1-1 The Crisis

Table 1-1 gives you output growth rates for the world economy, for advanced economies and for other countries separately, since 2000. As you can see, from 2000 to 2007 the world economy had a sustained expansion. Annual average world output growth was 3.2%, with advanced economies (the group of 30 or so richest countries in the world) growing at 2.6% per year, and emerging and developing economies (the other 150 or so other countries in the world) growing at an even faster 6.5% per year.

In 2007 however, signs that the expansion might be coming to an end started to appear. U.S. housing prices, which had doubled since 2000, started declining. In mid-2007, as we wrote the previous edition of this book, we described how economists were divided as to whether this might lead to a recession—a decrease in output. Optimists believed that, while lower housing prices might lead to lower housing construction and to lower spending by consumers, the Fed (the short name for the U.S. central bank, formally known as the *Federal Reserve Board*) could lower interest rates to stimulate demand and avoid a recession. Pessimists believed that the decrease in interest rates might not be enough to sustain demand, and that the United States may go through a short recession.

Even the pessimists turned out not to be pessimistic enough. As housing prices continued to decline, it became clear that many of the mortgage loans that had been given out during the earlier expansion were of poor quality. Many of the borrowers had taken too large a loan and were increasingly unable to make mortgage payments. And, with declining housing prices, the value of their mortgage often exceeded the price of the house, giving them an incentive to default. This was not the worst of it: The banks that had issued the mortgages had often bundled and packaged them together into new securities and then sold these securities to other banks and investors. These securities had often been repackaged into yet new securities, and so on. The result is that many banks, instead of holding the mortgages themselves, held these securities, which were so complex that their value was nearly impossible to assess.

"Banks" here actually means "banks and other financial institutions." But this is too long to write and we do not want to go into these complications in Chapter 1.

This complexity and opaqueness turned a housing price decline into a major financial crisis, a development that very few economists had anticipated. Not knowing the quality of the assets that other banks had on their balance sheets, banks became very reluctant to lend to each other for fear that the bank to which they lent might not be able to repay. Unable to borrow, and with assets of uncertain value, many banks found themselves in trouble. On September 15, 2008, a major bank, Lehman Brothers, went bankrupt. The effects were dramatic. Because the links between Lehman and other banks were so opaque, many other banks looked appeared

Table 1-1 World Output Growth since 2000

Percent	2000–2007 (average)	2008	2009	2010	2011*	2012*
World	3.2	1.5	–2.3	4.0	3.0	3.2
Advanced economies	2.6	0.1	–3.7	3.0	1.6	1.9
Emerging and developing economies	6.5	6.0	2.8	7.3	6.4	6.0

Output growth: Annual rate of growth of gross domestic product (GDP). *The numbers for 2011 and 2012 are forecasts, as of the fall of 2011.

Source: World Economic Outlook database, September 2011

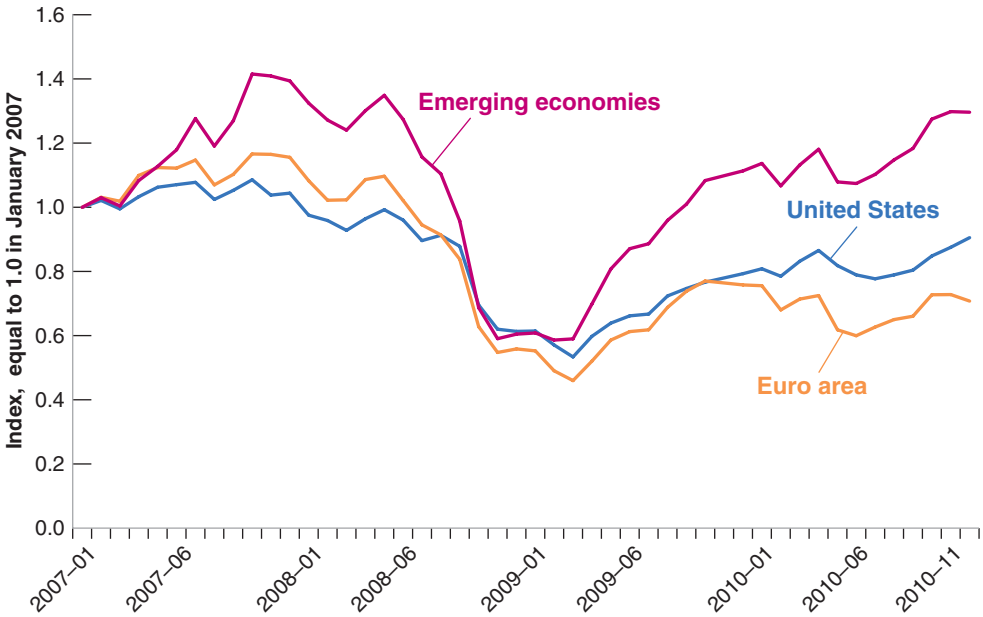


Figure 1-1

Stock prices in the United States, the Euro area, and emerging economies, 2007–2010

Source: Haver Analytics USA (S111ACD), Eurogroup (S023ACD), all emerging markets (S200ACD), all monthly averages)

at risk of going bankrupt as well. For a few weeks, it looked as if the whole financial system might collapse.

This financial crisis quickly turned into a major economic crisis. Stock prices collapsed. Figure 1-1 plots the evolution of three stock price indexes, for the United States, for the Euro area, and for emerging economies, from the beginning of 2007 on. The indexes are set equal to 1 in January 2007. Note how, by the end of 2008, stock prices had lost half or more of their value from their previous peak. Note also that, despite the fact that the crisis originated in the United States, European and emerging market stock prices decreased by as much as their U.S. counterparts; we shall return to this later.

Hit by the decrease in housing prices and the collapse in stock prices, and worried that this might be the beginning of another Great Depression, people sharply cut their consumption. Worried about sales and uncertain about the future, firms sharply cut back investment. With housing prices dropping and many vacant homes on the market, very few new homes were built. Despite strong actions by the Fed, which cut interest rates all the way down to zero, and by the U.S. government, which cut taxes and increased spending, demand decreased, and so did output. In the third quarter of 2008, U.S. output growth turned negative and remained so in 2009.

