Chapter 17 – Money Growth & Inflation

# The inflation rate is measured as the percentage change in the Consumer Price Index, the GDP deflator, or some other index of the overall price level.

## Over the past 80 years, prices have risen on average 3.7% per year in the United States.

### There has been substantial variation in the rate of price changes over time.

### From 2008 to 2018, prices rose at an average rate of 1.5% per year, while prices rose by 7.8% per year during the 1970s.

## International data shows an even broader range of inflation experiences. In 2018, inflation was 1.2% in Japan, 4.8% in Mexico, 12% in Nigeria, 15% in Turkey, 32% in Argentina, and 1.4 million% in Venezuela.

# The Classical Theory of Inflation

## The Level of Prices and the Value of Money

### When the price level rises, people have to pay more for the goods and services they buy.

### A rise in the price level also means that the value of money is now lower because each dollar now buys a smaller quantity of goods and services.

### If *P* is the price level, then the quantity of goods and services that can be purchased with $1 is equal to 1/*P*.

### Suppose you live in a country with one good (ice cream cones).

#### When the price of an ice cream cone is $2, the value of a dollar is 1/2 cone.

#### When the price of an ice cream cone rises to $3, the value of a dollar is 1/3 cone.

## Money Supply, Money Demand, and Monetary Equilibrium

### The value of money is determined by the supply and demand for money.

### For the most part, the supply of money is determined by the Fed.

### The demand for money reflects how much wealth people want to hold in liquid form.

#### One variable that is very important in determining the demand for money is the price level.

#### The higher prices are, the more money that is needed to perform transactions.

#### Thus, a higher price level (and a lower value of money) leads to a higher quantity of money demanded.

### In the long run, money supply and money demand are brought into equilibrium by the overall level of prices.

#### 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.

#### If the price level is below equilibrium, people will want to hold less money than that available and the price level will rise.

### We can show the supply and demand for money using a graph.

#### The horizontal axis shows the quantity of money.

#### The left-hand vertical axis is the value of money, measured by 1/*P*.

#### 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.

#### The supply curve is vertical because the Fed has fixed the quantity of money available.

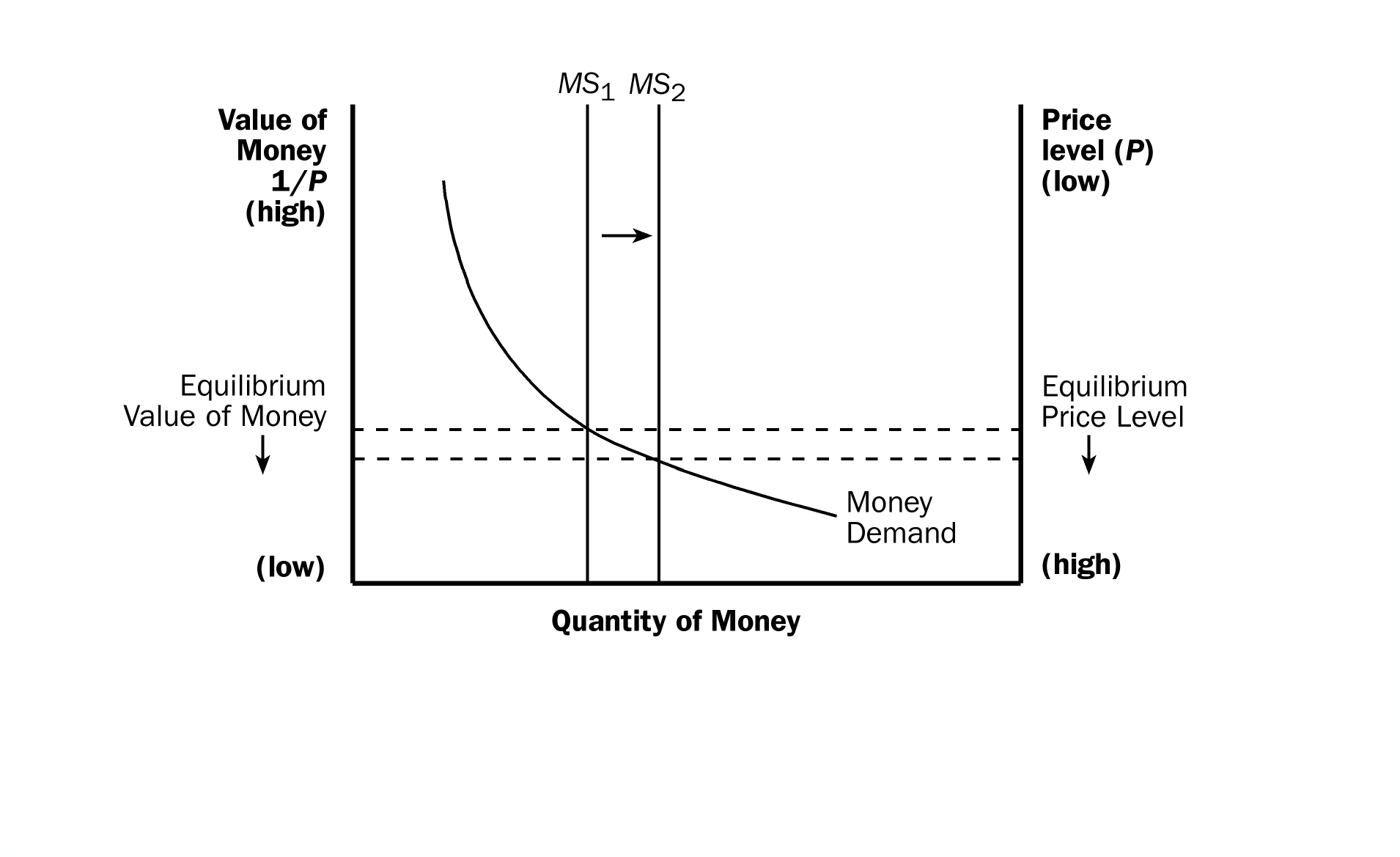
#### The demand curve for money is downward sloping. When the value of money is low, people demand a larger quantity of it to buy goods and services.

