7

Unemployment, Inflation, and Long-Run Growth

CHAPTER OUTLINE AND LEARNING OBJECTIVES

Each month the U.S. Bureau of Labor Statistics (BLS) announces the value of the unemployment rate for the previous month. For example, on March 9, 2018, it announced that the unemployment rate for February 2018 was 4.1 percent. The unemployment rate is a key measure of how the economy is doing and helps to determine the direction of government policy on spending, taxes and interest rates. This announcement is widely watched, and if the announced unemployment rate is different from what the financial markets expect, there can be large movements in those markets. It is thus important to know how the BLS computes the unemployment rate. The first part of this chapter describes how the unemployment rate is computed and discusses its various components.

Inflation is another key macroeconomic variable. The previous chapter discussed how the GDP deflator, the price deflator for the entire economy, is computed. The percentage change in the GDP deflator is a measure of inflation. There are, however, other measures of inflation, each pertaining to some part of the economy. The most widely followed price index is the consumer price index (CPI), and its measurement is discussed in this chapter. The CPI is also announced monthly by the BLS, and this announcement is widely followed by the financial markets as well. For example, on March 13, 2018, the BLS announced that the percentage change in the CPI for February 2018 was 0.2 percent for the month. After discussing the measurement of the CPI, this chapter discusses various costs of inflation as well as the concerns policy makers might have when there is deflation (a fall in the price level).

The last topic considered in this chapter is long-run growth. Although much of macroeconomics is concerned with explaining business cycles, long-run growth is also a major concern. The average yearly growth rate of U.S. real GDP depicted in Figure 5.2 in Chapter 5 is 3.2 percent. Although there were many ups and downs during the 118 years depicted in Figure 5.2, on average, the economy was growing at an annual 3.2 percent rate. In the last part of this chapter, we discuss the sources of this growth.

Keep in mind that this chapter is still descriptive. We begin our analysis of how the economy works in the next chapter.

7.1 LEARNING OBJECTIVE

Explain how unemployment is measured.

Unemployment

We begin our discussion of unemployment with its measurement.

Measuring Unemployment MyLab Economics Concept Check

The unemployment data released each month by the BLS are based on a survey of 60,000 households. Each interviewed household answers questions concerning the work activity of household members 16 years of age or older during the calendar week that contains the 12th of the month. (The survey is conducted in the week that contains the 19th of the month.)

If a household member 16 years of age or older worked 1 hour or more as a paid employee, either for someone else or in his or her own business or farm, the person is classified as **employed**. A household member is also considered employed if he or she worked 15 hours or more without pay in a family enterprise. Finally, a household member is counted as employed if the person held a job from which he or she was temporarily absent because of illness, bad weather, vacation, labor-management disputes, or personal reasons, regardless of whether he or she was paid.

employed Any person 16 years old or older (1) who works for pay, either for someone else or in his or her own business for 1 or more hours per week, (2) who works without pay for 15 or more hours per week in a family enterprise, or (3) who has a job but has been temporarily absent with or without pay.

Those who are not employed fall into one of two categories: (1) unemployed or (2) not in the labor force. To be considered **unemployed**, a person must be 16 years old or older, available for work, and have made specific efforts to find work during the previous 4 weeks. A person not looking for work because he or she does not want a job or has given up looking is classified as **not in the labor force**. People not in the labor force include full-time students, retirees, individuals in institutions, those staying home to take care of children, and discouraged job seekers.

unemployed A person 16 years old or older who is not working, is available for work, and has made specific efforts to find work during the previous 4 weeks.

not in the labor force A person who is not looking for work because he or she does not want a job or has given up looking.

The total **labor force** in the economy is the number of people employed plus the number of unemployed:

$$\text{labor force} = \text{employed} + \text{unemployed}$$

labor force The number of people employed plus the number of unemployed.

The total population 16 years of age or older is equal to the number of people in the labor force plus the number not in the labor force:

$$\text{population} = \text{labor force} + \text{not in labor force}$$

With these numbers, several ratios can be calculated. The **unemployment rate** is the ratio of the number of people unemployed to the total number of people in the labor force:

$$\text{unemployment rate} = \frac{\text{unemployed}}{\text{employed} + \text{unemployed}}$$

unemployment rate The ratio of the number of people unemployed to the total number of people in the labor force.

In February 2018, the labor force contained 161,921 million people, 155,215 million of whom were employed and 6,706 million of whom were unemployed and looking for work. The unemployment rate was 4.1 percent:

$$\frac{6{,}706}{155{,}215 + 6{,}706} = 4.1\%$$

The ratio of the labor force to the population 16 years old or over is called the **labor force participation rate**:

$$\text{labor force participation rate} = \frac{\text{labor force}}{\text{population}}$$

labor force participation rate The ratio of the labor force to the total population 16 years old or older.

ECONOMICS IN PRACTICE

Time Use for the Unemployed in a Recession

During the recession of 2008–2009, aggregate market work hours in the United States decreased substantially. A recent paper uses interesting new survey data to explore what the unemployed population did with these hours lost to the formal market.[1]

What would an economist expect to see change in time use for someone newly unemployed in a recession? First, we might expect people to spend some time looking for new jobs. Aguiar and his co-authors find that between 2 percent and 6 percent of the lost market hours go to job search. But clearly there are diminishing returns to job search, especially in a recession when new job opportunities are limited. What else did the survey reveal about time allocation? Twelve percent of the newly opened time went to activities tied to longer-run job placement, increased education, civic involvement, and health care. Other time, 35 percent of the hours lost, went to nonmarket work, cleaning, home maintenance, and child care. Clearly here the unemployed were substituting their own work for services they used to buy in the marketplace. For the unemployed worker, the opportunity cost of producing one's own home services is lower, so this change makes good economic sense. The remaining time, just under half the hours lost to the market, went to leisure activities, including sleeping.

