24 Money, the Price Level, and Inflation

After studying this chapter, you will be able to

- Define money and describe its functions
- Describe the banking system and explain the economic functions of banks, the Bank of Canada, and the payments system
- Explain how the banking system creates money
- Explain what determines the demand for money, the supply of money, and the nominal interest rate
- Explain how the quantity of money influences the price level and the inflation rate in the long run

Money has taken many forms. What is money today?

What happens when the bank lends the money we're deposited to someone else?

How does the Bank of Canada influence the quantity of money?

What happens when the Bank of Canada creates too much money?

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.

Store of Value

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

What is Money?

Money in the United States Today

Money in the United States consists of

- Currency
- Deposits at banks and other depository institutions

The notes and coins held by households and firm is called **currency**.

What is Money?

Official Measures of Money

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

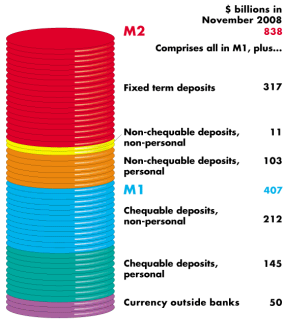
M1 consists of currency and chequable deposits of individuals and businesses.

M2 consists of M1 plus all other deposits.

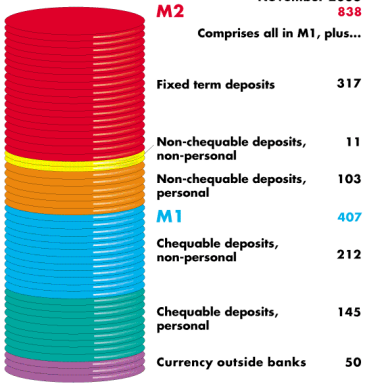
What is Money?

The figure illustrates the composition of M1 and M2 in November 2008.

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.

Some saving 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.

The Banking System

The banking system consists of private and public institutions that create money and manage the nation's monetary and payments systems.

These institutions play a crucial role in financial markets. They are

- Depository institutions
- The Bank of Canada
- The payments system

The Banking System

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

The institutions in the banking system divide into

- Chartered banks
- Credit unions and caisses populaires
- Trust and mortgage loan companies

The Banking System

Chartered Banks

A **chartered bank** is a private firm private firm, chartered under the Bank Act of 1992 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 1992 and that receives deposits from and makes loans to its members.

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

The Banking System

Trust and Mortgage Loan Companies

A **trust and mortgage loan company** is a privately owned depository institution that operates under the Trust and Loan Companies Act of 1992.

The Banking System

What Depository Institutions Do

To 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.

The Banking System

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

1. Reserves—notes and coins in its vault or its deposit at the Bank of Canada
2. Liquid assets—government of Canada Treasury bills and commercial bills
3. Securities—longer–term government of Canada bonds and other bonds such as mortgage-backed securities
4. Loans—commitments of fixed amounts of money for agreed-upon periods of time

The Banking System

Table 24.2 shows the sources and uses of funds in all Canadian chartered banks in September 2008.

TABLE 24.2 Chartered Banks: Sources and Uses of Funds

	$ billion September 2008	Percentage of deposits
Total funds	1,762.5	159.0
Sources		
Deposits	1,108.4	100.0
Borrowing and own capital	654.1	59.0
Uses		
Reserves	4.7	0.4
Liquid assets	216.0	19.5
Securities and other assets	194.7	17.6
Loans	1,347.1	121.5

TABLE 24.2 Chartered Banks: Sources and Uses of Funds

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The Banking System

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

The Banking System

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

The Banking System

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 Banking System

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 Banking System

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 Banking System

The Payments System

The **payments system** is the system through which banks make payments to each other to settle transactions by their customers.

The payments system is owned by the Canadian Payments Association (CPA) and it operates two national payments systems:

- Large Value Transfer System
- Automated Clearing Settlement System

The Banking System

Large Value Transfer System

The **Large Value Transfer System (LVTS)** is an electronic payments that enables financial institutions and their customers to make large payments instantly and with sure knowledge that the payment has been made.

Automated Clearing Settlements System

The **Automated Clearing Settlements System (ACSS)** is the system through which all payments not processed by the LVTS are handled. These payments include debit card and ABM transactions.

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

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.

How Banks Create Money

Desired Reserves

The fraction of a bank's total deposits held as reserves is the **reserve ratio**.

The **desired reserve ratio** is the ratio of reserves to deposits that banks are want to hold.

Reserves are the not required, so bank are free to determine the prudent level of reserves.

Excess reserves equal actual reserves minus desired reserves.

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 want to hold.

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

This leakage of currency is called the *currency drain*.

