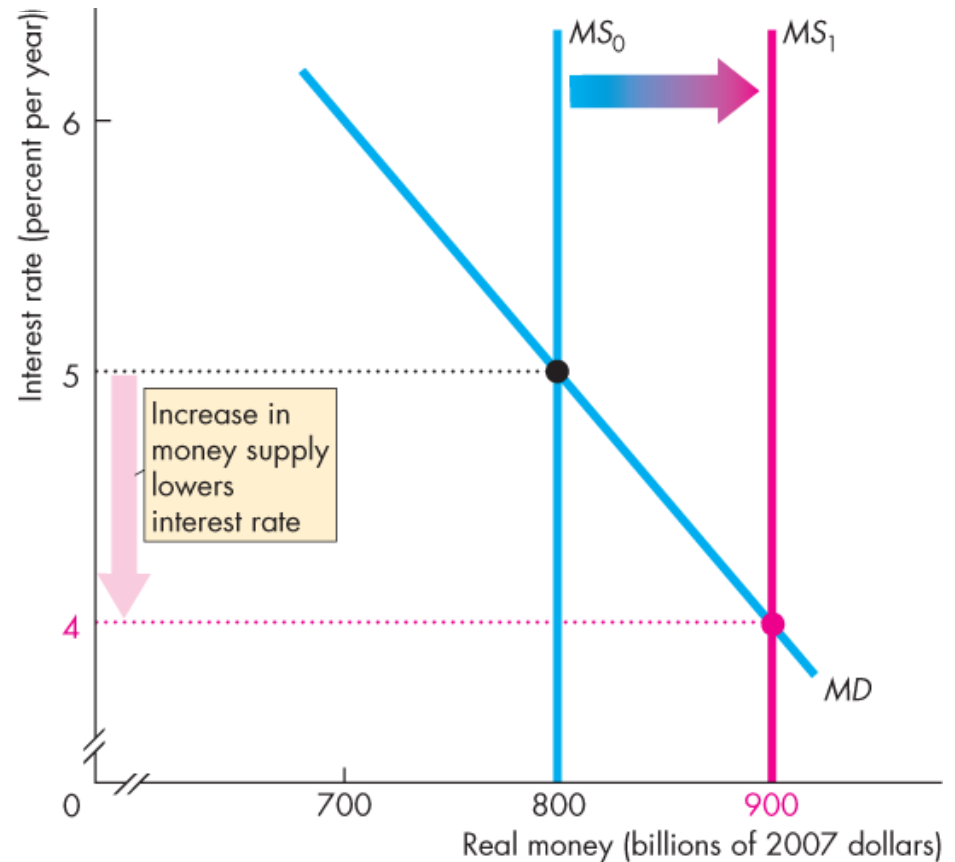
The Short-Run Effect of a Change in the Quantity of Money

Initially, the interest rate is 5 percent a year.

If the BOC 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.