CRITICAL THINKING

1. How would you expect the time use of the unemployed to differ in a boom time?

[1]Mark Aguiar, Erik Hurst, Louokas Karabarbounis, "Time Use During the Great Recession," *American Economic Review* 2016, 1664–1696.

In February 2018, the population of 16 years old or older was 256,934 million. So the labor force participation rate was .60 (=155,215/256,934).

Table 7.1 shows values of these variables for selected years since 1950. Although the unemployment rate has gone up and down over this period, the labor force participation rate grew steadily from 1950 until 2000, with declines thereafter. Much of the increase in the early period was the result of the growth in the participation rate of women between the ages of 25 and 54. This rate also declined slightly in the more recent period. Column 3 in Table 7.1 shows how many new workers the U.S. economy has absorbed since 1950. The number of employed workers increased by 40.4 million between 1950 and 1980 and by 54.0 million between 1980 and 2017.

TABLE 7.1 Employed, Unemployed, and the Labor Force, 1950–2017

	(1) Population 16 Years Old or Over (Millions)	(2) Labor Force (Millions)	(3) Employed (Millions)	(4) Unemployed (Millions)	(5) Labor Force Participation Rate (Percentage Points)	(6) Unemployment Rate (Percentage Points)
1950	105.0	62.2	58.9	3.3	59.2	5.3
1960	117.2	69.6	65.8	3.9	59.4	5.5
1970	137.1	82.8	78.7	4.1	60.4	4.9
1980	167.7	106.9	99.3	7.6	63.8	7.1
1990	189.2	125.8	118.8	7.0	66.5	5.6
2000	212.6	142.6	136.9	5.7	67.1	4.0
2010	237.8	153.9	139.1	14.8	64.7	9.6
2017	255.1	160.3	153.3	7.0	62.9	4.4

Note: Figures are civilian only (military excluded).
Source: Economic Report of the President, 2018 and U.S. Bureau of Labor Statistics.

MyLab Economics Real-time data

Components of the Unemployment Rate MyLab Economics Concept Check

To get a better picture of unemployment in the United States, it is useful to look at unemployment rates across groups of people.

Unemployment Rates for Different Demographic Groups There are large differences in rates of unemployment across demographic groups. Table 7.2 shows the unemployment rate for November 1982—the worst month of the recession in 1982—and for February 2018—a month of low unemployment—broken down by race, sex, and age. In February 2018, when the overall unemployment rate was 4.1 percent, the rate for whites was 3.7 percent, whereas the rate for African Americans was higher at 6.9 percent.

During the recession of 1982, men fared worse than women. For African Americans, 19.3 percent of men 20 years and older and 16.5 percent of women 20 years and older were unemployed. Teenagers between 16 and 19 years of age fared worst. African Americans between 16 and 19 experienced an unemployment rate of 49.5 percent in November 1982. For whites between 16 and 19, the unemployment rate was 21.3 percent. The unemployment rate for teenagers was also high in February 2018, and African American men and women continue to have unemployment rates higher than their white counterparts.

Discouraged-Worker Effects Many people believe that the unemployment rate underestimates the fraction of people who are involuntarily out of work. People who stop looking for work are classified as having dropped out of the labor force instead of being unemployed. During recessions, people may become discouraged about finding a job and stop looking. This lowers the unemployment rate as calculated by the BLS because those no longer looking for work are no longer counted as unemployed.

discouraged-worker effect The decline in the measured unemployment rate that results when people who want to work but cannot find work grow discouraged and stop looking, thus dropping out of the ranks of the unemployed and the labor force.

To demonstrate how this **discouraged-worker effect** lowers the unemployment rate, suppose there are 10 million unemployed out of a labor force of 100 million. This means an unemployment rate of $10/100 = .10$, or 10 percent. If 1 million of these 10 million unemployed people stopped looking for work and dropped out of the labor force, 9 million would be unemployed out of a labor force of 99 million. The unemployment rate would then drop to $9/99 = .091$, or 9.1 percent.

The BLS survey provides some evidence on the size of the discouraged-worker effect. Respondents who indicate that they have stopped searching for work are asked why they stopped. If the respondent cites inability to find employment as the sole reason for not searching, that person might be classified as a discouraged worker.

The number of discouraged workers seems to hover around 1 percent of the size of the labor force in normal times. During the 1980–1982 recession, the number of discouraged workers increased steadily to a peak of 1.5 percent. In February 2018, discouraged workers were estimated to comprise about 0.23 percent of the size of the labor force. Some economists argue that adding the number of discouraged workers to the number who are now classified as unemployed gives a better picture of the unemployment situation.

The Duration of Unemployment The unemployment rate measures unemployment at a given point in time. It tells us nothing about how long the average unemployed worker is out of work. With a labor force of 1,000 people and an annual unemployment rate of 10 percent, we

TABLE 7.2 Unemployment Rates by Demographic Group, 1982 and 2018

	Years	November 1982	February 2018
Total		10.8	4.1
White		9.6	3.7
Men	20 +	9.0	3.4
Women	20 +	8.1	3.3
Both sexes	16–19	21.3	12.6
African American		20.2	6.9
Men	20 +	19.3	5.9
Women	20 +	16.5	6.2
Both sexes	16–19	49.5	27.2

Source: U.S. Bureau of Labor Statistics. Data are seasonally adjusted.

MyLab Economics Real-time data

ECONOMICS IN PRACTICE

Female Labor Force Participation and Economic Development

It is a fact generally accepted that the labor force participation rate of women is a crucial factor in the economic development of any country. Higher female participation means a larger labor force and, therefore, an increase in the productive output of the economy. Though a direct causality between female labor force participation and economic growth is not easy to determine, there is, nonetheless, evidence of positive correlations between increased presence of women in labor markets and accelerated economic growth. Such a correlation can be found, for instance, in the decades following World War II in Western Europe and Northern America.

Boosting the integration of women into labor markets is an important policy objective for governments desirous of sustaining domestic economic development, besides other equally important objectives related to gender equality. To do so, it is important to consider factors like economic growth, rising wages, decline in fertility, and improvement in health, which help increase female labor force participation.

