

# Principles of Economics, 10e

## Chapter 30: The Monetary System

# Chapter Objectives (1 of 2)

By the end of this chapter, you should be able to:

- Define the three functions of money.
- Given a list of assets, order the assets from most liquid to least liquid.
- Identify an example of money as commodity money or fiat money.
- Differentiate between various money aggregates.
- Identify the responsibilities of the Federal Reserve System.
- Explain how open market operations impact the money supply.

# Chapter Objectives (2 of 2)

- Explain how the Fed uses the interest it pays on bank reserves to adjust short-term interest rates.
- Explain why the Federal Reserve does not have perfect control of the money supply.

# 30-1

## The Meaning of Money

# Barter and Money

- Barter
  - Exchanging one good or service for another
  - Requires a double coincidence of wants
    - Unlikely occurrence that two people each have a good or service the other wants
    - Waste of resources: People spend time searching for others to trade with
- Using money solves those problems

# Money

- **Money\***
  - Set of assets in an economy that people regularly use to buy goods and services
- Money serves three functions
  - Medium of exchange
  - A unit of account
  - A store of value

\*Words accompanied by an asterisk are key terms from the chapter.

# The Functions of Money

- **Medium of exchange\***
  - Item that buyers give to sellers when they want to purchase goods and services
- **Unit of account\***
  - Yardstick people use to post prices and record debts
- **Store of value\***
  - Item that people can use to transfer purchasing power from the present to the future

\*Words accompanied by an asterisk are key terms from the chapter.

# Store of Value

- Wealth
  - The total of all stores of value, including both money and nonmonetary assets
- **Liquidity\***
  - The ease with which an asset can be converted into the economy's medium of exchange

\*Words accompanied by an asterisk are key terms from the chapter.



# The Kinds of Money

- **Commodity money\***
  - Money that takes the form of a commodity with intrinsic value
  - Item would have value even if it were not used as money
    - For example, gold coins
- **Fiat money\***
  - Money without intrinsic value that is used as money by government decree
    - For example, RMB

\*Words accompanied by an asterisk are key terms from the chapter.

# Cryptocurrencies: A Fad or the Future?

## (1 of 2)

- **Cryptocurrencies:** A new kind of money that relies on **cryptography**—the science of encoding information—to create a medium of exchange that exists only in electronic form.
  - Use **blockchain** to maintain a public ledger that records transactions
  - Bitcoin: The first of these cryptocurrencies, introduced in 2009
  - Other examples: Ethereum, Litecoin, Ripple, Zcash, etc., differing in the details of their protocols
- Cryptocurrencies are neither commodity money nor fiat money.
  - No intrinsic value, not created by government decree

# Cryptocurrencies: A Fad or the Future?

## (2 of 2)

- Cryptocurrencies have exhibited wild price swings
  - Bitcoin: 5 cents (2010) -> \$1000 (2013) -> \$500 (2014) -> \$60000 (Apr 2021) -> \$31000 (Jul 2021) -> \$67000 (Nov 2021) ->\$20000 (Jul 2022) ->\$99000 (Nov 2024)
- Long-term success: Can they perform the functions of money?
- Many economists are skeptical
  - Great price volatility: risky way to hold wealth and inconvenient measure in which to post prices
  - Few retailers accept them in exchange so far
- Excluded from standard measures of the quantity of money

# Money in the Economy

- Money stock
  - The quantity of money circulating in the economy
- **Currency\***
  - Paper bills and coins in the hands of the public
- **Demand deposits\***
  - Balances in bank accounts; depositors can access on demand by writing a check

\*Words accompanied by an asterisk are key terms from the chapter.

# Money Stock

- M1 includes
  - Currency, demand deposits at banks, some other liquid deposits (balances in savings accounts)
- M2 includes
  - Everything in M1 plus small time deposits and money market funds (except those held in restricted retirement accounts)
- The money stock includes not only currency but also deposits in banks and other financial institutions that can be readily accessed and used to buy goods and services

# Active Learning 1: Calculating the Money Stock

- Calculate the money stock M2 if the entire economy has
  - \$150 dollars kept in coffee cans and wallets
  - \$300 in saving accounts
  - \$200 in credit card limits
  - \$350 in checking accounts
  - \$75 in time deposits
  - \$175 in restricted retirement accounts
  - \$400 in money market funds

# Active Learning 1: Answers

- M1 = Currency + Demand deposits + Other liquid deposits
- M2 = M1 + Small time deposits + Money market funds  
= (150 + 350 + 300) + 75 + 400 = \$1,275

# 30-2

## The Central Bank and Federal Reserve System



# Central Bank

- **Central bank\***
  - An institution designed to oversee the banking system and regulate the quantity of money in the economy
- **The People's Bank Of China (PBC)\***
  - The central bank of China
  - Responsible for overseeing the Chinese monetary system

\*Words accompanied by an asterisk are key terms from the chapter.

# The U.S. Federal Reserve System

- **The Federal Reserve (Fed)\***
  - The central bank of the U.S.
- Federal Reserve Board in Washington, D.C.
- 12 regional Federal Reserve Banks
  - Major cities around the country
  - Presidents are chosen by each bank's board of directors

# The Fed's Functions

1. Regulate banks and ensure the health of the banking system
  - Monitors each bank's financial condition and facilitates bank transactions
2. Act as a bank's bank
  - Makes loans to banks when banks themselves need funds
3. Act as a lender of last resort
  - Lender to maintain stability in the overall banking system
4. Control the money supply

# Monetary Policy

- **Money supply\***
  - The quantity of money available in the economy
- **Monetary policy\***
  - The setting of the money supply by policymakers in the central bank

\*Words accompanied by an asterisk are key terms from the chapter.

# 30-3

## Banks and the Money Supply

# The Simple Case of 100-Percent-Reserve Banking

- **Reserves\***
  - Deposits that banks have received but have not loaned out
- When people deposit money in banks and banks *use a fraction of these deposits to make loans* to the public, *the quantity of money in the economy increases*

\*Words accompanied by an asterisk are key terms from the chapter.