#### At the equilibrium, the quantity of money demanded is equal to the quantity of money supplied.

## The Effects of a Monetary Injection

### Assume that the economy is currently in equilibrium and the Fed suddenly increases the supply of money.

### The supply of money shifts to the right.



### The equilibrium value of money falls and the price level rises.

### 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.

### 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.

## A Brief Look at the Adjustment Process

### The immediate effect of an increase in the money supply is to create an excess supply of money.

### People try to get rid of this excess supply in a variety of ways.

#### They may buy goods and services with the excess funds.

#### They may use these excess funds to make loans to others by buying bonds or depositing the money in a bank account. These loans will then be used by others to buy goods and services.

#### In either case, the increase in the money supply leads to an increase in the demand for goods and services.

#### 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.

## The Classical Dichotomy and Monetary Neutrality

### 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.

### They suggested that economic variables should be divided into two groups: nominal variables and real variables.

#### Definition of nominal variables: variables measured in monetary units.

#### Definition of real variables: variables measured in physical units.

### Definition of classical dichotomy: the theoretical separation of nominal and real variables.

### Prices in the economy are nominal (because they are quoted in units of money), but relative prices are real (because they are not measured in money terms).

### Classical analysis suggested that different forces influence real and nominal variables.

#### Changes in the money supply affect nominal variables but not real variables.

#### Definition of **monetary neutrality: the proposition that changes in the money supply do not affect real variables**.

## Velocity and the Quantity Equation

### Definition of velocity of money: the rate at which money changes hands.

### To calculate velocity, we divide nominal GDP by the quantity of money.



### If *P* is the price level (the GDP deflator), *Y* is real GDP, and *M* is the quantity of money:



### Rearranging, we get the quantity equation:



### Definition of quantity equation: the equation *M* × *V* = *P* × *Y*, which relates the quantity of money, the velocity of money, and the dollar value of the economy’s output of goods and services.

#### The quantity equation shows that an increase in the quantity of money must be reflected in one of the other three variables.

#### Specifically, the price level must rise, output must rise, or velocity must fall.

#### Figure 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 nominal GDP and the money supply have grown dramatically.

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

#### The velocity of money is relatively stable over time.

#### When the central bank changes the quantity of money (*M*), it will proportionately change the nominal value of output (*P* × *Y*).

#### 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.

#### This must mean that *P* increases proportionately with the change in *M*.

#### Thus, when the central bank increases the money supply rapidly, the result is a high rate of inflation.

## Case Study: Money and Prices during Four Hyperinflations

### Hyperinflation is generally defined as inflation that exceeds 50% per month.

### Figure 4 shows data from four classic periods of hyperinflation during the 1920s in Austria, Hungary, Germany, and Poland.