However, a recent study[1] shows that despite the incidence of all these factors, female labor participation has stagnated in urban India over the past 30 years. The authors of the study, Stephan Klasen and Janneke Pieters, attribute this stagnation to a combination of supply and demand effects. On the demand side, they point out the stagnation of sectors traditionally hiring more women. On the supply side, female labor market participation has been hampered by rising household income, which makes the addition of another breadwinner, besides men, less necessary, along with the mixed effects of education. The latter discovery can appear counter-intuitive given the usually positive correlation one assumes between education and labor market participation: higher education levels usually help

prospective workers improve their chance of getting a job and therefore indicate a willingness to integrate the labor market or, as some economists call it, improve "labor market returns." In India, however, as the study showed higher education did not lead to increased female labor market participation. The authors find that at least some of the expansion in female education in urban India was driven by expected "marriage market returns"; in other words, some families invested in their daughters' education so as to improve their marriage prospects. This example effectively highlights some of the challenges associated with efforts to boost female labor force participation rate.

[1]Stephan Klasen and Janneke Pieters, "What Explains the Stagnation of Female Labor Force Participation In Urban India?" *World Bank Policy Research Working Paper*, March 2013.

know that at any moment 100 people are unemployed. But a different picture emerges if it turns out that the same 100 people are unemployed all year, as opposed to a situation in which each of the 1,000 people has a brief spell of unemployment of a few weeks during the year. The duration statistics give us information on this feature of unemployment. Table 7.3 shows that during recessionary periods, the average duration of unemployment rises. Between 1979 and 1983, the average duration of unemployment rose from 10.8 weeks to 20.0 weeks. The slow growth following the 1990–1991 recession resulted in an increase in duration of unemployment to 17.7 weeks in 1992 and to 18.8 weeks in 1994. In 2000, average duration was down to 12.6 weeks, which then rose to 19.6 weeks in 2004. Between 2007 and 2009 average duration rose sharply from 16.8 weeks to 24.4 weeks. Following the recession it rose even more—to 39.4 weeks in 2012. This reflects the slow overall recovery from the recession. Average duration then fell to 25.0 weeks by 2017.

The Costs of Unemployment MyLab Economics Concept Check

In the Employment Act of 1946, Congress declared that it was the continuing policy and responsibility of the federal government to use all practicable means to promote maximum employment, production, and purchasing power.

In the years since, full employment has remained an important target of federal policy. Why should full employment be a policy objective of the federal government? What costs does unemployment impose on society?

ECONOMICS IN PRACTICE

The Consequences of Unemployment Persist

Throughout the recession of 2008–2009 and the slow recovery afterward, many young college graduates found themselves unemployed, many for a number of months. As painful as that experience was, economists had more bad news for them. The negative effect of early unemployment on your career lasts for many years!

Lisa Kahn, a labor economist, followed graduates of colleges from the period 1979–1989 over the subsequent 17 years.[1] You know from Chapter 5 that within this overall period there was one recession in 1980–1982. Kahn finds that even 15 years later, wage rates of those with post-college unemployment lagged substantially. Not only did low wages persist, but fewer graduates in recessionary periods were able to enter high prestige jobs, even when the economy recovered.

CRITICAL THINKING

1. Describe a mechanism that might help explain the persistence of wage-effects from a recession.

[1]Lisa Kahn, "The Long-Term Labor Consequences of Graduating from College in a Bad Economy," *Labour Economics*, April 2010.

Frictional, Structural, and Cyclical Unemployment When we consider the various costs of unemployment, it is useful to categorize unemployment into three types:

- Frictional unemployment
- Structural unemployment
- Cyclical unemployment

TABLE 7.3 Average Duration of Unemployment, 1970–2017

	Weeks		Weeks		Weeks
1970	8.6	1986	15.0	2002	16.6
1971	11.3	1987	14.5	2003	19.2
1972	12.0	1988	13.5	2004	19.6
1973	10.0	1989	11.9	2005	18.4
1974	9.8	1990	12.0	2006	16.8
1975	14.2	1991	13.7	2007	16.8
1976	15.8	1992	17.7	2008	17.9
1977	14.3	1993	18.0	2009	24.4
1978	11.9	1994	18.8	2010	33.0
1979	10.8	1995	16.6	2011	39.3
1980	11.9	1996	16.7	2012	39.4
1981	13.7	1997	15.8	2013	36.5
1982	15.6	1998	14.5	2014	33.7
1983	20.0	1999	13.4	2015	29.2
1984	18.2	2000	12.6	2016	27.5
1985	15.6	2001	13.1	2017	25.0

Source: U.S. Bureau of Labor Statistics.

MyLab Economics Real-time data

In thinking about the social costs of unemployment, all unemployment is not created equal! When the BLS does its survey about work activity for the week containing the 12th of each month, it interviews many people who are involved in the normal search for work. Some are either newly entering the labor force, while others are switching jobs. This unemployment is both natural and beneficial for the economy. The portion of unemployment resulting from the normal turnover in the labor market is called **frictional unemployment**. As long as job search takes some time, the frictional unemployment rate will not be zero.

frictional unemployment
The portion of unemployment that is due to the normal working of the labor market; used to denote short-run job/skill matching problems.

The industrial structure of the U.S. economy is continually changing. Manufacturing, for instance, has yielded part of its share of total employment to services and to finance, insurance, and real estate. Within the manufacturing sector, the steel and textile industries have contracted sharply, whereas high-technology sectors have expanded. The unemployment that arises from such structural shifts is usually called **structural unemployment**. Thus, the term *frictional unemployment* is used to denote short-run job/skill-matching problems, problems that last a few weeks, and *structural unemployment* denotes longer-run adjustment problems—those that tend to last for years. Although structural unemployment is an indication of a dynamic economy, it also brings with it cost to those who lose their jobs because their skills are obsolete.

structural unemployment
The portion of unemployment that is a result of changes in the structure of the economy that result in a significant loss of jobs in certain industries.