The Great Depression saw four years of negative output growth from 1929 to 1932. The unemployment rate peaked at 24.9%.

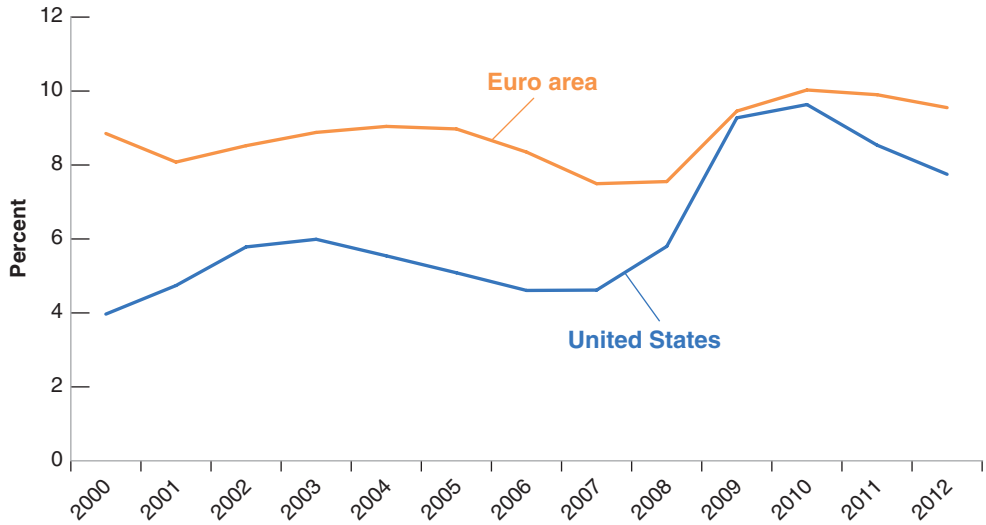
One might have hoped that the crisis would remain largely contained in the United States. As Table 1-1 and Figure 1-1 both show, this was not the case. The U.S. crisis quickly became a world crisis. Other countries were affected through two channels. The first channel was trade. As U.S. consumers and firms cut spending, part of the decrease fell on imports of foreign goods. Looking at it from the viewpoint of countries exporting to the United States, their exports went down, and so, in turn, did their output. The second channel was financial. U.S. banks, badly needing funds in the United States, repatriated funds from other countries, creating problems for banks in those countries as well. The result was not just a U.S. but a world recession. By 2009, average growth in advanced economies was −3.7%, by far the lowest annual growth rate since the Great Depression. Growth in emerging and developing economies remained positive but was nearly 4 percentage points lower than the 2000–2007 average.

Since then, thanks to strong monetary and fiscal policies and to the slow repair of the financial system, most economies have turned around. As you can see from Table 1-1,

Figure 1-2

Unemployment rates in the United States and the Euro area, 2000–2012

Source: World Economic Outlook database, September 2011



growth in both advanced countries and in emerging and developing economies turned positive in 2010, and the forecasts are for positive but low growth for 2011 and 2012.

Emerging and developing economies have largely recovered. Their exports have increased and foreign funds have returned. Indeed, some of these countries are starting to see increasing inflation, which is an indication that they may be overheating.

In advanced countries, however, many problems remain. As shown in Figure 1-2, both in the United States and the Euro area, unemployment increased a lot in the crisis and remains very high. The increase in the unemployment rate in the United States is particularly striking, increasing from 4.6% in 2007 to 9.6% in 2010, with forecasts implying only a slow decrease in 2011 and 2012. What is behind this persistently high unemployment is low output growth, and behind this low growth are many factors: Housing prices are still declining, and housing investment remains very low. Banks are still not in great shape, and bank lending is still tight. Consumers who have seen the value of their housing and their financial wealth fall are cutting consumption. And the crisis has led to serious fiscal problems. As output declined during the crisis, so did government revenues, leading to a large increase in budget deficits. Deficits have led in turn to a large increase in public debt over time. Countries must now reduce their deficits, and this is proving difficult. There are serious worries that, in some European countries, governments may not be able to adjust and may default on their debt. This, in turn, makes economists and policy makers worry that we may see yet another financial and economic crisis in the near future.

In short, while the worst of the crisis is probably over, it has left many problems in its wake, which will keep macroeconomists and policy makers busy for many years to come. We shall return to these issues in more detail at many points in the book. In the rest of the chapter, we take a closer look at the three main economic powers of the world: the United States, the Euro area, and China.

1-2 The United States

When economists first look at a country, the first two questions they ask are: How big is the country, from an economic point of view? And what is its standard of living? To answer the first, they look at output—the level of production of the country as a whole. To answer the second, they look at output per person. The