# 100-Percent-Reserve Banking

- If banks hold all deposits in reserve, banks do not influence the supply of money

First National Bank	
Assets	Liabilities
Reserves \$100.00	Deposits \$100.00

- FNB holds 100% of deposit as reserves
- Money supply = Currency + Deposits = \$0 + \$100 = \$100

# Money Creation with Fractional-Reserve Banking

- **Fractional-reserve banking\***
  - Banking system in which banks hold only a fraction of deposits as reserves
- **Reserve ratio\***
  - Fraction of deposits that banks hold as reserves
- Reserve requirement
  - Minimum amount of reserves that banks must hold; set by the Fed

\*Words accompanied by an asterisk are key terms from the chapter.



# Fractional-Reserve Banking

- When banks hold only a fraction of deposits in reserve, the banking system creates money
- Suppose that First National has a reserve ratio ( $R$ ) of  $1/10$ , or 10%

First National Bank			
Assets		Liabilities	
Reserves \$10.00		Deposits \$100.00	
Loans 90.00			

# Creation of Money (1 of 2)

- Suppose the borrower from First National uses the \$90 to buy something from someone who then deposits the currency in Second National Bank; process goes on and on

Second National Bank			
Assets		Liabilities	
Reserves \$ 9.00		Deposits \$90.00	
Loans 81.00			
Third National Bank			
Assets		Liabilities	
Reserves \$ 8.10		Deposits \$81.00	
Loans 72.90			

# Creation of Money (2 of 2)

Original deposit	= \$100.00
First National lending	= \$90.00 [= .9 × \$100.00]
Second National lending	= \$81.00 [= .9 × \$90.00]
Third National lending	= \$72.90 [= .9 × \$81.00]
etc.	etc.
Total money supply	= \$1,000.00

# The Money Multiplier

- **Money multiplier\***
  - The amount of money that results from each dollar of reserves
  - Reciprocal of the reserve ratio =  $1/R$
- The higher the reserve ratio
  - The less of each deposit banks loan out
  - The smaller the money multiplier

\*Words accompanied by an asterisk are key terms from the chapter.

# Active Learning 2: Banks and the Money Supply

- While cleaning his apartment, Hakeem finds a \$50 bill under the couch. He deposits the bill in his checking account at Chase Bank. The reserve ratio is 10% of deposits.
  - A. What is the maximum amount that the money supply could increase?
  - B. What if  $R = 5\%$ ? What is the maximum amount that the money supply could increase?

# Active Learning 2: Answers

- A. If banks hold 10% in reserve, then money multiplier =  $1/R = 1/0.1 = 10$
- Maximum possible increase in deposits is  $10 \times \$50 = \$500$
  - But money supply also includes currency, which falls by \$50
  - Hence, maximum increase in money supply = \$450
- B. Money multiplier increases to  $1/0.05 = 20$
- If banks hold 5% in reserve, the max increase in money supply is
  - New deposits – Currency =  $20 \times \$50 - \$50 = \$950$

# Bank Capital (1 of 2)

- A bank gets financial resources not only from accepting deposits but also, like other companies, from issuing **equity** and **debt**
- The resources that a bank obtains from issuing equity to its owners are called **bank capital**
- A bank uses these financial resources in a variety of ways to generate profit for its owners
  - In addition to making loans and holding reserves, it can buy **financial securities**, such as stocks and bonds

# Bank Capital (2 of 2)

- **Bank capital\***
  - Resources a bank's owners have put into the institution
  - Used to generate profit
- **Value of bank capital (owners' equity)**
  - Value of the bank's assets (reserves, loans, and securities) minus value of its liabilities (deposits and debt)

More Realistic National Bank			
Assets		Liabilities and Owners' Equity	
Reserves	\$200	Deposits	\$800
Loans	\$700	Debt	\$150
Securities	\$100	Capital (owners' equity)	\$50



# Leverage (1 of 2)

- **Leverage\***
  - Use of borrowed money to supplement existing funds for purposes of investment
- **Leverage ratio\***
  - Ratio of assets to bank capital
- **Capital requirement\***
  - Government regulation specifying a minimum amount of bank capital

\*Words accompanied by an asterisk are key terms from the chapter.

# Leverage (2 of 2)

- In this example, the leverage ratio is  $\$1,000/\$50 = 20$
- For every dollar of capital the bank owners have contributed, the bank has \$20 of assets
- Of the \$20 of assets, \$19 are financed with borrowed money
  - By taking in deposits or issuing debt

More Realistic National Bank			
Assets		Liabilities and Owners' Equity	
Reserves	\$200	Deposits	\$800
Loans	\$700	Debt	\$150
Securities	\$100	Capital (owners' equity)	\$50

# Bank Capital and Leverage (1 of 3)

- If bank's assets rise in value by 5% because some of the securities the bank was holding rose in price
  - \$1,000 of assets would now be worth \$1,050
  - Bank capital rises from \$50 to \$100
- For a leverage rate of 20 a 5% increase in the value of assets increases the owners' equity by 100%

# Bank Capital and Leverage (2 of 3)

- If bank's assets are reduced in value by 5% because of default on loans
  - \$1,000 of assets would be worth \$950
  - Value of the owners' equity falls to zero
- For a leverage ratio of 20 a 5% fall in the value of the bank assets leads to a 100% fall in bank capital

# Bank Capital and Leverage (3 of 3)

- If bank's assets are reduced in value by more than 5% because of default on loans
- For a leverage ratio of 20
  - Bank's assets would fall below its liabilities
  - Bank is insolvent: Unable to pay off its debt holders and depositors in full

# Bank Capital, Leverage, and the Financial Crisis of 2008–2009 (1 of 2)

- Financial crisis of 2008–2009
  - Banks find themselves with too little capital to satisfy capital requirements
  - Credit crunch: The shortage of capital induced the banks to reduce lending
- Many banks in 2008 and 2009 incurred sizable losses on some of their assets (mortgage loans and securities backed by mortgage loans)
  - Credit crunch contributed to a severe downturn in economic activity