Economists sometimes use the term **natural rate of unemployment** to refer to the unemployment rate that occurs in a normal functioning economy, subject to some frictional and structural unemployment. Estimates of the natural rate vary from 4 percent to 6 percent.

natural rate of unemployment
The unemployment rate that occurs as a normal part of the functioning of the economy. Sometimes taken as the sum of the frictional unemployment rate and the structural unemployment rate.

Between 2007 and 2009 the actual unemployment rate rose from 4.6 percent to 9.3 percent, and it seems unlikely that all of this rise was simply because of a rise in frictional and structural unemployment. Any unemployment that is above frictional plus structural is called **cyclical unemployment**. It seems likely that much of the unemployment in 2009, during the 2008–2009 recession, and during earlier recessions, was cyclical unemployment.

cyclical unemployment
Unemployment that is above frictional plus structural unemployment.

Social Consequences The costs of unemployment are neither evenly distributed across the population nor easily quantified. The social consequences of the Depression of the 1930s are perhaps the hardest to comprehend. Few emerged from this period unscathed. At the bottom were the poor and the fully unemployed, about 25 percent of the labor force. Even those who kept their jobs found themselves working part-time. Many people lost all or part of their savings as the stock market crashed and thousands of banks failed. Re-reading the excerpt from John Steinbeck's *The Grapes of Wrath* in Chapter 5 will give you a flavor for the social costs of the unemployment of that period. Many of you may also have seen friends or families lose valued jobs in the more recent recession of 2008–2009.

Inflation and Deflation

7.2 LEARNING OBJECTIVE

Describe the tools used to measure inflation and discuss the costs and effects of inflation.

In a market economy like the U.S. economy, prices of individual goods continually change as supply and demand shift. Indeed, a major concern of microeconomics is understanding the way in which relative prices change—why, for example, have computers become less expensive over time and dental services more expensive? In macroeconomics, we are concerned not with relative price changes, but with changes in the *overall* price level of goods and services. Inflation is defined as an increase in the overall price level, whereas deflation is a decrease in the overall price level.

The fact that all prices for the multitude of goods and services in our economy do not rise and fall together at the same rate makes measurement of inflation difficult. We have already explored measurement issues in Chapter 6 in defining the GDP deflator, which measures the price level for all goods and services in an economy. We turn now to look at a second, commonly used measure of the price level, the consumer price index.

The Consumer Price Index MyLab Economics Concept Check

The **consumer price index (CPI)** is the most widely followed price index. Unlike the GDP deflator, it is a fixed-weight index. It was first constructed during World War I as a basis for adjusting shipbuilders' wages, which the government controlled during the war. Currently, the CPI

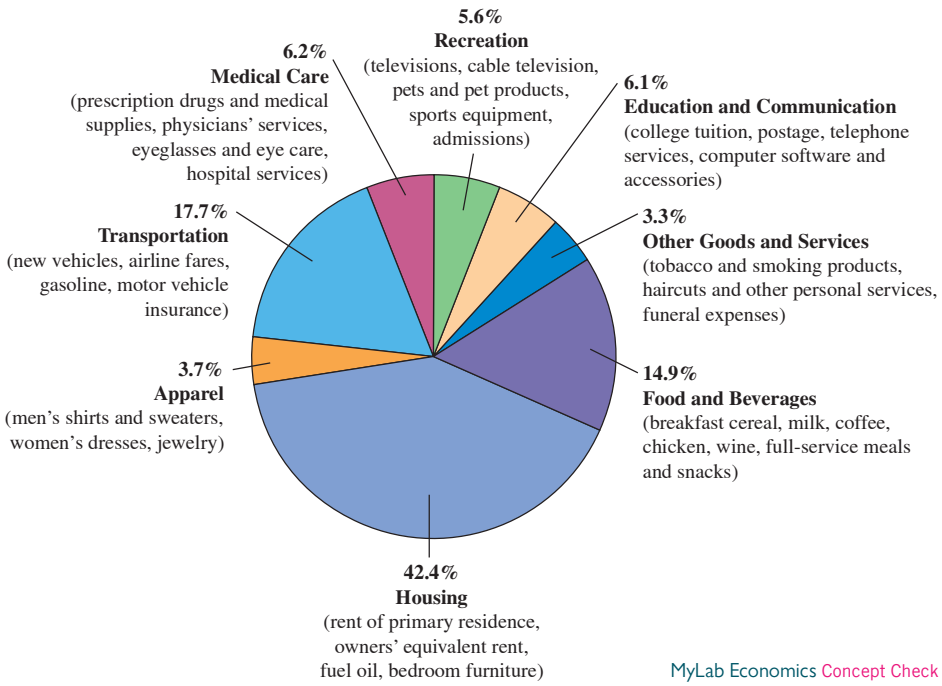
consumer price index (CPI)
A price index computed each month by the Bureau of Labor Statistics using a bundle that is meant to represent the "market basket" purchased monthly by the typical urban consumer.

is computed by the BLS each month using a bundle of goods meant to represent the "market basket" purchased monthly by the typical urban consumer. The quantities of each good in the bundle that are used for the weights are based on extensive surveys of consumers. In fact, the BLS collects prices each month for about 71,000 goods and services from about 22,000 outlets in 44 geographic areas. For example, the cost of housing is included in the data collection by surveying about 5,000 renters and 1,000 homeowners each month. Figure 7.1 shows the CPI market basket for December 2007.

Table 7.4 shows values of the CPI since 1950. The base period for this index is 1982–1984, which means that the index is constructed to have a value of 100.0 when averaged across these three years. The percentage change for a given year in the table is a measure of inflation in that year. For example, from 1970 to 1971, the CPI increased from 38.8 to 40.5, a percentage change of 4.4 percent. [The percentage change is $(40.5 - 38.8)/38.8$ times 100.] The table shows the high inflation rates in the 1970s and early 1980s and the fairly low inflation rates since 1992.