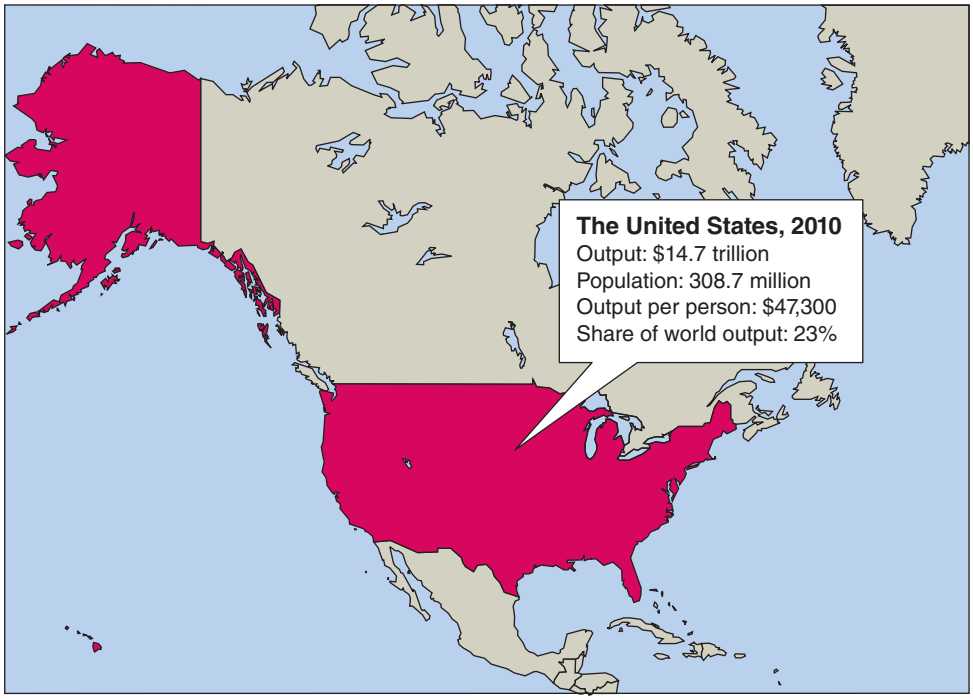


Figure 1-3

The United States

answers, for the United States, are given in Figure 1-3: The United States is very large, with an output of $14.7 trillion in 2010, accounting for 23% of world output. This makes it the largest country in the world, in economic terms. And the standard of living in the United States is very high: Output per person is $47,300. It is not the country with the highest output per person in the world, but it is close to the top.

Can you guess some of the countries with a higher standard of living than the United States? *Hint*: Think of oil producers and financial centers. For the answers, go to www.imf.org/external/pubs/ft/weo/2011/01/weodata/weoselgr.aspx and look for "Gross Domestic Product per capita, in current prices."

When economists want to dig deeper and look at the state of health of the country, they look at three basic variables:

- *Output growth*—the rate of change of output
- The *unemployment rate*—the proportion of workers in the economy who are not employed and are looking for a job
- The *inflation rate*—the rate at which the average price of the goods in the economy is increasing over time

Numbers for the three variables for the U.S. economy are given in Table 1-2. To put current numbers in perspective, the first column gives the average value of the rate of growth of output, the unemployment rate, and the inflation rate in the United States for the period 1980 to 1999. The next columns look at the more recent years, giving you first average numbers for the period 2000 to 2007, and then numbers for each year from 2008 to 2012. The numbers for 2011 and 2012 are forecasts as of the fall of 2011.

By looking at the first two columns, you can see why, in 2007, just before the crisis, economists felt good about the U.S. economy. The rate of growth of the economy since 2000 was 2.6%, admittedly a bit lower than the previous 20-year average, but still fairly high for an advanced country. Importantly, the average unemployment rate since 2000 was 5.0%, substantially lower than in the previous 20 years. And inflation was low, 2.8% on average since 2000, again substantially lower than it had been in the past.

Table 1-2 Growth, Unemployment, and Inflation in the United States, 1980–2012

Percent	1980–1999 (average)	2000–2007 (average)	2008	2009	2010	2011	2012
Output growth rate	3.0	2.6	0.0	–3.5	3.0	1.5	1.8
Unemployment rate	6.5	5.0	5.8	9.3	9.6	9.1	9.0
Inflation rate	4.2	2.8	3.8	–0.3	1.7	2.9	1.2

Output growth rate: annual rate of growth of output (GDP). Unemployment rate: average over the year. Inflation rate: annual rate of change of the price level (GDP deflator).

Source: World Economic Outlook database, September 2011

Then the crisis came, and you can see it in the numbers from 2008 onward. Output did not grow in 2008 and declined by 3.5% in 2009. Unemployment increased dramatically, to nearly 10%. Inflation declined, being slightly negative in 2009 and then staying positive but low since then. The economy rebounded in 2010, with growth of 3%. Since then, however, growth has decreased again, becoming so weak that unemployment is forecast to remain high for a long time to come. Inflation is forecast to remain low.

Apart from high unemployment, perhaps the most serious macroeconomic problem facing the United States is its very large budget deficit. We now turn to it, and to some of its implications.

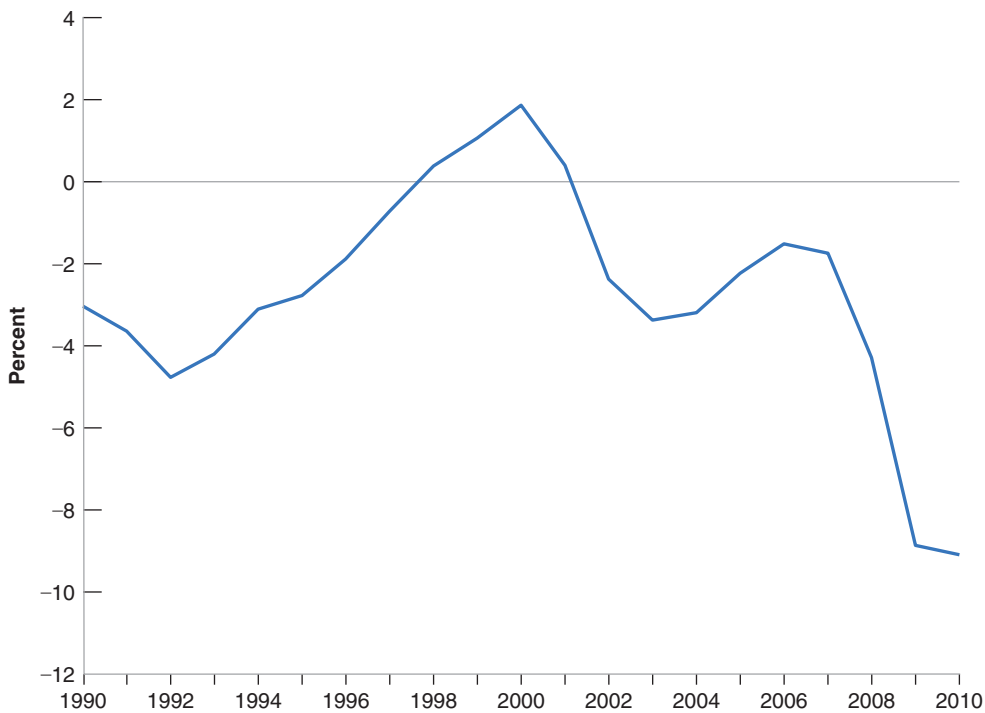
Should You Worry about the United States Deficit?