# Bank Capital, Leverage, and the Financial Crisis of 2008–2009 (2 of 2)

- U.S. Treasury and the Fed
  - Put many billions of dollars of public funds into the banking system to increase the amount of bank capital
  - Temporarily made the U.S. taxpayer a part owner of many banks
  - Goal: To recapitalize the banking system so that bank lending could return to a more normal level (occurred by late 2009)

# 30-4

## Tools of Monetary Control



# How the Fed Influences the Quantity of Reserves

- The Fed has several tools it can use to influence the money supply
  1. Influence the quantity of reserves
    - Open-market operations
    - Fed lending to banks
  2. Influence the reserve ratio
    - Reserve requirements
    - Paying interest on reserves

# Open-Market Operations

- **Open-market operations\***
  - Purchase and sale of U.S. government bonds by the Fed
- To expand the money supply the Fed buys U.S. government bonds
- To reduce the money supply the Fed sells U.S. government bonds

\*Words accompanied by an asterisk are key terms from the chapter.

# Fed Lending to Banks (1 of 2)

- Fed lending to banks to increase the money supply
  - Banks pay an interest rate called the discount rate
  - If the Fed lowers the discount rate, it encourages banks to borrow more, increasing the quantity of reserves and the money supply

# Fed Lending to Banks (2 of 2)

- **Discount rate\***
  - Interest rate on the loans that the Fed makes to banks
  - Higher discount rate
    - Reduces the money supply
  - Smaller discount rate
    - Increases the money supply

\*Words accompanied by an asterisk are key terms from the chapter.

# How the Fed Influences the Reserve Ratio

- **Reserve requirements\***
  - Minimum amount of reserves that banks must hold against deposits
  - Reducing reserve requirements would lower the reserve ratio and increase the money multiplier
  - Less effective in recent years as many banks hold excess reserves

\*Words accompanied by an asterisk are key terms from the chapter.

# Interest on Reserves

- **Interest on reserves\*** (2008)
  - The interest rate paid to banks on the reserves held in deposit at the Fed
  - An increase in the interest rate on reserves
    - Increases the reserve ratio
    - Lowers the money multiplier
    - Lowers the money supply

\*Words accompanied by an asterisk are key terms from the chapter.

# Problems in Controlling the Money Supply

- The Fed's control of the money supply is not precise
- The Fed does not control
  - The amount of money that households choose to hold as deposits in banks
  - The amount that bankers choose to lend

# 30-5

## Conclusion



# Conclusion

- The monetary system has an important role in our daily lives
  - Whenever we buy or sell anything, we are relying on the social convention called “money”
- Next, we can examine how changes in the quantity of money affect the economy

# Think-Pair-Share Activity

Suppose you are a personal friend of the chair of the Board of Governors of the Federal Reserve System (Jerome Powell). He comes over to your house for lunch and notices your couch. He is so struck by the beauty of your couch that he simply must have it for his office. He buys it from you for \$1,000 and, since it is for his office, he pays you with a check drawn on the Federal Reserve Bank of New York.

- A. Are there more dollars in the economy than before? Why or why not?
- B. Why do you suppose that the Fed doesn't buy and sell couches, real estate, and so on instead of government bonds when they desire to change the money supply?
- C. If the Fed doesn't want the money supply to rise when it purchases new furniture, what might it do to offset the purchase?