Because the CPI is a fixed-weight price index (with the current base period 1982–1984), it suffers from the substitution problem discussed in the last chapter. With fixed weights, it does not account for consumers' substitution away from high-priced goods. The CPI thus has a tendency to overestimate the rate of inflation. This problem has important policy implications because government transfers, such as Social Security payments, are tied to the CPI. If inflation as measured by percentage changes in the CPI is biased upward, Social Security payments will grow more rapidly than they would with a better measure: The government is spending more than it otherwise would.

In response to the fixed-weight problem, in August 2002, the BLS began publishing a version of the CPI called the Chained Consumer Price Index, which uses changing weights. Although this version is not yet the main version, it may be that within a few years the BLS will completely move away from the fixed-weight version of the CPI. Remember, however, that even if this happens, the CPI will still differ in important ways from the GDP deflator, discussed in the last chapter. The CPI covers only consumer goods and services—those listed in Figure 7.1—whereas the GDP deflator covers all goods and services produced in the economy. Also, the CPI includes prices of imported goods, which the GDP deflator does not.



MyLab Economics Concept Check

▲ **FIGURE 7.1 The CPI Market Basket**

The CPI market basket shows how a typical consumer divides his or her money among various goods and services. Most of a consumer's money goes toward housing, transportation, and food and beverages.

TABLE 7.4 The CPI, 1950–2017

	Percentage Change in CPI	CPI		Percentage Change in CPI	CPI
1950	1.3	24.1	1984	4.3	103.9
1951	7.9	26.0	1985	3.6	107.6
1952	1.9	26.5	1986	1.9	109.6
1953	0.8	26.7	1987	3.6	113.6
1954	0.7	26.9	1988	4.1	118.3
1955	−0.4	26.8	1989	4.8	124.0
1956	1.5	27.2	1990	5.4	130.7
1957	3.3	28.1	1991	4.2	136.2
1958	2.8	28.9	1992	3.0	140.3
1959	0.7	29.1	1993	3.0	144.5
1960	1.7	29.6	1994	2.6	148.2
1961	1.0	29.9	1995	2.8	152.4
1962	1.0	30.2	1996	3.0	156.9
1963	1.3	30.6	1997	2.3	160.5
1964	1.3	31.0	1998	1.6	163.0
1965	1.6	31.5	1999	2.2	166.6
1966	2.9	32.4	2000	3.4	172.2
1967	3.1	33.4	2001	2.8	177.1
1968	4.2	34.8	2002	1.6	179.9
1969	5.5	36.7	2003	2.3	184.0
1970	5.7	38.8	2004	2.7	188.9
1971	4.4	40.5	2005	3.4	195.3
1972	3.2	41.8	2006	3.2	201.6
1973	6.2	44.4	2007	2.8	207.3
1974	11.0	49.3	2008	3.9	215.3
1975	9.1	53.8	2009	−0.4	214.5
1976	5.8	56.9	2010	1.7	218.1
1977	6.5	60.6	2011	3.1	224.9
1978	7.6	65.2	2012	2.1	229.6
1979	11.3	72.6	2013	1.5	233.0
1980	13.5	82.4	2014	1.6	236.7
1981	10.3	90.9	2015	1.3	237.0
1982	6.2	96.5	2016	1.3	240.0
1983	3.2	99.6	2017	2.1	245.1

Sources: U.S. Bureau of Labor Statistics.

MyLab Economics Real-time data

Other popular price indexes are **producer price indexes (PPIs)**, once called *wholesale price indexes*. These are indexes of prices that producers receive for products at various stages in the production process, not just the final stage. The indexes are calculated separately for various stages in the production process. The three main categories are *finished goods, intermediate materials,* and *crude materials,* although there are subcategories within each of these categories.

producer price indexes (PPIs) Measures of prices that producers receive for products at various stages in the production process.

One advantage of some of the PPIs is that they detect price increases early in the production process. Because their movements sometimes foreshadow future changes in consumer prices, they are considered to be leading indicators of future consumer prices.

The Costs of Inflation MyLab Economics Concept Check

If you asked most people why inflation is bad, they would tell you that it lowers the overall standard of living by making goods and services more expensive. That is, it cuts into people's purchasing power. People are fond of recalling the days when a bottle of Coca-Cola cost a dime and a hamburger cost a quarter. Just think what we could buy today if prices had not changed. What people usually do not think about is what their incomes were in the "good old days." The fact that the cost of a Coke has increased from 10 cents to a dollar does not mean anything in real terms if people who once earned $5,000 now earn $50,000. During inflations, most prices—including

input prices like wages—tend to rise together, and input prices determine both the incomes of workers and the incomes of owners of capital and land. So inflation by itself does not *necessarily* reduce one's purchasing power.

Inflation May Change the Distribution of Income Whether you gain or lose during a period of inflation depends on whether your income rises faster or slower than the prices of the things you buy. The group most often mentioned when the impact of inflation is discussed is people living on fixed incomes. If your income is fixed and prices rise, your ability to purchase goods and services falls proportionately.

Although the elderly are often thought of as living on fixed incomes, many pension plans pay benefits that are *indexed* to inflation, as we describe in the *Economics in Practice* on the next page. The benefits these plans provide automatically increase when the general price level rises. If prices rise 10 percent, benefits also rise 10 percent. The biggest source of income for many elderly people is Social Security. These benefits are fully indexed; when prices rise—that is, when the CPI rises—by 5 percent, Social Security benefits also increase by 5 percent.

Wages are also sometimes indexed to inflation through cost-of-living adjustments (COLAs) written into labor contracts. These contracts usually say the wage rate will be increased with the inflation rate. If wages are fully indexed, workers do not suffer a fall in real income when inflation rises, although wages are not always fully indexed.