Figure 1-4 shows the evolution of the U.S. federal budget surplus (a negative value represents a deficit) since 1990. You can see that after an increase in deficits due to the 1990–1991 recession, the rest of the decade was associated with a steady improvement and by 1998, the budget had actually gone from deficit to surplus. The main reasons for the steady improvement were twofold. First, strong output growth

Figure 1-4

U.S. Federal Budget surpluses as a percent of GDP since 1990

Source: Table B-79 Economic Report of the President 2010. Values for 2011 and 2012 are estimates.



for most of the decade led to strong growth of government revenues. Second, rules were devised and implemented to contain government spending, from the use of spending caps on some categories of spending to the requirement that any new spending program be associated with an equal increase in revenues. Once budget surpluses appeared, however, Congress became increasingly willing to break its own rules and allow for more spending. At the same time, the Bush administration convinced Congress to cut taxes, with the stated intent of spurring growth. The result was a return to budget deficits. On the eve of the crisis, in 2007, the deficit was equal to 1.7% of GDP, not very large but still a deficit. The crisis had a dramatic effect on the deficit, which increased to 9% of GDP in 2010 and appears likely to be even higher in 2011. The factors behind the increase are straightforward. Lower output has led to lower government revenues. Federal revenues, which were equal to 18.9% of GDP in 2007, had declined to 16.2% of GDP in 2010. Federal spending, which was equal to 20.6% in 2007, had increased to 25.3% in 2010. This reflects not only an increase in transfers, such as higher unemployment benefits, but a more general increase in spending across the board as the government tried to counteract the decrease in private demand through an increase in public spending.

You may conclude that, as output recovers further and unemployment decreases, revenues will increase and some of the spending will be phased out. This is indeed likely to be the case, and forecasts are for a reduction in the deficit to around 5% by the middle of the decade. A 5% deficit, however, is still too a large number and creates a steadily increasing debt. Budget forecasts for the more distant future are even gloomier. The U.S. population is getting older, and Social Security benefits will increase substantially in the future. And, even more importantly, health expenditures are growing very fast and, with them, spending in government programs such as Medicare and Medicaid. So there is wide agreement that the budget deficit must be reduced further. But there is disagreement as to both when and how.

- Some economists argue that deficit reduction should start now and proceed rapidly. They argue that the credibility of the U.S. government is at stake, and that only a strong reduction will convince people that the government will do what is needed to stabilize the debt. Other economists argue, however, that too fast a reduction in the deficit would be dangerous. A reduction in the deficit can be achieved by a combination of an increase in taxes and a decrease in spending. Either one, they argue, will decrease demand and slow down growth at a time when unemployment is still very high. Their recommendation is thus to reduce the deficit, but to do it slowly and steadily.
- Even if there is agreement on the need for deficit reduction, there is much less agreement on how it should be achieved. The disagreement is along political lines. Republicans believe that it should be done primarily through decreases in spending. They suggest the elimination of a number of government programs and caps on such programs as Medicare. Democrats believe that most existing programs are justified, and they are more inclined to want to do the adjustment through an increase in taxes. The worry, at this juncture, is that these positions are hard to reconcile, and that, as a result, large deficits may continue for a long time to come.

1-3 The Euro Area

In 1957, six European countries decided to form a common European market—an economic zone where people and goods could move freely. Since then, 21 more countries have joined, bringing the total to 27. This group is now known as the **European Union**, or EU for short.

◀ Until a few years ago, the official name was the *European Community*, or EC. You may still encounter that name.

In 1999, the European Union decided to go one step further and started the process of replacing national currencies with one common currency, called the *Euro*. Only eleven countries participated at the start; since then, six more have joined. Some countries, in particular the United Kingdom, have decided not to join, at least for the time being. The official name for the group of member countries is the **Euro area**. The transition took place in steps. On January 1, 1999, each of the 11 countries fixed the value of its currency to the Euro. For example, 1 Euro was set equal to 6.56 French francs, to 166 Spanish pesetas, and so on. From 1999 to 2002, prices were quoted both in national currency units and in Euros, but the Euro was not yet used as currency. This happened in 2002, when Euro notes and coins replaced national currencies. Seventeen countries now belong to this *common currency* area.

The area also goes by the names of "Euro zone" or "Euroland." The first sounds too technocratic, and the second reminds one of Disneyland. We shall avoid them.

As you can see from Figure 1-5, the Euro area is a strong economic power. Its output is nearly equal to that of the United States, and its standard of living is not far behind. (The European Union as a whole has an output that exceeds that of the United States.) As the numbers in Table 1-3 show, however, it is not doing very well.

The Euro area has existed only since 1999 and membership has increased; numbers for 1980 to 1999 are constructed by adding national numbers for each of the 17 current member countries.

Look at the first two columns of Table 1-3. Even during the pre-crisis period, from 2000 to 2007, the Euro area was not doing very well compared to the United States. Output growth was lower than in the United States over the same period. Unemployment was substantially higher than in the United States. Admittedly, inflation was lower than in the United States and fell over the decade after 2000. The overall picture was of a slowly growing economy with high unemployment. Not surprisingly, the crisis made things worse. Growth was negative in 2009, and while it has turned positive, the forecasts for 2011 and 2012 are of very low growth. Unemployment has increased to 10% and, because of low growth, is forecast to decrease only slowly. The Euro area faces two main issues today. First (and this is a problem it shares with the rest of Europe) is how to reduce unemployment. Second is how to function efficiently as a **common currency area**. We consider these two issues in turn.

How Can European Unemployment Be Reduced?

The increase in European unemployment since 2007 is primarily due to the crisis, and it is reasonable to expect that the unemployment rate will eventually return to its pre-crisis level. But this pre-crisis level was already high, 8.5% for the Euro area over the period 2000–2007. Why is this? Despite a large amount of research, there is still no full agreement on the answers.

Some politicians blame macroeconomic policy. They argue that the monetary policy followed by the European Central Bank has kept interest rates too high, leading to low demand and high unemployment. According to them, the central bank should decrease interest rates and allow for an increase in demand, and unemployment would decrease.