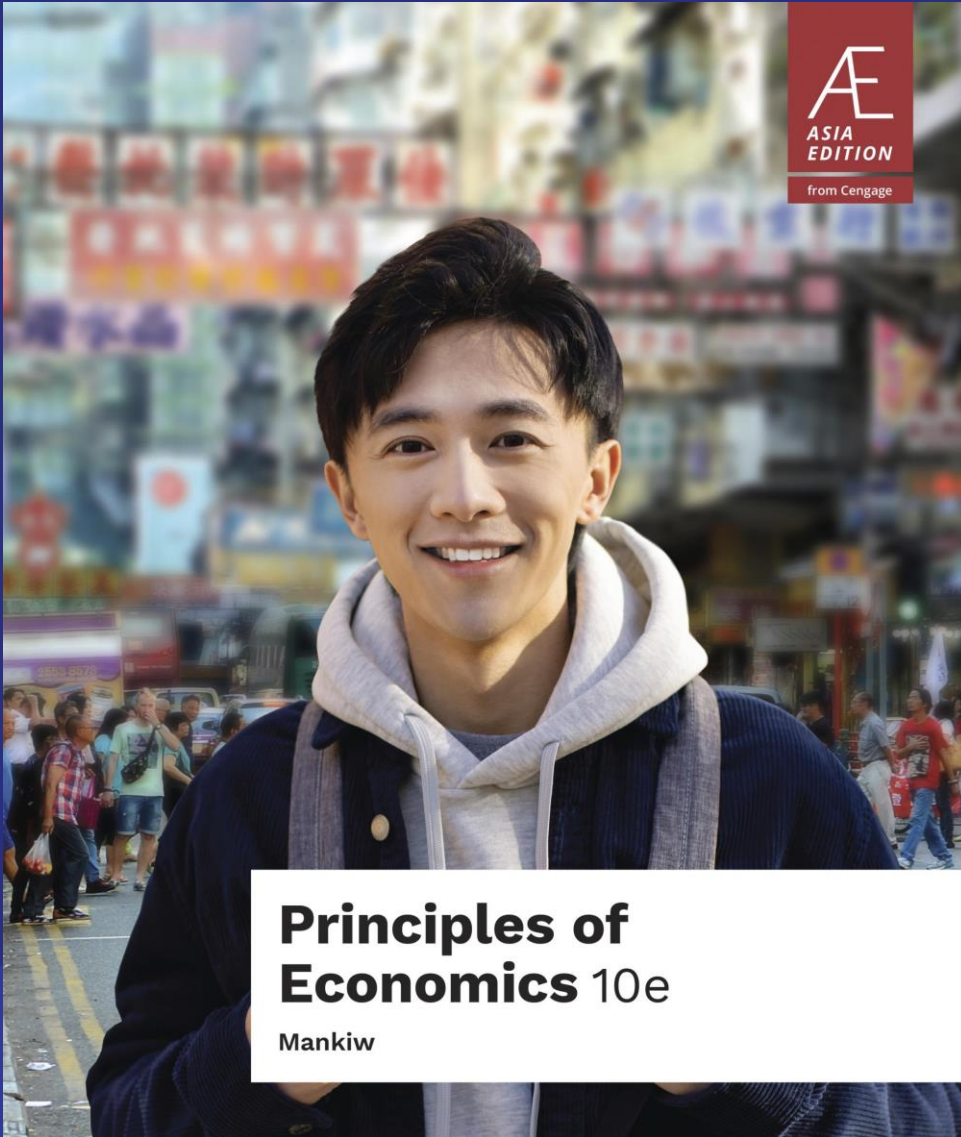
# Self-Assessment

- Why can't the Fed control the money supply perfectly?

# Summary

Click the link to review the objectives for this presentation.

[Link to Objectives](#)



# Principles of Economics, 10e

## Chapter 31: Money Growth and Inflation

# Chapter Objectives (1 of 2)

By the end of this chapter, you should be able to:

- Interpret the quantity theory of money.
- Describe the relationship between the nominal interest rate, inflation, and the real interest rate.
- Given a graph of the market for money, show the effect of a change in the money supply on the market equilibrium.
- Determine the effect of a change in the money supply on inflation using the quantity equation.
- Explain how the classical dichotomy relates to money neutrality.

# Chapter Objectives (2 of 2)

- Calculate the impact of unexpected inflation using the Fisher effect.
- Given a scenario, identify the cost of inflation being described.
- Compare the results of a low-inflation scenario against a high-inflation scenario with regards to tax distortions.

# 31-1

## The Classical Theory of Inflation



# Inflation

- Inflation
  - Increase in the overall level of prices
- Deflation
  - Decrease in the overall level of prices
- Hyperinflation
  - Extraordinarily high rate of inflation

# Inflation in the U.S.

- 1970 to 1980
  - Prices rose by 7.8% per year
- 2010 to 2020
  - Prices rose at an average rate of 1.7% per year
- Early 2022
  - The inflation rate rose above 7%
  - Highest rate in four decades

# International Inflation Data

- 2020 inflation rate
  - U.S.: 1.2%
  - Japan: 0%
  - Mexico: 3.4%
  - Nigeria: 11%
  - Turkey: 12%
- 2018 inflation rate
  - Venezuela: 1 million% (hyperinflation)

# Classical Theory of Inflation

- **Quantity theory of money\***
  - Theory asserting that the quantity of money available determines the price level and that the growth rate in the quantity of money available determines the inflation rate
  - Developed by some of the earliest economic thinkers

\*Words accompanied by an asterisk are key terms from the chapter.

# The Level of Prices and the Value of Money

- Inflation
  - Economy-wide phenomenon
  - Concerns the value of economy's medium of exchange
- Inflation: Rise in the price level
  - Lower value of money
  - Each dollar buys a smaller quantity of goods and services

# Money Supply, Money Demand, and Monetary Equilibrium (1 of 2)

- Money demand
  - How much wealth people want to hold in liquid form
  - Depends on  $P$ : An increase in  $P$  reduces the value of money, so more money is required to buy goods and services
- Quantity of money demanded
  - Is negatively related to the value of money
  - Is positively related to  $P$ , other things equal

# Money Supply, Money Demand, and Monetary Equilibrium (2 of 2)

- Money supply
  - Influenced by the Fed, the banking system, and consumers
- We assume the Fed precisely controls MS and sets it at some fixed amount
  - Supply curve is vertical
- In the long run
  - Money supply and money demand are brought into equilibrium by the overall level of prices

