

28

MONEY GROWTH AND INFLATION

LEARNING OBJECTIVES:

By the end of this chapter, students should understand:

- why inflation results from rapid growth in the money supply.
- the meaning of the classical dichotomy and monetary neutrality.
- why some countries print so much money that they experience hyperinflation.
- how the nominal interest rate responds to the inflation rate.
- the various costs that inflation imposes on society.

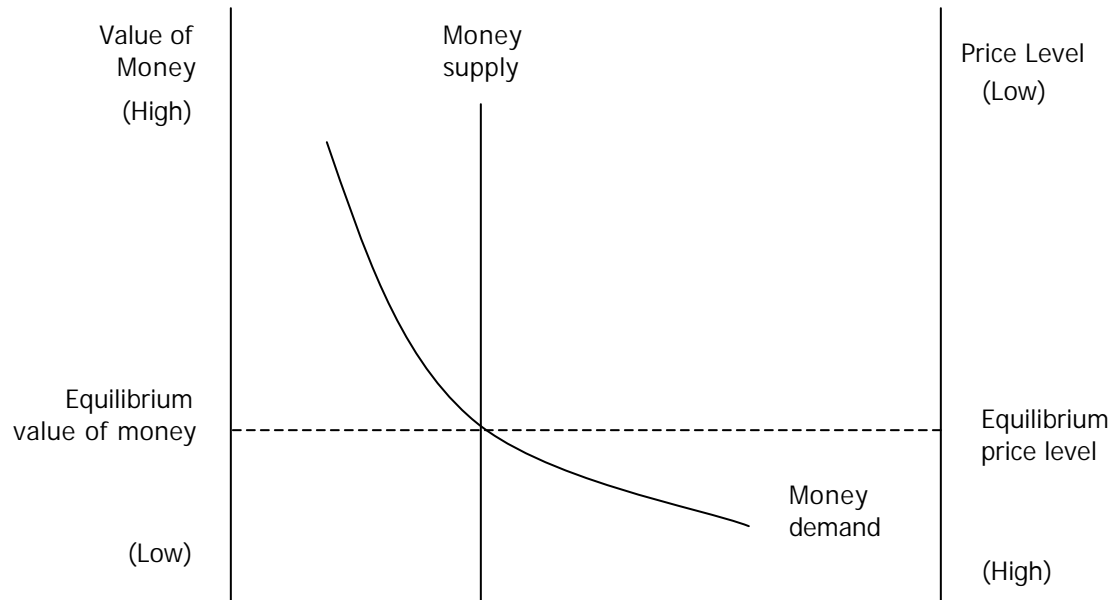
KEY POINTS:

1. The overall level of prices in an economy adjusts to bring money supply and money demand into balance. When the central bank increases the supply of money, it causes the price level to rise. Persistent growth in the quantity of money supplied leads to continuing inflation.
2. The principle of monetary neutrality asserts that changes in the quantity of money influence nominal variables but not real variables. Most economists believe that monetary neutrality approximately describes the behavior of the economy in the long run.
3. A government can pay for some of its spending simply by printing money. When countries rely heavily on this “inflation tax,” the result is hyperinflation.
4. One application of the principle of monetary neutrality is the Fisher effect. According to the Fisher effect, when the inflation rate rises, the nominal interest rate rises by the same amount, so that the real interest rate remains the same.
5. Many people think that inflation makes them poorer because it raises the cost of what they buy. This view is a fallacy, however, because inflation also raises nominal incomes.
6. Economists have identified six costs of inflation: shoeleather costs associated with reduced money holdings, menu costs associated with more frequent adjustment of prices, increased variability of relative prices, unintended changes in tax liabilities due to nonindexation of the tax code, confusion and inconvenience resulting from a changing unit of account, and arbitrary redistributions of wealth between debtors and creditors. Many of these costs are large during hyperinflation, but the size of these costs for moderate inflation is less clear.