Table 1-3 Growth, Unemployment, and Inflation in the Euro Area, 1980–2012

Percent	1980–1999 (average)	2000–2007 (average)	2008	2009	2010	2011	2012
Output growth rate	2.2	2.2	0.4	–4.2	1.8	1.6	1.1
Unemployment rate	9.6	8.5	7.6	9.5	10.1	9.9	9.9
Inflation rate	5.2	2.3	3.2	0.3	1.6	2.5	1.5

Source: World Economic Outlook database, September 2011

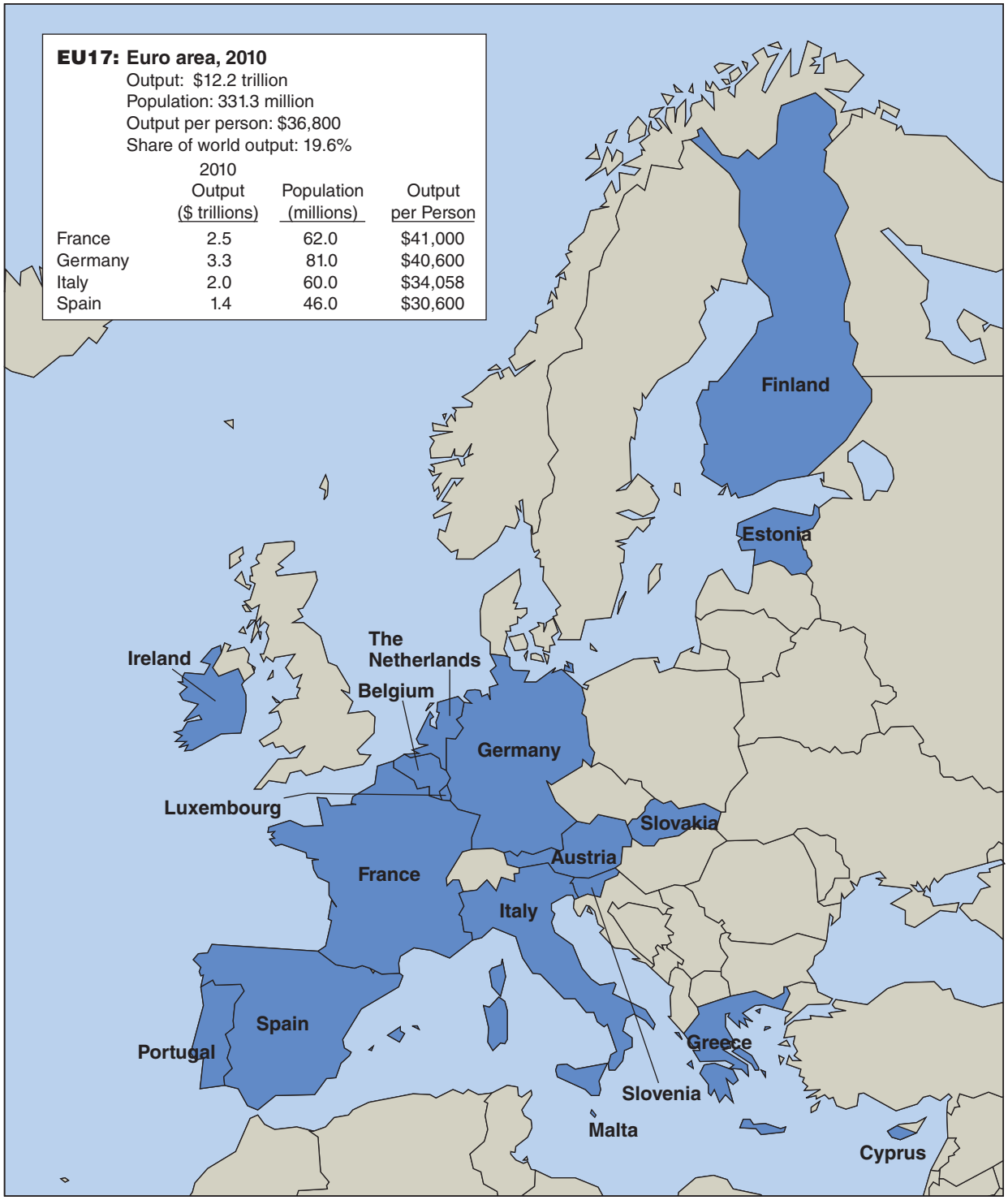


Figure 1-5

The Euro area

Most economists believe, however, that the source of the problem is not macroeconomic policy, but *labor market institutions*. Too tight a monetary policy, they concede, can indeed lead to high unemployment for some time, but surely not for 20 years. The fact that unemployment has been so high for so long points to problems in the labor market. The challenge is then to identify exactly what these problems are.

Some economists believe the main problem is that European states protect workers too much. To prevent workers from losing their jobs, they make it expensive for firms to lay off workers. One of the unintended results of this policy is to deter firms from hiring workers in the first place, and this increases unemployment. To protect workers who become unemployed, European governments provide generous unemployment insurance. But, by doing so, they decrease the incentives for the unemployed to look for jobs; this also increases unemployment. The solution, they argue, is to be less protective, to eliminate these *labor market rigidities*, and to adopt U.S.-style labor-market institutions. This is what the United Kingdom has largely done, and, until the crisis, its unemployment rate was low.

Others are more skeptical. They point to the fact that, before the crisis, unemployment was not high everywhere in Europe. It was low in a number of smaller countries—for example, the Netherlands or Denmark, where the unemployment rate was under 4%. Yet these countries are very different from the United States and provide generous social insurance to workers. This suggests that the problem may lie not so much with the degree of protection but with the way it is implemented. The challenge, these economists argue, is to understand what the Netherlands or Denmark have done right. Resolving these questions is one of the major tasks facing European macroeconomists and policy makers today.

What Has the Euro Done for Its Members?