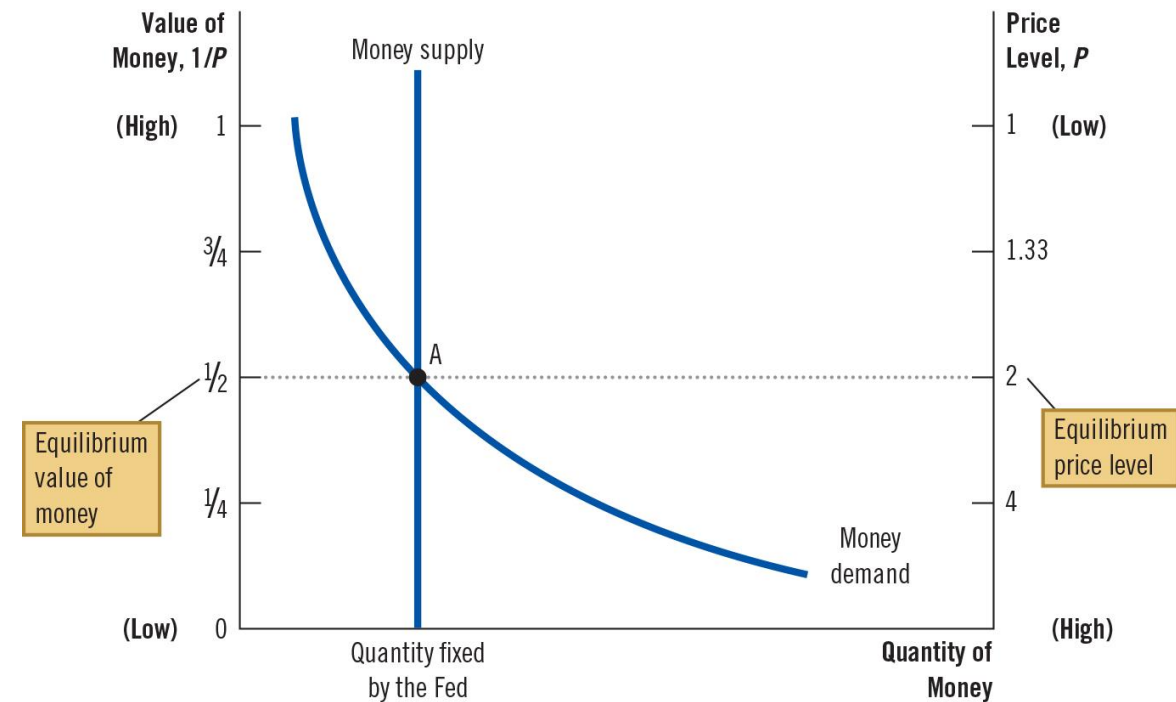
# The Effects of a Monetary Injection

- Economy starts in equilibrium
- If Fed doubles the supply of money
  - Supply curve shifts right
  - Value of money decreases
  - Price level increases
  - New equilibrium



# Figure 1 How the Supply and Demand for Money Determine the Equilibrium Price Level

The horizontal axis shows the quantity of money. The left vertical axis shows the value of money, and the right vertical axis shows the price level. The supply curve for money is vertical because the quantity of money supplied is fixed by the Fed. The demand curve for money slopes downward because people want to hold a larger quantity of money when each dollar buys less. At the equilibrium, point A, the value of money (on the left axis) and the price level (on the right axis) have adjusted to bring the quantity of money supplied and the quantity of money demanded into balance.

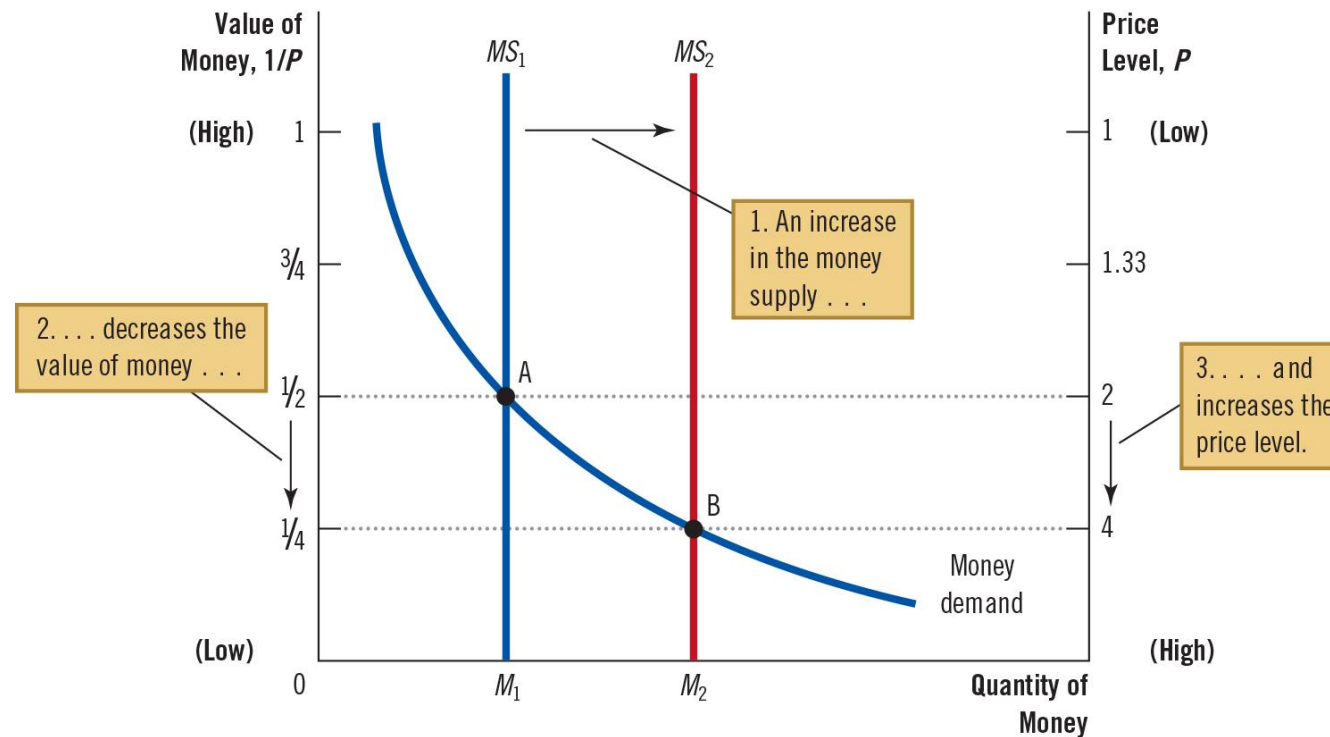


# A Brief Look at the Adjustment Process

- Increasing money supply causes  $P$  to rise
  - At the initial  $P$ , an increase in money supply causes an excess supply of money
  - People get rid of their excess money: spend it on goods and services or by loan it to others who spend it
  - Result: Increased demand for goods and services
  - But supply of goods does not increase, so prices must rise, so the quantity of money demanded increases because people are using more dollars for every transaction

# Figure 2 An Increase in the Money Supply

When the Fed increases the supply of money, the money supply curve shifts from  $MS_1$  to  $MS_2$ . The value of money (on the left axis) and the price level (on the right axis) adjust to bring supply and demand back into balance. The equilibrium moves from point A to point B. Thus, when an increase in the money supply makes dollars more plentiful, the price level increases, making each dollar less valuable.



# The Classical Dichotomy and Monetary Neutrality (1 of 2)

- **Nominal variables\***
  - Variables measured in monetary units (dollar prices)
    - Dollar prices
- **Real variables\***
  - Variables measured in physical units (relative prices, real wages, real interest rate)
- **Classical dichotomy\***
  - Theoretical separation of nominal and real variables

\*Words accompanied by an asterisk are key terms from the chapter.