One way of thinking about the effects of inflation on the distribution of income is to distinguish between *anticipated* and *unanticipated* inflation. If inflation is anticipated and contracts are made and agreements written with the anticipated value of inflation in mind, there need not be any effects of inflation on income distribution. Consider an individual who is thinking about retiring and has a pension that is not indexed to the CPI. If she knew what inflation was going to be for the next 20 or 30 years of her retirement, there would be no problem. She would just wait to retire until she had enough money to pay for her anticipated growing expenses. The problem occurs if, after she has retired, inflation is higher than she expected. At that point, she may face the prospect of having to return to work. Similarly, if I as a landlord expect inflation to be 2 percent per year over the next 3 years and offer my tenants a 3-year lease with a 2 percent rent increase each year, I will be in bad shape if inflation turns out to be 10 percent per year and causes all my costs to rise by 10 percent per year.

For another example, consider debtors versus creditors. It is commonly believed that debtors benefit at the expense of creditors during an inflation because with inflation they pay back less in the future in real terms than they borrowed. But this is not the case if the inflation is anticipated and the loan contract is written with this in mind.

Suppose that you want to borrow $100 from me to be paid back in a year and that we both agree that if there is no inflation, the appropriate interest rate is 5 percent. Suppose also that we both anticipate that the inflation rate will be 10 percent. In this case we will agree on a 15 percent interest rate—you will pay me back $115 at the end of the year. By charging you 15 percent I have taken into account the fact that you will be paying me back with dollars worth 10 percent less in real terms than when you borrowed them. I am then not hurt by inflation and you are not helped if the actual inflation rate turns out to equal our anticipated rate. I am earning a 5 percent **real interest rate**—the difference between the interest rate on a loan and the inflation rate.

real interest rate The difference between the interest rate on a loan and the inflation rate.

Unanticipated inflation, on the other hand, is a different story. If the actual inflation rate during the year turns out to be 20 percent, I as a creditor will be hurt. I charged you 15 percent interest, expecting to get a 5 percent real rate of return, when I needed to charge you 25 percent to get the same 5 percent real rate of return. Because inflation was higher than anticipated, I got a negative real return of 5 percent. Inflation that is higher than anticipated benefits debtors; inflation that is lower than anticipated benefits creditors.

To summarize, the effects of anticipated inflation on the distribution of income are likely to be fairly small because people and institutions will adjust to the anticipated inflation. Unanticipated inflation, on the other hand, may have large effects, depending, among other things, on how much indexing to inflation there is. If many contracts are not indexed and are based on anticipated inflation rates that turn out to be wrong, there can be big winners and

losers. In general, there is more uncertainty and risk when inflation is unanticipated. This uncertainty may prevent people from signing long-run contracts that would otherwise be beneficial for both parties.

Administrative Costs and Inefficiencies There may be costs associated even with anticipated inflation. One is the administrative cost associated with simply keeping up. During the rapid inflation in Israel in the early 1980s, a telephone hotline was set up to give the hourly price index. In Zimbabwe, where the inflation rate in June 2008 was estimated by some to be more than 1 million percent at an annual rate, the government was forced to print ever-increasing denominations of money. In 2009, Zimbabwe abandoned its currency and started using the U.S. dollar and the South African Rand to conduct business. In 2018 the Venezuelan government was increasing the total currency in circulation by more than 50 percent per month to avoid the cash shortages coming from its hyperinflation.

What about Deflation? MyLab Economics Concept Check

In 2017 most of the developed world experienced very little inflation. Indeed, the United States has not seen high inflation since the 1970s. Instead, governments in a number of countries have begun to worry about deflation hitting their economies. Why might we worry about price declines?

Part of the answer, of course, parallels the discussion of price increases. If prices fall and the fall is unanticipated, borrowers will gain at the expense of lenders, whereas those on fixed pensions will gain at the expense of the governments and firms paying those pensions. But deflation also brings with it another worry. It may be a signal that aggregate demand is too low to support full employment. We will have much to say about aggregate demand in future chapters.

ECONOMICS IN PRACTICE

Chain-Linked Consumer Price Index in the News

The calculations described in Chapter 6 on how to construct a chain-linked price index may seem complicated and a bit arcane to you. But throughout the last months of 2012 and into early 2016, as Republicans and Democrats argued over the federal budget, chain linking became a hot topic.

As we know from the discussion of fixed weights in Chapter 6, chain linking a price index accounts for product substitution that people make in response to relative price changes. Fixed-weight price indices, which do not take into account this substitution, tend to overestimate inflation. There are two versions of the consumer price index (CPI), one using fixed weights and one using chain linking. The fixed-weight version is the one that is used to adjust Social Security benefits and veteran benefits to price changes. If, say, the CPI increases by 2 percent in a year, benefits are increased by 2 percent. If the chain-linked CPI were used instead, benefits would tend to increase more slowly because in general the chain-linked CPI increases less than does the fixed-weight CPI (because of product substitution). You may see where this is going. One way to decrease expenditures on social security and veteran benefits in the future would be to use the chain-linked CPI rather than the fixed-weight CPI. The nonpartisan Congressional Budget Office estimated that if

the chain-linked CPI were adopted, it would save the federal government about $145 billion over a 10-year period from the lower benefits.

CRITICAL THINKING

1. Tax brackets are also tied to the fixed-weight CPI. How would tax revenue be affected if the chain-linked CPI were used instead?

7.3 LEARNING OBJECTIVE

Discuss the components and implications of long-run growth.

output growth The growth rate of the output of the entire economy.

per-capita output growth The growth rate of output per person in the economy.

productivity growth The growth rate of output per worker.

Long-Run Growth

In discussing long-run growth, it will be useful to begin with a few definitions. **Output growth** is the growth rate of the output of the entire economy. **Per-capita output growth** is the growth rate of output per person in the economy. If the population of a country is growing at the same rate as output, then per-capita output is not growing: Output growth is simply keeping up with population growth. Not everyone in a country works, and so output per worker is not the same as output per person. Output per worker is larger than output per person, and it is a measure of productivity. **Productivity growth** is thus the growth rate of *output per worker*.