CHAPTER OUTLINE:

- I. The Classical Theory of Inflation
 - A. The Level of Prices and the Value of Money
 1. When the price level rises, people have to pay more for the goods and services that they purchase.
 2. A rise in the price level also means that the value of money is now lower because each dollar now buys a smaller amount of goods and services.
 3. If P is the price level, then the quantity of goods and services that can be purchased with \$1 is equal to $1/P$.
 - B. Money Supply, Money Demand and Monetary Equilibrium
 1. The value of money is determined by the supply and demand for money.
 2. For the most part, the supply of money is determined by the Fed.
 - a. This implies that the quantity of money supplied is fixed (until the Fed decides to change it).
 - b. Thus, the supply of money will be vertical (perfectly inelastic).
 3. There are many determinants of the demand for money.
 - a. One variable that is very important in determining the demand for money is the price level.
 - b. The higher prices are, the more money that is needed to perform transactions.
 - c. Thus, a higher price level leads to a higher quantity of money demanded.
 4. In the long run, the overall price level adjusts to the level at which the demand for money and the supply of money are equal.
 - a. If the price level is above the equilibrium level, people will want to hold more money than is available and prices will have to decline.
 - b. If the price level is below equilibrium, people will want to hold less money than that available and the price level will rise.

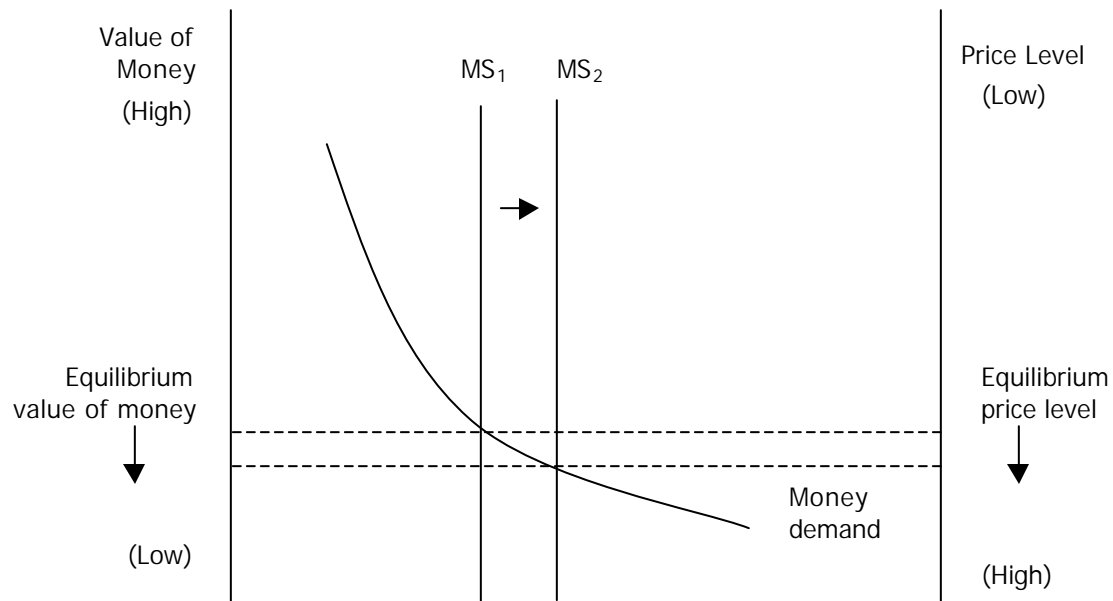
Figure 28-1



5. We can show the supply and demand for money using a graph.
 - a. The left-hand vertical axis is the value of money, measured by $1/P$.
 - b. The right-hand vertical axis is the price level (P). Note that it is inverted? a high value of money means a low price level and vice versa.
 - c. At the equilibrium, the quantity of money demanded is equal to the quantity of money supplied.

C. The Effects of a Monetary Injection

1. Assume that the economy is currently in equilibrium and the Fed suddenly increases the supply of money.
2. The supply of money shifts to the right.
3. The equilibrium value of money falls (from V_1 to V_2) and the price level rises (from P_1 to P_2).
4. When an increase in the money supply makes dollars more plentiful, the result is an increase in the price level that makes each dollar less valuable.