# The Classical Dichotomy and Monetary Neutrality (2 of 2)

- Monetary developments
  - Influence nominal variables
  - Irrelevant for explaining real variables
- **Monetary neutrality\***
  - Proposition that changes in the money supply do not affect real variables
  - Not completely realistic in short-run
  - Correct in the long run

\*Words accompanied by an asterisk are key terms from the chapter.

# Active Learning 1: The Neutrality of Money

- If the central bank doubles the money supply, what happens with the real wage and total employment?

# Active Learning 1: Answers

- Doubling the money supply
  - Nominal wages double
  - Price level doubles
  - Real wage is  $W/P$  remains unchanged
  - Quantity of labor supplied does not change
  - Quantity of labor demanded does not change
  - Total employment of labor does not change

# Velocity and the Quantity Equation

- **Velocity of money\*** ( $V$ )
  - Rate at which money changes hands
- $V = (P \times Y) / M$ 
  - $P$ : Price level (GDP deflator)
  - $Y$ : Real GDP
  - $M$ : Quantity of money

\*Words accompanied by an asterisk are key terms from the chapter.



# Quantity Equation (1 of 2)

- **Quantity equation\***

- $M \times V = P \times Y$

- Quantity of money ( $M$ )

- Velocity of money ( $V$ )

- Dollar value of the economy's output of goods and services ( $P \times Y$ )

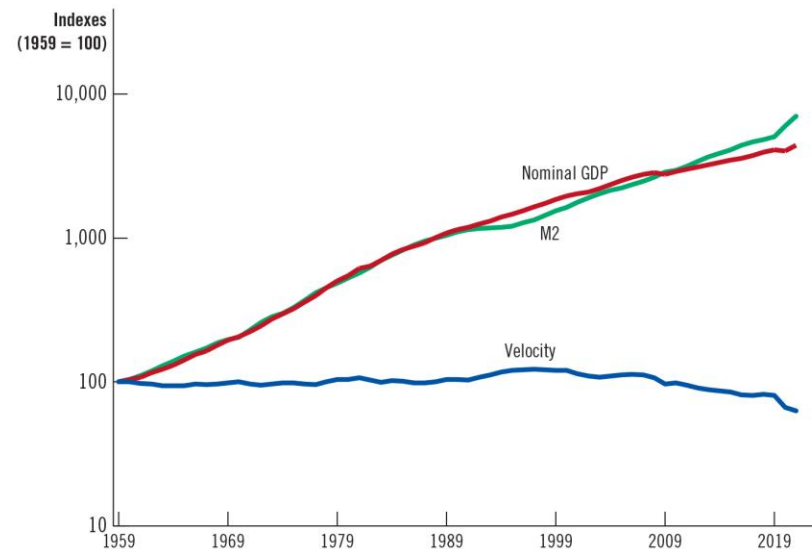
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# Quantity Equation (2 of 2)

- $M \times V = P \times Y$ 
  - An increase in quantity of money must be reflected in
    - Price level (rise)
    - And/or Quantity of output (rise)
    - And/or Velocity of money (fall)
- In many cases, it turns out that the velocity of money is relatively stable, at least compared with other economic variables.

# Figure 3 Nominal GDP, the Quantity of Money, and the Velocity of Money

This figure shows the nominal value of output as measured by nominal GDP, the quantity of money as measured by M2, and the velocity of money as measured by their ratio. For comparability, all three series have been scaled to equal 100 in 1959. Notice that nominal GDP and the quantity of money have grown substantially over this period, while velocity has been relatively stable.



Source: U.S. Department of Commerce; Federal Reserve Board.

# Active Learning 2: Velocity of Money

- Assume there is only one good in the economy, corn. The economy has enough labor, capital, and land to produce 1,800 bushels of corn.  $V$  is constant. In 2023, money supply is \$3,600 and the price of corn is \$8/bushel.
  - Compute nominal GDP and velocity in 2023

# Active Learning 2: Answers

- Nominal GDP =  $P \times Y = \$8 \times 1,800 = \$14,400$
- Velocity  $V = P \times Y / M = \$14,400 / \$3,600 = 4$

# Equilibrium Price Level and Inflation Rate (1 of 2)

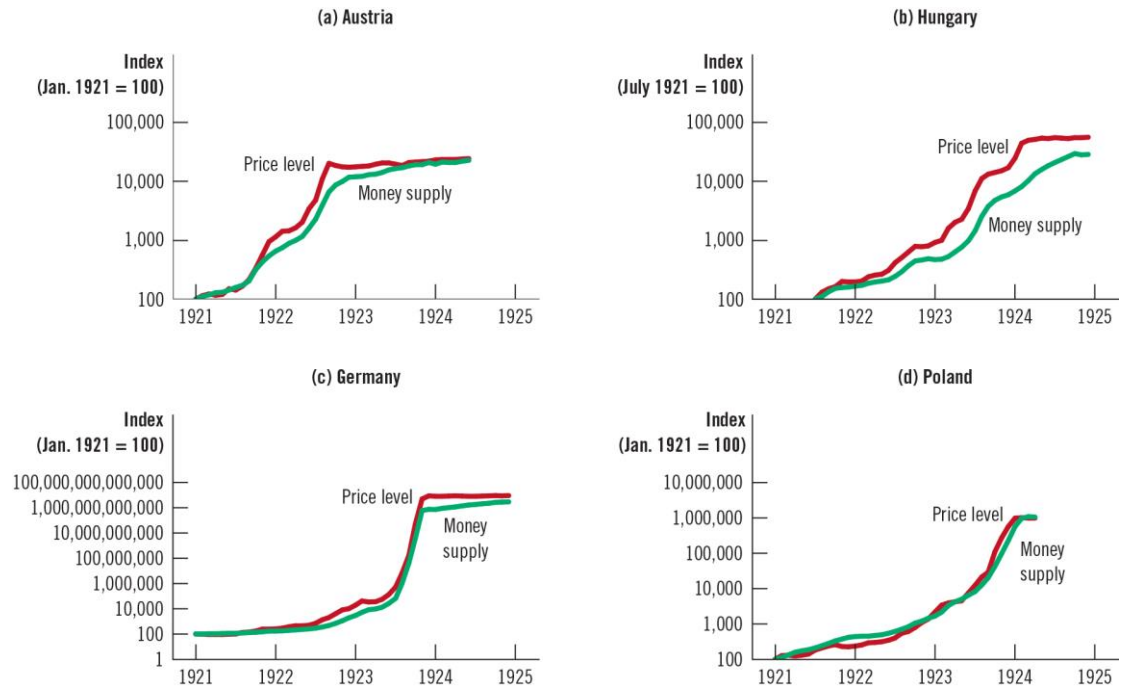
1. Velocity of money
  - Relatively stable over time
2. Changes in quantity of money ( $M$ )
  - Proportionate changes in nominal value of output ( $P \times Y$ )
3. Economy's output of goods & services ( $Y$ )
  - Primarily determined by factor supplies and production technology
  - Money does not affect output