Supporters of the euro point first to its enormous symbolic importance. In light of the many past wars among European countries, what better proof of the permanent end to military conflict than the adoption of a common currency? They also point to the economic advantages of having a common currency: no more changes in the relative price of currencies for European firms to worry about, no more need to change currencies when crossing borders. Together with the removal of other obstacles to trade among European countries, the euro contributes, they argue, to the creation of a large economic power in the world. There is little question that the move to the euro was indeed one of the main economic events of the start of the twenty-first century.

Others worry, however, that the symbolism of the euro may come with substantial economic costs. They point out that a common currency means a common monetary policy, which means the same interest rate across the euro countries. What if, they argue, one country plunges into recession while another is in the middle of an economic boom? The first country needs lower interest rates to increase spending and output; the second country needs higher interest rates to slow down its economy. If interest rates have to be the same in both countries, what will happen? Isn't there the risk that one country will remain in recession for a long time or that the other will not be able to slow down its booming economy?

Until recently, the debate was somewhat abstract. It no longer is. A number of euro members, from Ireland, to Portugal, to Greece, are going through deep recessions. If they had their own currency, they likely would have decreased their interest rate or depreciated their currency vis à vis other euro members to increase the demand for their exports. Because they share a currency with their neighbors, this is not possible. Thus, some economists argue that they should drop out of the euro. Others argue that such an exit would be both unwise, as it would give up on the other advantages of being in the euro, and extremely disruptive, leading to even deeper problems for the country that has exited. This issue is likely to remain a hot one for some time to come.

1-4 China

China is in the news every day. It is increasingly seen as one of the major economic powers in the world. Is the attention justified? A first look at the numbers in Figure 1-6 suggests it may not be. True, the population of China is enormous, more than four times that of the United States. But its output, expressed in dollars by multiplying the number in yuans (the Chinese currency) by the dollar–yuan exchange rate, is only 5.8 trillion dollars, less than half that of the United States. Output per person is only $4,300, roughly one-tenth of output per person in the United States.

So why is so much attention paid to China? There are two reasons. To understand the first, we need to go back to the number for output per person. When comparing output per person in a rich country like the United States and a relatively poor country like China, one must be careful. The reason is that many goods are cheaper in poor countries. For example, the price of an average restaurant meal in New York City is about 20 dollars; the price of an average restaurant meal in Beijing is about 25 yuans, or, at the current exchange rate, about 4 dollars. Put another way, the same income (expressed in dollars) buys you much more in Beijing than in New York City. If we want to compare standards of living, we have to correct for these differences; measures which do so are called PPP (for *purchasing power parity*) measures. Using such a measure, output per person in China is estimated to be about $7,500, roughly one-sixth of the output per person in the United States. This gives a more accurate picture of the standard of living in China. It is obviously still much lower than that of the United States or other rich countries. But it is higher than suggested by the numbers in Figure 1-6.

The issue is less important when comparing two rich countries. Thus, this was not a major issue when comparing standards of living in the United States and the euro area earlier.

Second, and more importantly, China has been growing rapidly for more than three decades. This is shown in Table 1-4, which gives output growth, unemployment, and inflation for the periods 1980–1999, 2000–2007, and each of the years 2008 to 2012. The numbers for 2011 and 2012 are forecasts as of the fall of 2011.

Look at the first two columns of Table 1-4. The most impressive numbers are those for output growth. Since 1980, China's output has grown at roughly 10% a year. This

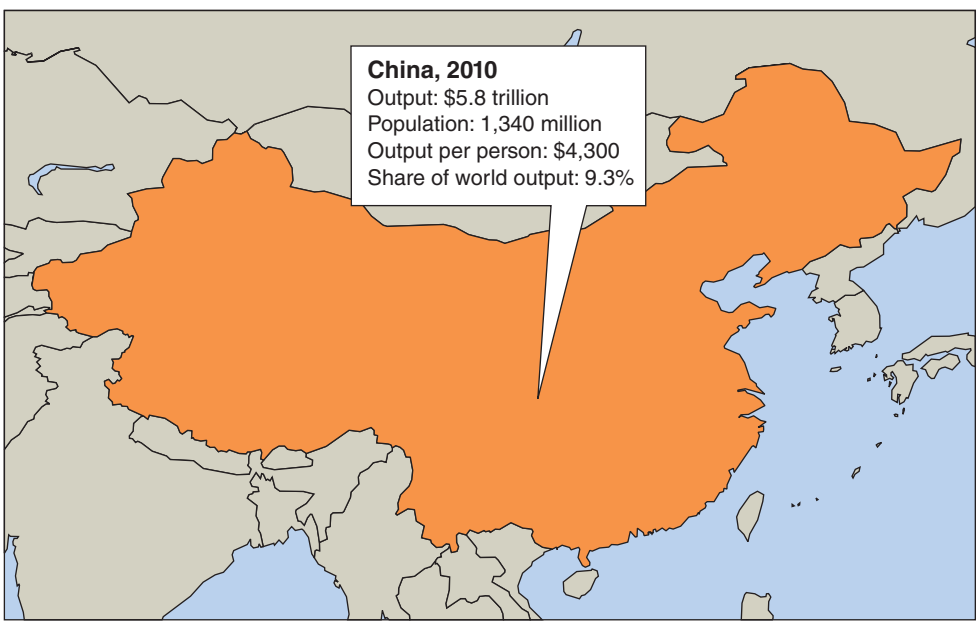


Figure 1-6

China

Table 1-4 Growth and Inflation in China, 1980–2012

Percent	1980–1999 (average)	2000–2007 (average)	2008	2009	2010	2011	2012
Output growth rate	9.8	10.5	9.6	9.2	10.3	9.5	9.0
Unemployment rate	2.7	3.9	4.2	4.3	4.1	4.0	4.0
Inflation rate	8.1	1.6	5.9	–0.6	3.3	5.5	3.3

Output growth rate: annual rate of growth of output (GDP). Inflation rate: annual rate of change of the price level (GDP deflator).

Source: World Economic Outlook database, September 2011

represents a doubling of output every seven years. Compare this number to the numbers for the United States and for Europe we saw earlier, and you understand why the importance of the emerging economies in the world economy, China being the main one, is increasing so rapidly. Turn to unemployment. Numbers for unemployment are typically less reliable in poorer countries, so you should take those numbers with a grain of salt: Many workers stay in the countryside rather than being unemployed in the cities. Nevertheless, the numbers suggest consistently low unemployment. And inflation, which was high before 2000, is now relatively low.