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

How Banks Create Money

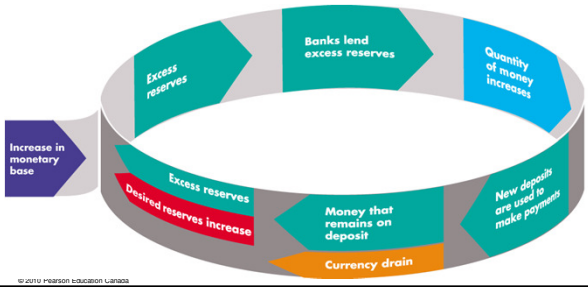
The Money Creation Process

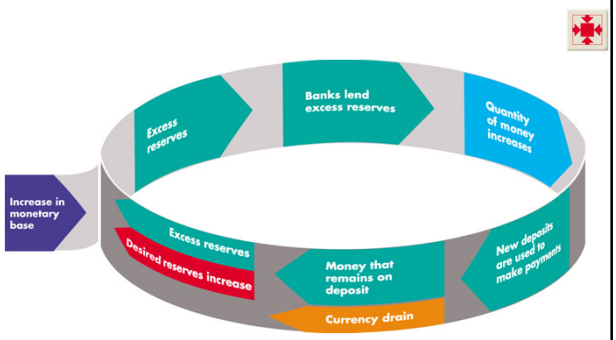
The eight steps in the money creation process are

1. Banks have excess reserves.
2. Banks lend excess reserves.
3. The quantity of money increases.
4. New money is used to make payments.
5. Some of the new money remains on deposit.
6. Some of the new money is a *currency drain.*
7. Desired reserves increase because deposits have increased.
8. Excess reserves decrease, but remain positive.

How Banks Create Money

Figure 24.1 illustrates 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.

In our example, when the monetary base increased by $100,000, the quantity of money increased by $250,000, so the money multiplier is 2.5.

The Market for Money

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 Market for Money

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 nominal money ÷ 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 Market for Money

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 Market for Money

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

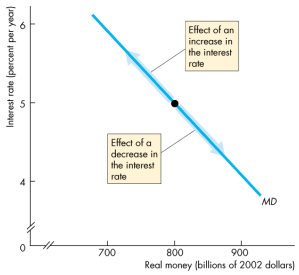
The **demand for money** is the relationship between the quantity of real money demanded and the nominal interest rate when all other influences on the amount of money that people wish to hold remain the same.

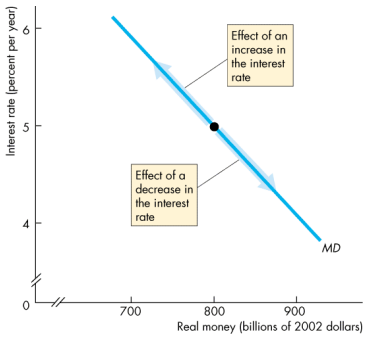
The Market for Money

Figure 24.2 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.



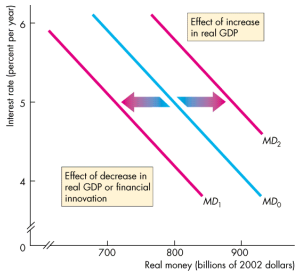


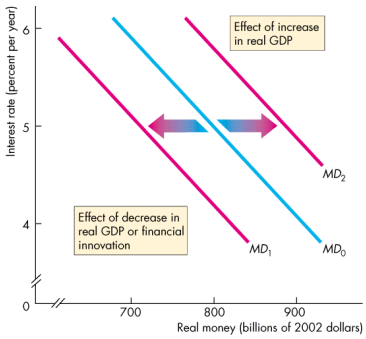
The Market for Money

Shifts in the Demand for Money Curve

Figure 24.3 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 Market for Money

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.

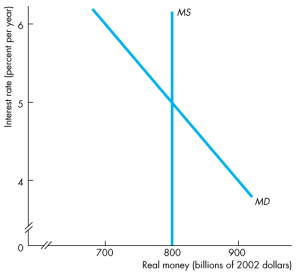
The Market for Money

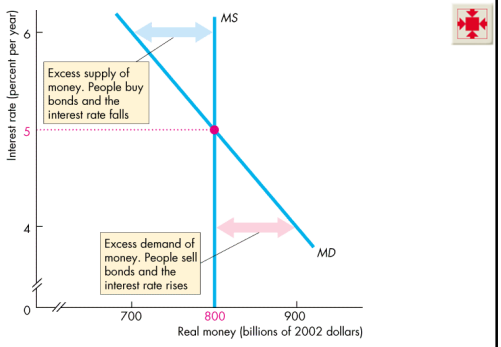
Short-Run Equilibrium

Figure 24.4 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.