# Equilibrium Price Level and Inflation Rate (2 of 2)

4. Change in money supply ( $M$ )
  - Induces proportional changes in the nominal value of output ( $P \times Y$ )
  - Reflected in changes in the price level ( $P$ )
5. When the central bank increases the money supply rapidly
  - High rate of inflation

# Figure 4 Money and Prices during Four Hyperinflations

This figure shows the quantity of money and the price level during four hyperinflations. (Note that because these variables are graphed on logarithmic scales, equal vertical distances on the graph represent equal percentage changes in the variable.) In each case, the quantity of money and the price level move closely together. The strong association between these two variables is consistent with the quantity theory of money, which states that growth in the money supply is the primary cause of inflation.



Source: Adapted from Thomas J. Sargent, “The End of Four Big Inflations,” in Robert Hall, ed., *Inflation* (Chicago: University of Chicago Press, 1983), pp. 41–93. Each series is normalized to equal 100 for the initial observation.



# Active Learning 3: Quantity Theory of Money

- Assume there is only one good in the economy, corn. The economy has enough labor, capital, and land to produce 1,800 bushels of corn.  $V$  is constant. In 2023, money supply was \$3,600 and the price of corn was \$8/bushel. For 2024, the Fed increases money supply, money supply by 10%.
  - A. Compute the 2024 values of nominal GDP and  $P$
  - B. Compute the inflation rate for 2023–2024

# Active Learning 3: Answers

- A. Calculate velocity because it is constant from 2023 to 2024, then calculate nominal GDP for 2024, knowing the money supply increased by 10% to \$3,960
- 2023:  $P \times Y = M \times V$ , so  $8 \times 1,800 = 3,600 \times V$ , therefore  $V = 4$
  - Nominal GDP 2024:  $P \times Y = M \times V = 3,960 \times 4 = \$15,840$
- B. To calculate inflation rate we need the price of corn in 2023 (\$8) and in 2024
- 2024:  $P = M \times V / Y = 15,840 / 1,800 = \$8.80$
  - Inflation rate 2023-2024:  $[(8.80 - 8.00) / 8.00] \times 100 = 10\%$  (same as money supply)

# The Inflation Tax

- **Inflation tax\***
  - Revenue the government raises by creating (printing) money
  - Like a tax on everyone who holds money
    - When the government prints money
    - The price level rises
    - And the dollars in your wallet are less valuable
- In the U.S., the inflation tax today accounts for less than 3% of federal receipts

\*Words accompanied by an asterisk are key terms from the chapter.

# The Fisher Effect (1 of 2)

- Principle of monetary neutrality
  - An increase in the rate of money growth raises the rate of inflation but does not affect any real variable
- Because
  - Real interest rate = Nominal interest rate – Inflation rate
- We get
  - Nominal interest rate = Real interest rate + Inflation rate

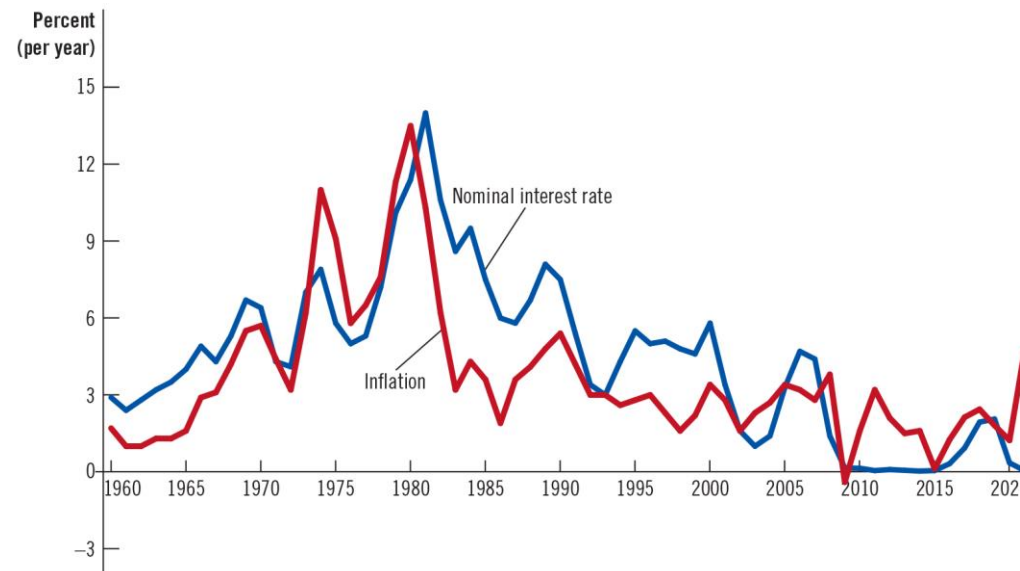
# The Fisher Effect (2 of 2)

- **Fisher effect\***
  - One-for-one adjustment of nominal interest rate to inflation rate
  - When the Fed increases the rate of money growth, long-run result is
    - Higher inflation rate
    - Higher nominal interest rate

\*Words accompanied by an asterisk are key terms from the chapter.