Figure 28-2

5. Definition of **Quantity Theory of Money**: a 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.

D. A Brief Look at the Adjustment Process

1. The immediate effect of an increase in the money supply is to create an excess supply of money.
2. People try to get rid of this excess supply in a variety of ways.
 - a. They may buy goods and services with the funds.
 - b. They may use these excess funds to make loans to others. These loans are then likely used to buy goods and services.
 - c. In either case, the increase in the money supply leads to an increase in the demand for goods and services.
 - d. Because the supply of goods and services has not changed, the result of an increase in the demand for goods and services will be higher prices.

E. The Classical Dichotomy and Monetary Neutrality

$$\text{velocity} = \text{nominal GDP} / \text{money supply}$$

1. In the 18th century, David Hume and other economists wrote about the relationship between monetary changes and important macroeconomic variables such as production, employment, real wages, and real interest rates.
 2. They suggested that economic variables should be divided into two groups: nominal variables and real variables.
 - a. Definition of **Nominal Variables**: variables measured in monetary units.
 - b. Definition of **Real Variables**: variables measured in physical units.
 3. Definition of **Classical Dichotomy**: the theoretical separation of nominal and real variables.
 4. Prices in the economy are nominal, but relative prices are real.
 5. Hume suggested that different forces influence real and nominal variables.
 6. According to Hume, changes in the money supply affect nominal variables but not real variables.
 7. Definition of **Monetary Neutrality**: the proposition that changes in the money supply do not affect real variables.
- F. Velocity and the Quantity Equation
1. Definition of **Velocity of Money**: the rate at which money changes hands.
 2. To calculate velocity, we divide nominal GDP by the quantity of money.
 3. If P is the price level (the GDP deflator), Y is real GDP and M is the quantity of money:

$$\text{velocity} = \frac{P \times Y}{M}$$
 4. Rearranging, we get the quantity equation.

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

5. Definition of **Quantity Equation**: the equation $M \times V = P \times Y$, which relates the quantity of money, the velocity of money, and the dollar value of the economy's output of goods and services.

- a. The quantity equation shows that an increase in the quantity of money must be reflected in one of the other three variables.
- b. Specifically, the price level must rise, output must rise, or velocity must fall.

Figure 28-3

- c. Figure 28-3 shows nominal GDP, the quantity of money (as measured by M2, and the velocity of money for the United States since 1960. It appears that velocity is fairly stable, while GDP and the money supply have grown dramatically.

6. We can now explain how an increase in the quantity of money affects the price level using the quantity equation.

- a. The velocity of money is relatively stable over time.
- b. When the Fed changes the quantity of money (M), it will proportionately change the nominal value of output ($P \times Y$).
- c. The economy's output of goods and services (Y) is determined primarily by available resources and technology. Because money is neutral, changes in the money supply do not affect output.
- d. This must mean that P increases proportionately with the change in M.

G. *Case Study: Money and Prices during Four Hyperinflations*

1. Hyperinflation is generally defined as inflation that exceeds 50 percent per month.

Figure 28-4

2. Figure 28-4 shows data from four classic periods of hyperinflation during the 1920s.
3. We can see that, in each graph, the quantity of money and the price level are almost parallel.

H. The Inflation Tax

1. Some countries use money creation to pay for spending instead of using tax revenue.
2. Definition of **Inflation Tax**: the revenue the government raises by creating money.

3. The inflation tax is a tax on everyone who holds money.
4. Almost all hyperinflations follow the same pattern.
 - a. The government has a high level of spending and inadequate tax revenue to pay for its spending.
 - b. The government's ability to borrow funds is limited.
 - c. As a result, it turns to printing money to pay for its spending.
 - d. The large increases in the money supply lead to large amounts of inflation.
 - e. The hyperinflation ends when the government cuts its spending eliminating the need to create new money.
5. *In the News: Russia Turns to the Inflation Tax*
 - a. In 1998, Russian policymakers began to pay for government expenses by printing money, leading to an inflation rate greater than 100 percent.
 - b. This is an article from *The New York Times* detailing this country's problems with hyperinflation.

I. The Fisher Effect

1. Recall that the real interest rate is equal to the nominal interest rate minus the inflation rate.
2. This, of course, means that:

$$\text{nominal interest rate} = \text{real interest rate} + \text{inflation rate}$$

- a. The supply and demand for loanable funds determines the real interest rate.
 - b. Growth in the money supply determines the inflation rate.
3. When the Fed increases the rate of growth of the money supply, the inflation rate increases. This in turn will lead to an increase in the nominal interest rate.
4. Definition of **Fisher Effect**: the one-for-one adjustment of the nominal interest rate to the inflation rate.