One measure of the economic welfare of a country is its per-capita output. Per-capita output can increase because each worker now produces more than he or she did previously, or because there are more workers relative to nonworkers in the population. In the United States, both forces have been at work in increasing per-capita output.

Output and Productivity Growth MyLab Economics Concept Check

We have pointed out that aggregate output in the United States has grown at an annual rate of 3.2 percent since 1900, with year-to-year fluctuations. An area of economics called *growth theory* is concerned with the question of what determines this rate. Why 3.2 percent and not 2 percent or 4 percent? We take up this question in Chapter 16, but a few points are useful to make now.

In a simplified economy, machines (capital) and workers (labor) are needed to produce output. How can output increase in this economy? There are a number of ways. One way is to add more workers. With more workers, more output can be produced per machine per hour. Another way is to add more machines, so that each worker has more capital to work with. A third way is to increase the length of the work week. With workers and machines working more hours, more output can be produced. Output can thus increase if labor or capital increases or if the amount of time that labor and capital are working per week increases.

Another way for output to increase in our economy is for the quality of the workers to increase, perhaps through education, experience, or even better health. If workers become more physically fit by exercising more and eating less fat and more whole grains and fresh fruits and vegetables, their greater fitness may increase their output on the machines. People are sometimes said to be adding to their *human capital* when they increase their mental or physical skills.

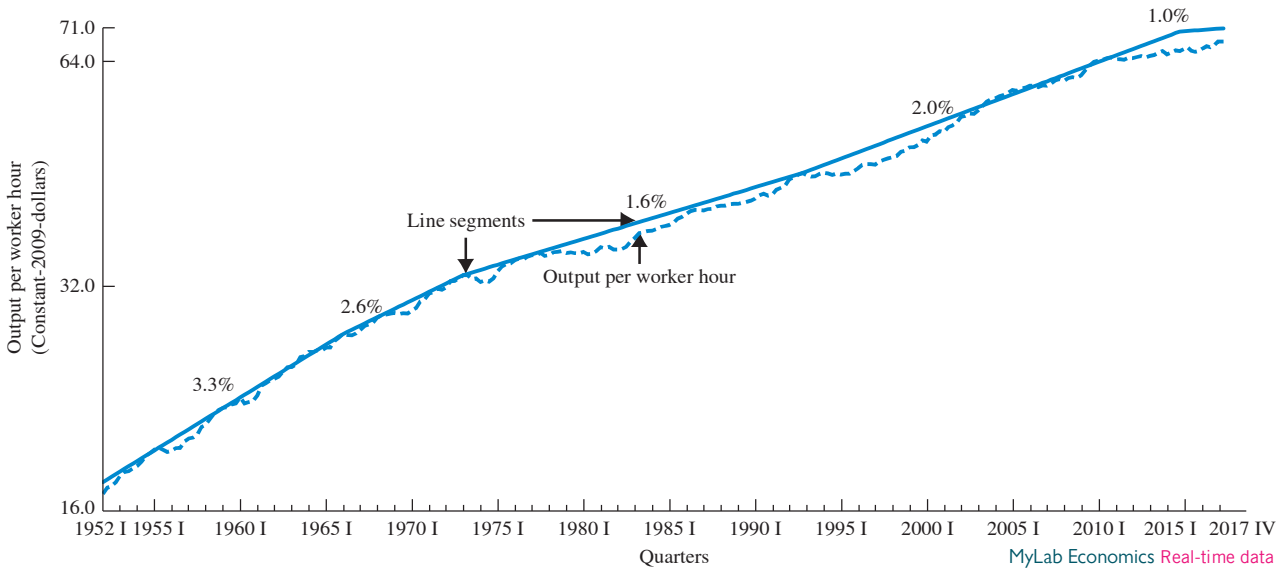
The quality of the machines used in the workplace may also increase. In particular, new machines that replace old machines may allow more output to be produced per hour with the same number of workers. An obvious example is the replacement of an old computer with a new, faster one that allows more to be done per minute of work on the computer.

To summarize, output can increase when there are more workers, more skills per worker, more machines, better machines, or a longer workweek.

Output per worker hour is called *labor productivity* or sometimes just *productivity*. Output per worker hour is plotted in Figure 7.2 for the 1952 I–2017 IV period. Two features are immediately clear from the figure. First, there is an upward trend in labor productivity. Second, there are fairly sizable short-run fluctuations around the trend. Chapter 16 will discuss these short-run fluctuations, linking them to underutilization of an employed work force. For now, however, our main interest is the long-run trend.

To smooth out the short-run fluctuations in Figure 7.2, we have added straight-line segments to the figure, where the segments roughly go through the high values. The slope of each line segment is the growth rate of productivity along the segment. The growth rates are listed in the figure. The different productivity growth rates in the figure tell an interesting story. From the 1950s through the mid-1960s, the growth rate was 3.4 percent. The rate then fell to 2.6 percent in the last half of the 1960s and early 1970s. Between the early 1970s and the early 1990s, the growth rate was much lower at 1.6 percent. Between the early 1990s and 2010 it was 2.0 percent. Since 2010 the growth rate appears to have considerably slowed, to around 1.0 percent.