# Figure 5 The Nominal Interest Rate and the Inflation Rate

This figure uses annual data since 1960 to show the nominal interest rate on three-month Treasury bills and the inflation rate as measured by the consumer price index. The close association between these two variables provides evidence for the Fisher effect: When the inflation rate rises, so does the nominal interest rate.



Source: U.S. Department of Treasury; U.S. Department of Labor.

# 31-2

## The Costs of Inflation

# A Fall in Purchasing Power? The Inflation Fallacy

- Inflation *fallacy*
  - “Inflation robs people of the purchasing power of his hard-earned dollars”
- When prices rise
  - Buyers pay more
  - Sellers get more
  - Inflation in incomes goes hand in hand with inflation in prices
- *Inflation does not in itself reduce people’s real purchasing power*



# The Costs of Inflation

- People believe the inflation fallacy because they do not appreciate the principle of monetary neutrality
- Nominal incomes tend to keep pace with rising prices *in the long run*
- Why then is inflation a problem?
  - No single answer
  - Several costs of inflation
  - Each of these costs shows some way in which *persistent growth in the money supply does, in fact, have some adverse effect on real variables*

# Shoeleather Costs

- Inflation is like a tax on the holders of money
- Avoid the inflation tax
  - By holding less money (and go to the bank more often)
- **Shoeleather costs\***
  - Resources wasted when inflation encourages people to reduce their money holdings
  - Can be substantial in countries with hyperinflation

\*Words accompanied by an asterisk are key terms from the chapter.

# Menu Costs

- **Menu costs\***
  - Costs of changing prices
  - Inflation increases menu costs that firms must bear
  - Deciding on new prices
  - Printing new price lists and catalogs
  - Advertising the new prices
  - Dealing with customer annoyance over price changes

\*Words accompanied by an asterisk are key terms from the chapter.

# Relative-Price Variability and the Misallocation of Resources

- Misallocation of resources from relative-price variability
  - Firms don't all raise prices at the same time, so relative prices can vary
  - The higher the inflation rate, the greater this swing in relative prices will be
- Inflation distorts relative prices
  - Consumer decisions are distorted
  - Markets are less able to allocate resources to their best use

# Inflation-Induced Tax Distortions (1 of 2)

- Inflation makes nominal income grow faster than real income
- Taxes are based on nominal income, and some are not adjusted for inflation
- So, inflation causes people to pay more taxes even when their real incomes don't increase

# Inflation-Induced Tax Distortions (2 of 2)

- Tax treatment of capital gains
  - Capital gains are profits
  - Inflation exaggerates the size of capital gains
  - Increases the tax burden
- Tax treatment of interest income
  - Treated as income
  - Inflation tends to discourage people from saving

# Table 1 How Inflation Raises the Tax Burden on Saving

- In the presence of zero inflation, a 25 percent tax on interest income reduces the real interest rate from 4 percent to 3 percent.
- In the presence of 8 percent inflation, the same tax reduces the real interest rate from 4 percent to 1 percent.

	Economy A (zero inflation)	Economy B (high inflation)
Real interest rate	4%	4%
Inflation rate	0	8
Nominal interest rate (real interest rate + inflation rate)	4	12
Reduced interest due to 25 percent tax (0.25 x nominal interest rate)	1	3
After-tax nominal interest rate (0.75 x nominal interest rate)	3	9
After-tax real interest rate (after-tax nominal interest rate - inflation rate)	3	1

# Confusion and Inconvenience

- Inflation changes the yardstick we use to measure transactions
  - Complicates long-range planning and the comparison of dollar amounts over time
  - Difficult to judge the costs of the confusion and inconvenience that arise from inflation



# A Special Cost of Unexpected Inflation: Arbitrary Redistributions of Wealth

- Unexpected inflation
  - Redistributes wealth among the population
    - Not by merit
    - Not by need
  - Redistribute wealth among debtors and creditors
- Inflation is volatile and uncertain
  - When the average rate of inflation is high

# Inflation Is Bad, but Deflation May Be Worse (1 of 2)

- The Friedman rule
  - Prescription for moderate inflation
  - Small and predictable amount of deflation may be desirable
- In practice, deflation is rarely steady and predictable
  - Redistribution of wealth away from debtors (who are often poorer)
- Deflation often arises from broader macroeconomic difficulties

# Inflation Is Bad, but Deflation May Be Worse (2 of 2)

- Costs of deflation
  - Menu costs
  - Relative-price variability
  - If not steady and predictable
    - Redistribution of wealth toward creditors and away from debtors
- Arises because of broader macroeconomic difficulties
  - Symptom of deeper economic problems

# 31-3

## Conclusion

# Conclusion

- The primary cause of substantial or persistent inflation is growth in the quantity of money
  - When the central bank creates money in large quantities, the value of money falls quickly
  - To maintain stable prices, the central bank must limit growth in the money supply

# Think-Pair-Share Activity

Suppose you explain the concept of an “inflation tax” to a friend. You correctly tell them, “When a government prints money to cover its expenditures instead of taxing or borrowing, it causes inflation. An inflation tax is simply the erosion of the value of money from this inflation. Therefore, the burden of the tax lands on those who hold money.” Your friend responds, “What’s so bad about that? Rich people have all the money, so an inflation tax seems fair to me. Maybe the government should finance all of its expenditures by printing money.”

- A. Is it true that rich people hold more money than poor people do?
- B. Do rich people hold a higher percent of their income as money than poor people?
- C. Compared to an income tax, does an inflation tax place a greater or lesser burden on the poor? Explain.
- D. Are there any other reasons why engaging in an inflation tax is not good policy?

# Self-Assessment

- What are the costs of inflation? Which of these costs do you think are most important for the U.S. economy?

# Summary

Click the link to review the objectives for this presentation.

[Link to Objectives](#)