In this chapter, look for the answers to these questions:

• How does the money supply affect inflation and nominal interest rates?
• Does the money supply affect real variables like real GDP or the real interest rate?
• How is inflation like a tax?
• What are the costs of inflation? How serious are they?

Money Growth and Inflation

• The Meaning of Money
  – Money is the set of assets in an economy that people regularly use to buy goods and services from other people.

The Classical Theory of Inflation

• Inflation: Historical Aspects
  – Over the past 60 years, prices in the U.S. have risen on average about 5 percent per year.
  – Deflation, meaning decreasing average prices, occurred in the U.S. in the nineteenth century.
  – Hyperinflation refers to high rates of inflation such as Germany experienced in the 1920s.
  – In the 1970s prices rose by 7 percent per year.
  – During the 1990s, prices rose at an average rate of 2 percent per year.

The Level of Prices and the Value of Money

• The quantity theory of money is used to explain the long-run determinants of the price level and the inflation rate.
• Inflation is an economy-wide phenomenon that concerns the value of the economy’s medium of exchange.
• When the overall price level rises, the value of money falls.
Money Supply, Money Demand, and Monetary Equilibrium

- The money supply is a policy variable that is controlled by the Fed.
- Through instruments such as open-market operations, the Fed directly controls the quantity of money supplied.
- Money demand has several determinants, including interest rates and the average level of prices in the economy.

Money Supply, Money Demand, and Monetary Equilibrium

- People hold money because it is the medium of exchange.
- The amount of money people choose to hold depends on the prices of goods and services.
- In the long run, the overall level of prices adjusts to the level at which the demand for money equals the supply.

The Effects of a Monetary Injection

- The Quantity Theory of Money
  - How the price level is determined and why it might change over time is called the quantity theory of money.
  - The quantity of money available in the economy determines the value of money.
  - The primary cause of inflation is the growth in the quantity of money.

The Classical Dichotomy and Monetary Neutrality

- Nominal variables are variables measured in monetary units.
- Real variables are variables measured in physical units.
The Classical Dichotomy and Monetary Neutrality

- According to Hume and others, real economic variables do not change with changes in the money supply.
- According to the *classical dichotomy*, different forces influence real and nominal variables.
- Changes in the money supply affect nominal variables but not real variables.
- The irrelevance of monetary changes for real variables is called *monetary neutrality*.

Velocity and the Quantity Equation

- The *velocity of money* refers to the speed at which the typical dollar bill travels around the economy from wallet to wallet.
  \[ V = \frac{P \times Y}{M} \]
  where:
  - \( V \) = velocity
  - \( P \) = the price level
  - \( Y \) = the quantity of output
  - \( M \) = the quantity of money

Velocity and the Quantity Equation

- Rewriting the equation gives the quantity equation:
  \[ M \times V = P \times Y \]
  - The quantity equation relates the quantity of money (\( M \)) to the nominal value of output (\( P \times Y \)).
  - The *quantity equation* shows that an increase in the quantity of money in an economy must be reflected in one of three other variables:
    - The price level must rise,
    - the quantity of output must rise, or
    - the velocity of money must fall.

CASE STUDY: Money and Prices during Four Hyperinflations

- Hyperinflation is inflation that exceeds 50 percent per month.
- Hyperinflation occurs in some countries because the government prints too much money to pay for its spending.
The Inflation Tax

- When the government raises revenue by printing money, it is said to levy an inflation tax.
- An inflation tax is like a tax on everyone who holds money.
- When tax revenue is inadequate and ability to borrow is limited, govt may print money to pay for its spending.
- The revenue from printing money is the inflation tax: printing money causes inflation, which is like a tax on everyone who holds money.
- The inflation ends when the government institutes fiscal reforms such as cuts in government spending.

The Fisher Effect

- The Fisher effect refers to a one-to-one adjustment of the nominal interest rate to the inflation rate.
- According to the Fisher effect, when the rate of inflation rises, the nominal interest rate rises by the same amount.
- The real interest rate stays the same.

THE COSTS OF INFLATION

- A Fall in Purchasing Power?
- Inflation does not in itself reduce people’s real purchasing power.
- Shoeleather costs
- Menu costs
- Relative price variability
- Tax distortions
- Confusion and inconvenience
- Arbitrary redistribution of wealth
Shoeleather Costs

- **Shoeleather costs** are the resources wasted when inflation encourages people to reduce their money holdings.
- Inflation reduces the real value of money, so people have an incentive to minimize their cash holdings.
- Less cash requires more frequent trips to the bank to withdraw money from interest-bearing accounts.
- The actual cost of reducing your money holdings is the time and convenience you must sacrifice to keep less money on hand.
- Also, extra trips to the bank take time away from productive activities.

Menu Costs

- **Menu costs** are the costs of adjusting prices.
- During inflationary times, it is necessary to update price lists and other posted prices.
- This is a resource-consuming process that takes away from other productive activities.

Relative-Price Variability and the Misallocation of Resources

- Inflation distorts relative prices.
- Consumer decisions are distorted, and markets are less able to allocate resources to their best use.

Inflation-Induced Tax Distortion

- Inflation exaggerates the size of capital gains and increases the tax burden on this type of income.
- With progressive taxation, capital gains are taxed more heavily.
- The income tax treats the nominal interest earned on savings as income, even though part of the nominal interest rate merely compensates for inflation.
- The after-tax real interest rate falls, making saving less attractive.

Confusion and Inconvenience

- When the Fed increases the money supply and creates inflation, it erodes the real value of the unit of account.
- Inflation causes dollars at different times to have different real values.
- Therefore, with rising prices, it is more difficult to compare real revenues, costs, and profits over time.

### Table 1 How Inflation Raises the Tax Burden on Saving

<table>
<thead>
<tr>
<th>Economy A (price stability)</th>
<th>Economy B (inflation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real interest rate</td>
<td>4%</td>
</tr>
<tr>
<td>Inflation rate</td>
<td>0</td>
</tr>
<tr>
<td>Nominal interest rate</td>
<td>4</td>
</tr>
<tr>
<td>(nominal interest rate - inflation rate)</td>
<td>1</td>
</tr>
<tr>
<td>Reduced interest due to 25% tax</td>
<td>1.25 x nominal interest rate</td>
</tr>
<tr>
<td>After-tax nominal interest rate</td>
<td>3</td>
</tr>
<tr>
<td>After-tax real interest rate</td>
<td>3</td>
</tr>
<tr>
<td>(after-tax nominal interest rate - inflation rate)</td>
<td>3</td>
</tr>
</tbody>
</table>
A Special Cost of Unexpected Inflation: Arbitrary Redistribution of Wealth

- Unexpected inflation redistributes wealth among the population in a way that has nothing to do with either merit or need.
- These redistributions occur because many loans in the economy are specified in terms of the unit of account—money.