### We can see that, in each graph, the quantity of money and the price level are almost parallel.

### These episodes illustrate Principle #9: Prices rise when the government prints too much money.

## The Inflation Tax

### Some countries use money creation to pay for spending instead of using tax revenue.

### Definition of inflation tax: the revenue the government raises by creating money.

### The inflation tax is like a tax on everyone who holds money.

### Almost all hyperinflations follow the same pattern.

#### The government has a high level of spending and inadequate tax revenue to pay for its spending.

#### The government’s ability to borrow funds is limited.

#### As a result, it turns to printing money to pay for its spending.

#### The large increases in the money supply lead to large amounts of inflation.

#### The hyperinflation ends when the government cuts its spending and eliminates the need to create new money.

## The Fisher Effect

### Recall that the real interest rate is equal to the nominal interest rate minus the inflation rate.

### This, of course, means that:



#### The supply and demand for loanable funds determines the real interest rate.

#### Growth in the money supply determines the inflation rate.

### 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.

### Definition of Fisher effect: the one-for-one adjustment of the nominal interest rate to the inflation rate.

#### The Fisher effect does not hold in the short run to the extent that inflation is unanticipated.

#### If inflation catches borrowers and lenders by surprise, the nominal interest rate will fail to reflect the rise in prices.

### Figure 5 shows the nominal interest rate and the inflation rate in the U.S. economy since 1960.

# The Costs of Inflation

## A Fall in Purchasing Power? The Inflation Fallacy

### Most individuals believe that the major problem caused by inflation is that inflation lowers the purchasing power of a person’s income.

### However, as prices rise, so do incomes. Thus, inflation does not in itself reduce the purchasing power of incomes.

## Shoeleather Costs

### Because inflation erodes the value of money that you carry in your pocket, you can avoid this drop in value by holding less money.

### However, holding less money generally means more trips to the bank.

### Definition of shoeleather costs: the resources wasted when inflation encourages people to reduce their money holdings.

### This cost can be considerable in countries experiencing hyperinflation.

## Menu Costs

### Definition of menu costs: the costs of changing prices.

### During periods of inflation, firms must change their prices more often.

## Relative-Price Variability and the Misallocation of Resources

### 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.

### When inflation distorts relative prices, consumer decisions are distorted and markets are less able to allocate resources to their best use.

## Inflation-Induced Tax Distortions

### Lawmakers fail to take inflation into account when they write tax laws.

### The nominal values of interest income and capital gains are taxed (not the real values).

#### Table 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.

#### The person living in the country with inflation ends up with a smaller after-tax real interest rate.

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

### A possible solution to this problem would be to index the tax system.

## Confusion and Inconvenience

### Money is the yardstick that we use to measure economic transactions.

### When inflation occurs, the value of money falls. This alters the yardstick that we use to measure important variables like incomes and profit.

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

### Example: Sam Student takes out a $20,000 loan 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.

### The real value of this debt will depend on inflation.

#### If the economy has a hyperinflation, wages and prices will rise so much that Sam may be able to pay the $40,000 out of pocket change.

#### If the economy has deflation, Sam will find the $40,000 a greater burden than he anticipated.

### 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.

### Inflation is especially volatile and uncertain when the average rate of inflation is high.

## Inflation Is Bad, but Deflation May Be Worse

### Although inflation has been the norm in recent U.S. history, from 1998 to 2012 Japan experienced a 4-percent decline in its overall price level.

### Deflation leads to lower shoeleather costs, but still creates menu costs and relative-price variability.

### Deflation also results in the redistribution of wealth toward creditors and away from debtors.

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

### Some scholars believe that the book *The Wizard of Oz* was written about U.S. monetary policy in the late 19th century.

### From 1880 to 1896, the United States experienced deflation, redistributing wealth from farmers (with outstanding loans) to banks.

### 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.

### 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.

### 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.

### Within 15 years, prices were back up and the farmers were better able to handle their debts.

## *In the News: Life During Hyperinflation:* “What 52,000 Percent Inflation Can do to a Country.”

### Hyperinflation is sometimes defined as 50% per month for at least 30 days.

### Hyperinflation occurs when a government spends (or prints) money that it doesn’t have, and the public loses confidence in the money.

### A most recent hyperinflation is in Venezuela. With inflation at 52,000%, Venezuela’s economy shrank 35% in five years. Nine of ten people can’t buy sufficient food and have lost 24 pounds on average. More than 2.3 million have fled the country, including more than half the nation’s doctors. This in a country with more oil reserves than Saudi Arabia.

### Venezuela’s government earns most of its revenue from oil and it refused to reduce its spending when oil prices went down.