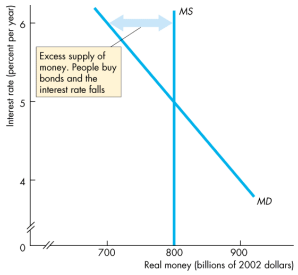
The Market for Money

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.



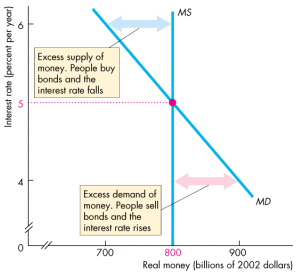
The Market for Money

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 Market for Money

Long-Run Equilibrium

In the long run, demand and supply in the loanable funds market determines the real interest rate.

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

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

The Market for Money

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

When the Bank of Canada changes the nominal quantity of money, the price level changes in the long run by the same percentage as the percentage change in the quantity of nominal money.

In the long run, the change in the price level is proportional to the change in the quantity of nominal 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.

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 + Rate of velocity change = Inflation rate + 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.

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 (50 percent) drains from the bank as currency and $66,667 remains on deposit.

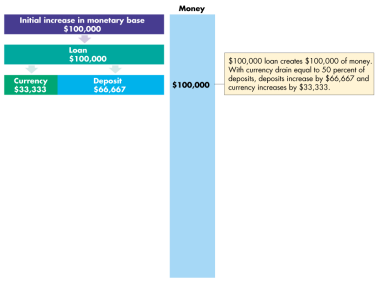


Figure 1 The money creation process

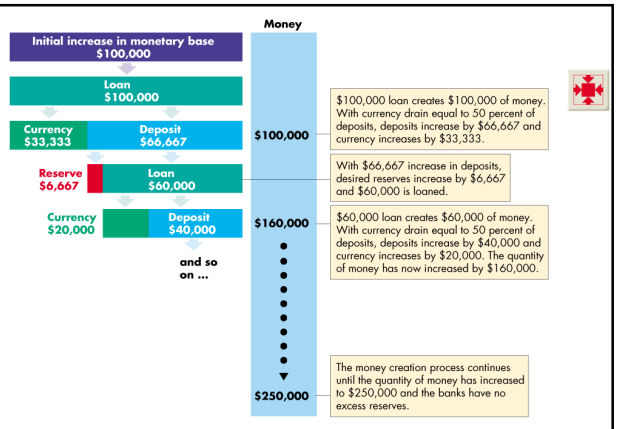


Figure 1 The money creation process

Mathematical Note: The Money Multiplier

The bank's reserves and deposits have increased by $66,667,

so the bank keeps $6,667 (10 percent) as reserves and loans out $60,000.

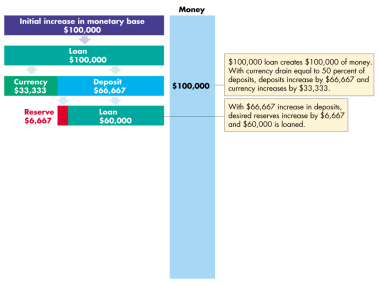


Figure 1 The money creation process

Mathematical Note: The Money Multiplier

$20,000 (50 percent of the loan) drains off as currency and $40,000 remain on deposit.

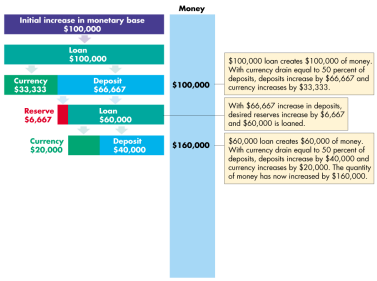


Figure 1 The money creation process

Mathematical Note: The Money Multiplier

The process repeats until the banks have created enough deposits to eliminate the excess reserves.

$100,000 of excess reserves creates $250,000 of money.

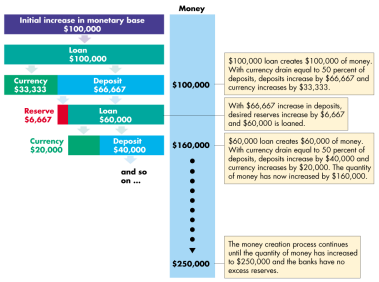


Figure 1 The money creation process

Mathematical Note: The Money Multiplier

The size of the money multiplier depends on

- The currency drain ratio, *a*
- The desired reserve ratio, *b*

Money multiplier = $(1 + a)/(a + b)$

In our example, *a* is 0.5 and *b* is 0.1, so

Money multiplier = $(1 + 0.5)/(0.1 + 0.5)$

$= (1.5)/(0.6)$

$= 2.5$