Another striking aspect of Table 1-4 is how difficult it is to see the effects of the crisis in the data. Growth has barely decreased, and unemployment has barely increased since 2007. The reason is not that China is closed to the rest of the world. Chinese exports slowed during the crisis. But the adverse effect on demand was nearly fully offset by a major fiscal expansion by the Chinese government, with, in particular, a major increase in public investment. The result was sustained growth of demand and, in turn, of output.

This sustained growth performance raises obvious questions. The first is whether the numbers are for real. Could it be that growth has been overstated? After all, China is still officially a communist country, and government officials may have incentives to overstate the economic performance of their sector or their province. Economists who have looked at this carefully conclude that this is probably not the case. The statistics are not as reliable as they are in richer countries, but there is no obvious bias. Output growth is indeed very high in China.

So where does the growth come from? It clearly comes from two sources:

- The first is high accumulation of capital. The investment rate (the ratio of investment to output) in China exceeds 40% of output, a high number. For comparison, the investment rate in the United States is only 17%. More capital means higher productivity and higher output.
- The second is rapid technological progress. One of the strategies followed by the Chinese government has been to encourage foreign firms to relocate and produce in China. As foreign firms are typically much more productive than Chinese firms, this has increased productivity and output. Another aspect of the strategy has been to encourage joint ventures between foreign and Chinese firms. By making Chinese firms work with and learn from foreign firms, the productivity of the Chinese firms has increased dramatically.

When described in this way, achieving high productivity and high output growth appears easy, a recipe that every poor country could and should follow. In fact, things are less obvious. China is one of a number of countries that made the transition from central planning to a market economy. Most of the other countries, from Central Europe to Russia and the other former Soviet republics, experienced a large decrease in output at the time of transition. Most still have growth rates far below that of China. In many

countries, widespread corruption and poor property rights make firms unwilling to invest. So why has China fared so much better? Some economists believe that this is the result of a slower transition: The first Chinese reforms took place in agriculture as early as 1980, and even today, many firms remain owned by the state. Others argue that the fact that the communist party has remained in control has actually helped the economic transition; tight political control has allowed for a better protection of property rights, at least for new firms, giving them incentives to invest. Getting the answers to these questions, and thus learning what other poor countries can take from the Chinese experience, can clearly make a huge difference, not only for China but for the rest of the world.

1-5 Looking Ahead

This concludes our world tour. There are many other regions of the world we could have looked at:

- India, another poor and large country, with a population of 1,200 million people, which, like China, is now growing very fast. In 2010, India's output growth rate was 10%.
- Japan, whose growth performance for the 40 years following World War II was so impressive that it was referred to as an economic miracle, but has done very poorly in the last two decades. Since a stock market crash in the early 1990s, Japan has been in a prolonged slump, with average output growth under 1% per year.
- Latin America, which went from very high inflation to low inflation in the 1990s. Many countries, such as Chile and Brazil, appear to be in good economic shape and have done relatively well in the crisis. Argentina, which went through a collapse of its exchange rate and a major banking crisis in the early 2000s, has now largely recovered and is also growing rapidly.
- Central and Eastern Europe, which shifted from central planning to a market system in the early 1990s. In most countries, the shift was characterized by a sharp decline in output at the start of transition. Some countries, such as Poland, now have high growth rates; others, such as Bulgaria or Romania, are still struggling.
- Africa, which has suffered decades of economic stagnation, but where, contrary to common perceptions, growth has been high since 2000, averaging 5.5% per year during the decade and reflecting growth in most of the countries of the continent.

There is a limit to how much you can absorb in this first chapter. Think about the questions to which you have been exposed:

- The big issues triggered by the crisis: What caused the crisis? Why did it transmit so fast from the United States to the rest of the world? In retrospect, what could and should have been done to prevent it? Were the monetary and fiscal responses appropriate? Why is the recovery so slow in advanced countries? How was China able to maintain high growth?
- Can monetary and fiscal policies be used to avoid recessions? At what rate should the United States reduce its budget deficit? What are the pros and cons of joining a common currency area such as the euro area? What measures could be taken in Europe to reduce persistently high unemployment?
- Why do growth rates differ so much across countries, even over long periods of time? Can other countries emulate China and grow at the same rate?

The purpose of this book is to give you a way of thinking about these questions. As we develop the tools you need, we shall show you how to use them by returning to these questions and showing you the answers the tools suggest.

Key Terms

European Union (EU), 9
euro area, 10
common currency area, 10

Questions and Problems

QUICK CHECK

All Quick Check questions and problems are available on MyEconLab.

1. Using the information in this chapter, label each of the following statements true, false, or uncertain. Explain briefly.

a. Output growth was negative in both advanced as well as emerging and developing countries in 2009.
b. Stock prices fell between 2007 and 2010 around the world.
c. In the 1960s and early 1970s, the United States had a higher rate of unemployment than Europe, but today it has a much lower rate of unemployment.
d. China's seemingly high growth rate is a myth, a product solely of misleading official statistics.
e. The high rate of unemployment in Europe started when a group of major European countries adopted a common currency.
f. The Federal Reserve lowers interest rates when it wants to avoid recession and raises interest rates when it wants to slow the rate of growth in the economy.
g. Output per person is very different in the euro area, the United States, and China.
h. The United States federal government has never run a budget surplus in the last two decades.

2. Macroeconomic policy in Europe

Beware of simplistic answers to complicated macroeconomic questions. Consider each of the following statements and comment on whether there is another side to the story.

a. There is a simple solution to the problem of high European unemployment: Reduce labor market rigidities.
b. What can be wrong about joining forces and adopting a common currency? The euro is obviously good for Europe.

DIG DEEPER

All Dig Deeper questions and problems are available on MyEconLab.