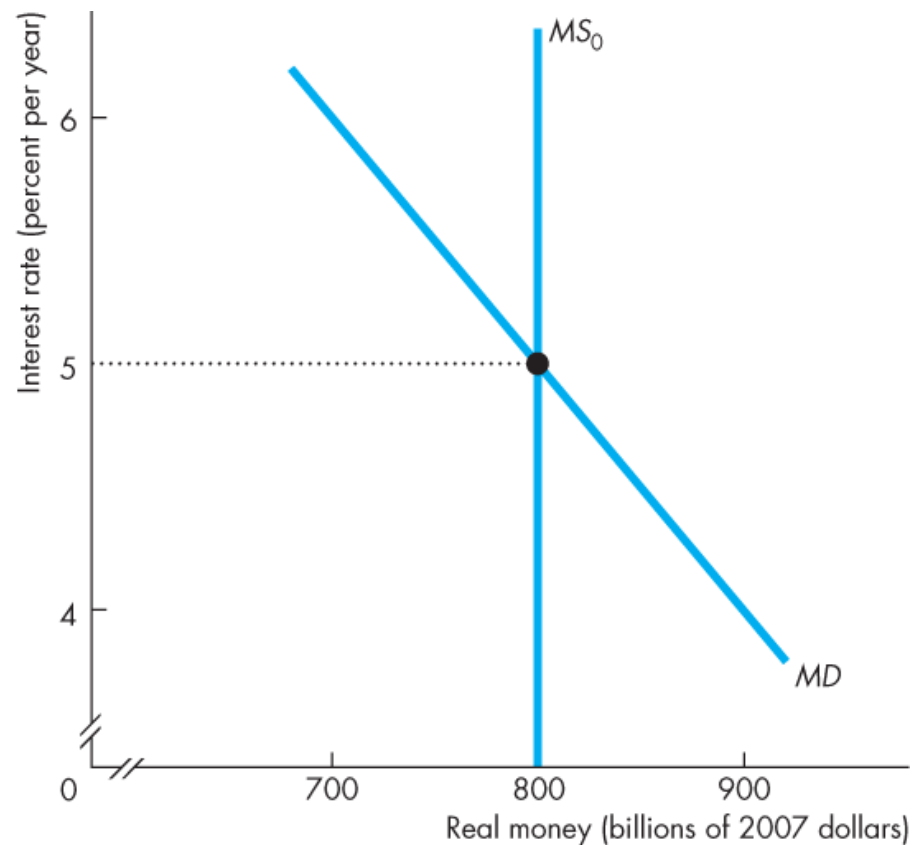


Initially, the interest rate is 5 percent a year.

If the BOC 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.



Long-Run Equilibrium

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

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

If in long-run equilibrium, the BOC 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 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.

Denote the velocity of circulation as 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 .

$$MV = PY$$

Expressing the equation of exchange in growth rates:

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

Rearranging:

Inflation rate = Money growth rate + Growth rate of velocity – Real GDP growth

In the long run, velocity does not change, so

Inflation rate = Money growth rate – Real GDP growth

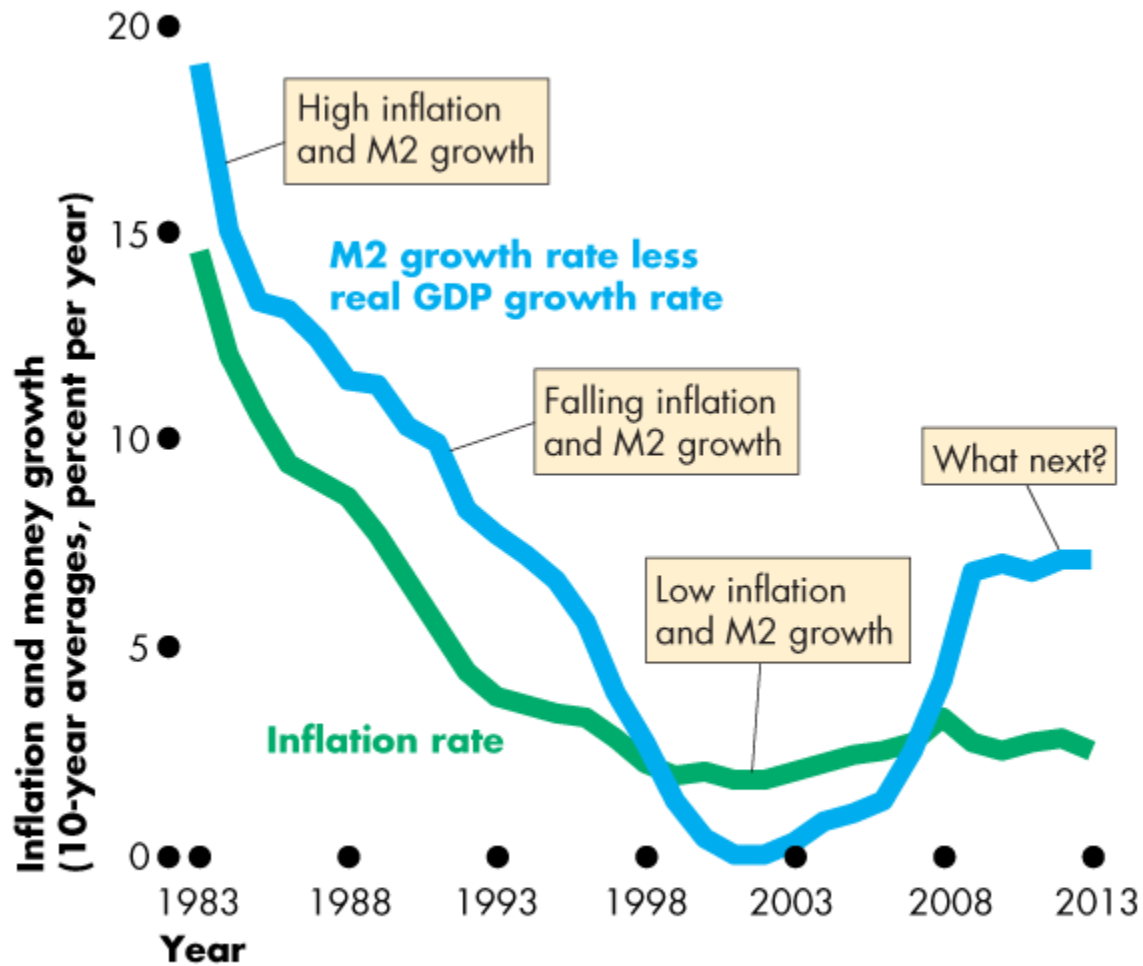