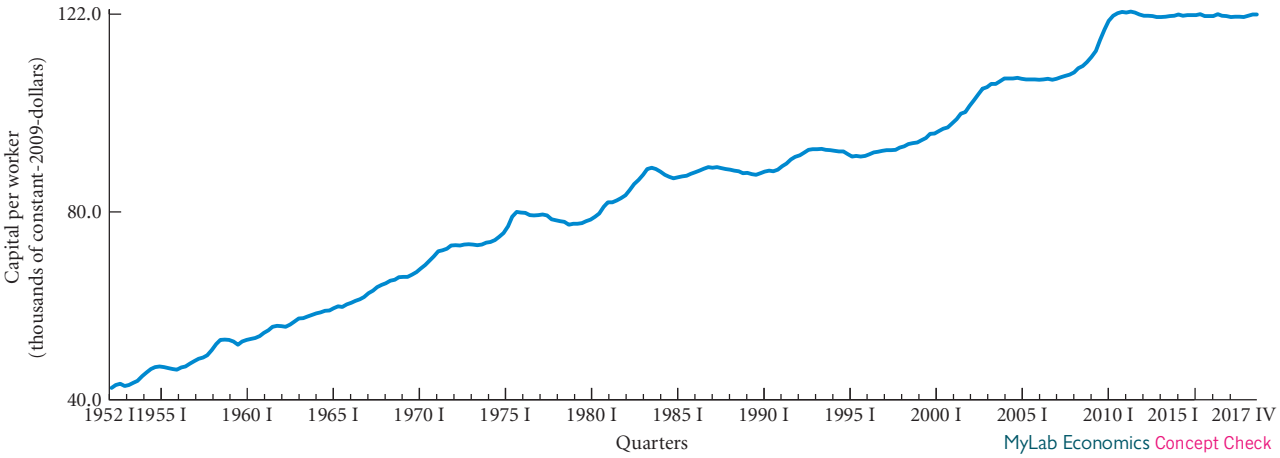
Why are the growth rates positive in Figure 7.2? Why has the amount of output that a worker can produce per hour risen in the last half-century? Part of the answer is that the amount of capital per worker has increased. In Figure 7.3 capital per worker is plotted for the same 1952 I–2017



▲ **FIGURE 7.2 Output per Worker Hour (Productivity), 1952 I–2017 IV**
Productivity grew much faster in the 1950s and 1960s than since.

IV period. It is clear from the figure that the amount of capital per worker has generally been rising. Therefore, with more capital per worker, more output can be produced per worker. The other part of the answer is that the quality of labor and capital has been increasing. Both the average skill of workers and the average quality of capital have been increasing. This means that more output can be produced per worker for a given quantity of capital because both workers and capital are getting better.

A harder question to answer concerning Figure 7.2 is why the growth rate of productivity was much higher in the 1950s and 1960s than it has been since the early 1970s. Again, part of the answer is that the amount of capital per worker rose more rapidly in the 1950s and 1960s than it has since then. This can be seen in Figure 7.3. The other part of the answer is, of course, that the quality of labor and capital must have increased more in the 1950s and 1960s than later, although this is difficult to explain or to get direct evidence on. Interestingly, it has been difficult to find big productivity gains from recent technological innovations in the communications area.



▲ **FIGURE 7.3 Capital per Worker, 1952 I–2017 IV**
Capital per worker grew until about 1980 and then leveled off somewhat.

Looking Ahead

This ends our introduction to the basic concepts and problems of macroeconomics. The first chapter of this part introduced the field; the second chapter discussed the measurement of national product and national income; and this chapter discussed unemployment, inflation, and long-run growth. We are now ready to begin the analysis of how the macroeconomy works.

SUMMARY

7.1 UNEMPLOYMENT *p. 152*

1. The *unemployment rate* is the ratio of the number of *unemployed* people to the number of people in the *labor force*. To be considered unemployed and in the labor force, a person must be looking for work.
2. Big differences in rates of unemployment exist across demographic groups, regions, and industries. African Americans, for example, experience much higher unemployment rates than whites.
3. A person who decides to stop looking for work is considered to have dropped out of the labor force and is no longer classified as unemployed. People who stop looking because they are discouraged about finding a job are sometimes called *discouraged workers*.
4. Some unemployment is inevitable. Because new workers are continually entering the labor force, because industries and firms are continuously expanding and contracting, and because people switch jobs, there is a constant process of job search as workers and firms try to match the best people to the available jobs. This unemployment is both natural and beneficial for the economy.
5. The unemployment that occurs because of short-run job/skill-matching problems is called *frictional unemployment*. The unemployment that occurs because of longer-run structural changes in the economy is called *structural unemployment*. The *natural rate of unemployment* is the sum of the frictional rate and the structural rate. The increase in unemployment that occurs during recessions and depressions is called *cyclical unemployment*.

7.2 INFLATION AND DEFLATION *p. 157*

6. The *consumer price index (CPI)* is a fixed-weight price index. It represents the "market basket" purchased by the typical urban consumer.
7. Whether people gain or lose during a period of inflation depends on whether their income rises faster or slower than the prices of the things they buy. The elderly are more insulated from inflation than most people think because Social Security benefits and many pensions are indexed to inflation.
8. Inflation is likely to have a larger effect on the distribution of income when it is unanticipated than when it is anticipated.

7.3 LONG-RUN GROWTH *p. 162*

9. Output growth depends on: (1) the growth rate of the capital stock, (2) the growth rate of output per unit of the capital stock, (3) the growth rate of labor, and (4) the growth rate of output per unit of labor.
10. Output per worker hour (labor productivity) rose faster in the 1950s and 1960s than it rose from the 1970s to 2017. An interesting question is whether labor productivity will rise faster in the future because of the Internet.

REVIEW TERMS AND CONCEPTS

consumer price index (CPI), *p. 157*
cyclical unemployment, *p. 157*
discouraged-worker effect, *p. 154*
employed, *p. 152*
frictional unemployment, *p. 157*
labor force, *p. 152*
labor force participation rate, *p. 152*
natural rate of unemployment, *p. 157*
not in the labor force, *p. 152*
output growth, *p. 162*
per-capita output growth, *p. 162*
producer price indexes (PPIs), *p. 159*
productivity growth, *p. 162*
real interest rate, *p. 160*
structural unemployment, *p. 157*
unemployed, *p. 152*
unemployment rate, *p. 152*

Equations: labor force = employed + unemployed, *p. 152*

population = labor force + not in labor force, *p. 152*

$$\text{unemployment rate} = \frac{\text{unemployed}}{\text{employed} + \text{unemployed}}, \text{ p. 152}$$

$$\text{labor force participation rate} = \frac{\text{labor force}}{\text{population}}, \text{ p. 152}$$

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