Figure 28-5

5. Figure 28-5 shows the nominal interest rate and the inflation rate since 1960.

II. The Costs of Inflation

A. A Fall in Purchasing Power? The Inflation Fallacy

1. Most individuals believe that the major problem caused by inflation is that inflation lowers the purchasing power of a person's income.
2. However, as prices rise, so do incomes. Thus, inflation does not in itself reduce the purchasing power of incomes.

B. Shoeleather Costs

1. Because inflation erodes the value of money that you carry in your pocket, you can avoid this drop in value by holding less money.
2. However, holding less money generally means more trips to the bank.
3. Definition of **Shoeleather Costs**: the resources wasted when inflation encourages people to reduce their money holdings.
4. This cost can be considerable in countries experiencing hyperinflation.

C. Menu Costs

1. Definition of **Menu Costs**: the costs of changing prices.
2. During period of inflation, firms must change their prices more often.

D. Relative-Price Variability and the Misallocation of Resources

1. Because prices of most goods change only once in a while (instead of constantly), inflation causes relative prices to vary more than they would otherwise.
2. When inflation distorts relative prices, consumer decisions are distorted and markets are less able to allocate resources efficiently.

E. Inflation-Induced Tax Distortions

1. Lawmakers rarely take into account inflation when they write tax laws.
2. The nominal values of interest income and capital gains are taxed (not the real values).

Table 28-1

- a. Table 28-1 shows a hypothetical example of two individuals, living in two countries earning the same real interest rate, and paying the same tax rate, but one individual lives in a country without inflation and the other lives in a country with 8% inflation.
- b. The person living in the country with inflation ends up with a smaller after-tax real interest rate.

3. This implies that higher inflation will tend to discourage saving.

F. Confusion and Inconvenience

1. Money is the yardstick that we use to measure economic transactions.
2. When inflation occurs, the value of money falls. This alters the yardstick that we use to measure important variables like incomes and profit.
3. *In the News: The Hyperinflation in Serbia*
 - a. Serbia experienced very high rates of inflation in the early 1990s.
 - b. This is an article from *The Wall Street Journal* detailing the difficulties of living with hyperinflation.

G. A Special Cost of Unexpected Inflation: Arbitrary Redistributions of Wealth

1. Example: Sam Student takes out \$20,000 in loans at 7% interest (nominal). In 10 years, the loan will come due. After his debt has compounded for 10 years at 7%, Sam will owe the bank \$40,000.
2. The real value of this debt will depend on inflation.
 - a. If the economy has a hyperinflation, wages and prices will rise so much that Sam would be able to pay the \$40,000 out of pocket change.
 - b. If the economy has deflation, Sam will find the \$40,000 a greater burden than he imagined.
3. Because inflation is often hard to predict, it imposes risk on both Sam and the bank that the real value of the debt will differ from that expected when the loan is made.

H. Case Study: The Wizard of Oz and the Free Silver Debate

1. Most people do not know that book *The Wizard of Oz* was written about U.S. monetary policy in the late nineteenth century.
2. From 1880 to 1896, the United States experienced deflation, redistributing wealth from farmers (with outstanding loans) to banks.
3. Because the United States followed the gold standard at this time, one possible solution to the problem was to start to use silver as well. This would increase the supply of money, raising the price level, and reduce the real value of the farmers' debts.
4. There has been some debate over the interpretation assigned to each character, but it is clear that the story revolves around the monetary policy debate at that time in history.

5. Even though those who wanted to use silver were defeated, the money supply in the United States increased in 1898 when gold was discovered in Alaska and supplies of gold were shipped in from Canada and South Africa.
6. Within 15 years, prices were back up and the farmers were better able to handle their debts.

I. *In the News: How to Protect Your Savings from Inflation*

1. In 1997, the U.S. government issued bonds that were indexed for inflation.
2. This is an article from *The New York Times* discussing the merits of this policy.