Figure 1 Canadian Money Growth and Inflation

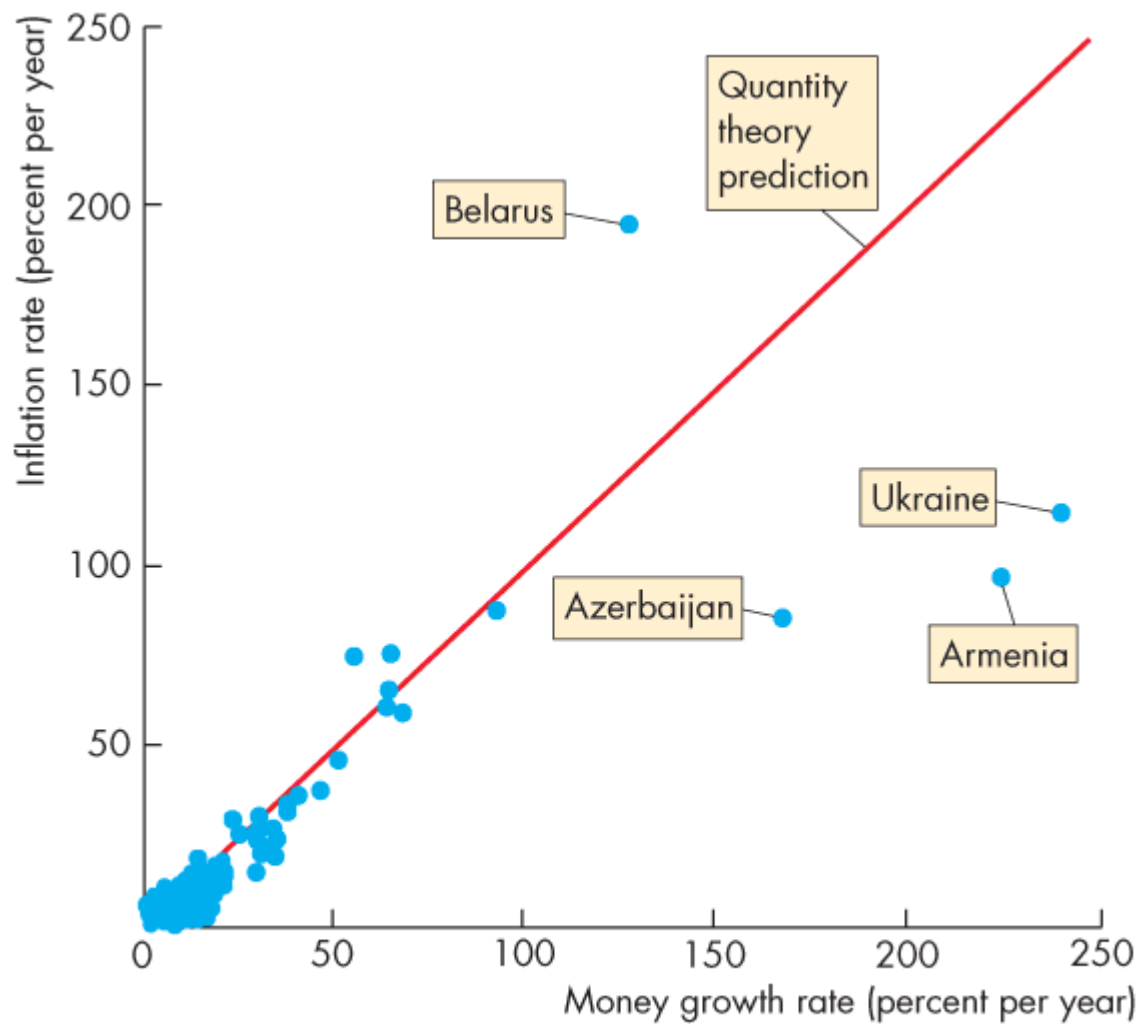


Figure 2 134 Countries: 1990–2005

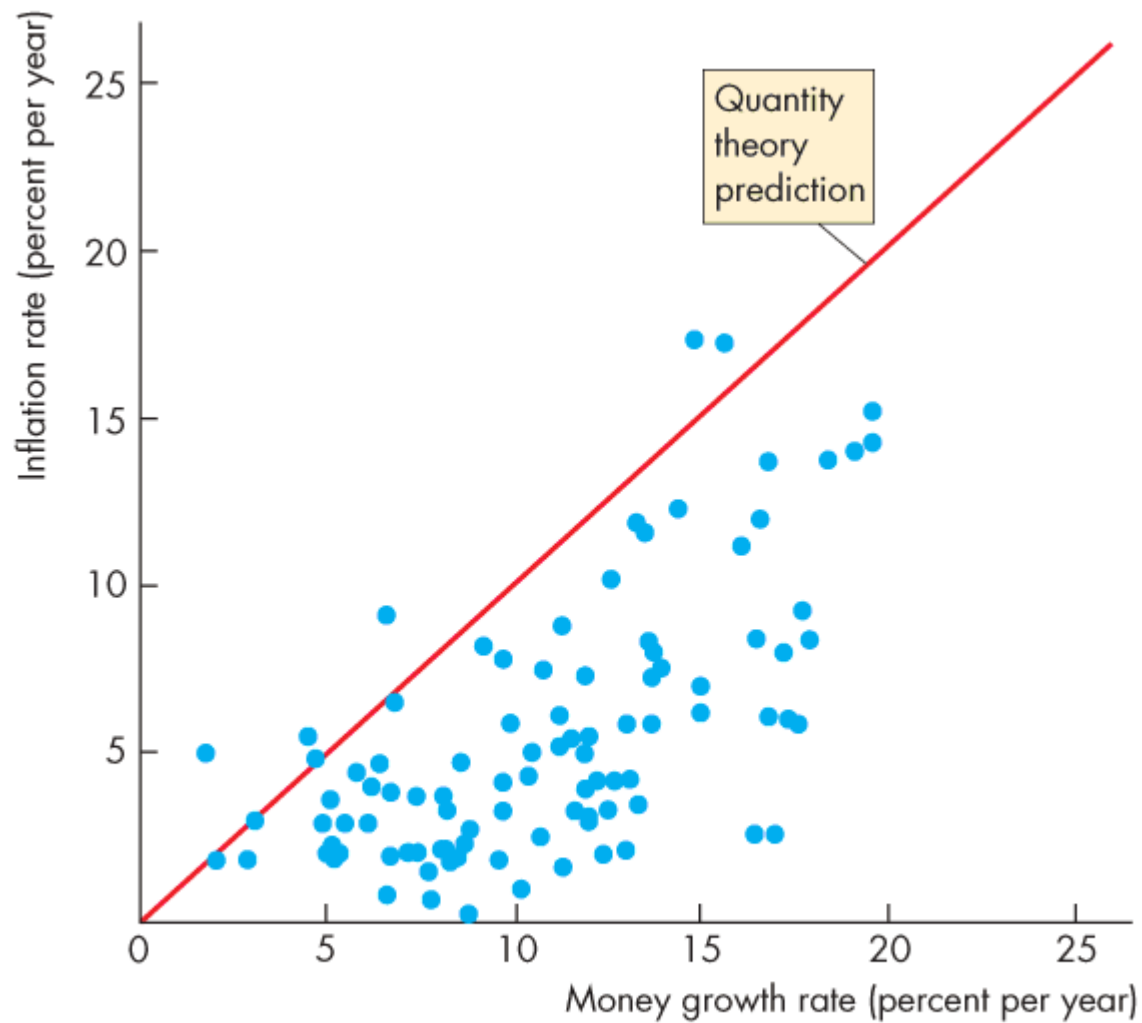


Figure 3 Lower-Inflation Countries: 1990–2005