3. Chinese economic growth is the outstanding feature of the world economic scene over the past two decades.

a. In 2010, U.S. output was $14.7 trillion, and Chinese output was $5.8 trillion. Suppose that from now on, the output of China grows at an annual rate of 10.5% per year, while the output of the United States grows at an annual rate of 2.6% per year. These are the values in each country for the period 2000–2007 as stated in the text. Using these assumptions and a spreadsheet, calculate and plot U.S. and Chinese output from 2010 over the next 100 years. How many years will it take for China to have a total level of output equal to that of the United States?
b. When China catches up with the United States in total output, will residents of China have the same standard of living as U.S. residents? Explain.
c. Another word for standard of living is output per person. How has China raised its output per person in the last two decades? Are these methods applicable to the United States?
d. Do you think China's experience in raising its standard of living (output per person) provides a model for developing countries to follow?

4. Deficit reduction was identified as the major issue facing the United States as of the writing of this chapter.

a. Go to the most recent Economic Report of the President to ascertain whether deficits as a percent of GDP have increased or decreased compared to what was expected for 2011 and 2012 as of the writing of the chapter.
b. Calculate the total change in the deficit as a percent of GDP between 2011 and most recent data. Now split the change in the deficit since 2011 into (1) the changes in tax revenue as a percent of GDP, (2) the change in expenditures as a percent of GDP.
c. Use the data entitled Economic and Financial Indicators found in *The Economist* to find the country with largest budget deficit and largest budget surplus. In this list the budget deficit is called the "Budget Balance." Then find the OECD member in this list with the largest budget deficit and largest budget surplus.

EXPLORE FURTHER

5. U.S. postwar recessions

This question looks at the recessions over the past 40 years. To work this problem, first obtain quarterly data on U.S. output growth for the period 1960 to the most recent date from the Web site ***www.bea.gov****. Table 1.1.1 presents the percent change in real gross domestic product. This data can be downloaded to a spreadsheet. Plot the quarterly GDP growth rates from 1960:1 to the latest observations. Did any quarters have negative growth? Using the definition of a recession as two or more consecutive quarters of negative growth, answer the following questions.*

a. How many recessions has the U.S. economy undergone since 1960, quarter 2?
b. How many quarters has each recession lasted?
c. In terms of length and magnitude, which two recessions have been the most severe?

6. From Problem 5, write down the quarters in which the six traditional recessions started. Find the monthly series in the Federal Reserve Bank of St. Louis (FRED) database for the seasonally adjusted unemployment rate. Retrieve the monthly

data series on the unemployment rate for the period 1969 to the end of the data. Make sure all data series are seasonally adjusted.

a. Look at each recession since 1969. What was the unemployment rate in the first month of the first quarter of negative growth? What was the unemployment rate in the last month of the last quarter of negative growth? By how much did the unemployment rate increase?

b. Which recession had the largest increase in the rate of unemployment? Begin with the month before the quarter in which output first falls and measure to the highest level of the unemployment rate before the next recession.

Further Reading

- The best way to follow current economic events and issues is to read *The Economist*, a weekly magazine published in England. The articles in *The Economist* are well informed, well written, witty, and opinionated. Make sure to read it regularly.

APPENDIX: Where to Find the Numbers

Suppose you want to find the numbers for inflation in Germany over the past five years. Fifty years ago, the answer would have been to learn German, find a library with German publications, find the page where inflation numbers were given, write them down, and plot them by hand on a clean sheet of paper. Today, improvements in the collection of data, the development of computers and electronic databases, and access to the Internet make the task much easier. This appendix will help you find the numbers you are looking for, be it inflation in Malaysia last year, or consumption in the United States in 1959, or unemployment in Ireland in the 1980s. In most cases, the data can be downloaded to spreadsheets for further treatment.

For a Quick Look at Current Numbers

- The best source for the most recent numbers on output, unemployment, inflation, exchange rates, interest rates, and stock prices for a large number of countries is the last four pages of *The Economist*, published each week (www.economist.com). The Web site, like many of the Web sites listed below, contains both information available free to anyone and information available only to subscribers.
- A good source for recent numbers about the U.S. economy is *National Economic Trends*, published monthly by the Federal Reserve Bank of Saint Louis (www.research.stlouisfed.org/publications/net/).

For More Detail about the U.S. Economy

- A convenient database, with numbers often going back to the 1960s, for both the United States and other countries, is the *Federal Reserve Economic Database* (called *FRED*), maintained by the Federal Reserve Bank of Saint Louis. Access is free, and much of the data used in this book comes from that database. (www.research.stlouisfed.org/fred2/)
- Once a year, the *Economic Report of the President*, written by the Council of Economic Advisers and published by the U.S. Government Printing Office in Washington, D.C., gives a description of current evolutions, as well as numbers for most major macroeconomic variables, often going back to the 1950s. (It contains two parts, a report on the economy, and a set of statistical tables. Both can be found at www.origin.www.gpoaccess.gov/eop/.)
- A detailed presentation of the most recent numbers for national income accounts is given in the *Survey of Current Business*, published monthly by the U.S. Department of Commerce, Bureau of Economic Analysis (www.bea.gov). A user's guide to the statistics published by the Bureau of Economic Analysis is given in the *Survey of Current Business*, April 1996.
- The standard reference for national income accounts is the *National Income and Product Accounts of the United States*. Volume 1, 1929–1958, and Volume 2, 1959–1994, are published by the U.S. Department of Commerce, Bureau of Economic Analysis (www.bea.gov).
- For data on just about everything, including economic data, a precious source is the *Statistical Abstract of the United States*, published annually by the U.S. Department of Commerce, Bureau of the Census (www.census.gov/prod/www/statistical-abstract.html).

Numbers for Other Countries

The **Organization for Economic Cooperation and Development**, OECD for short, located in Paris, France (www.oecd.org), is an organization that includes most of the rich countries in the world (Australia, Austria, Belgium, Canada, Chile, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Israel, Italy, Japan, Korea,

Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, the United Kingdom, and the United States). Together, these countries account for about 70% of the world's output. One strength of the OECD data is that, for many variables, the OECD tries to make the variables comparable across member countries (or tells you when they are not comparable). The OECD puts out three useful publications, all available on the OECD site:

- The first is the *OECD Economic Outlook*, published twice a year. In addition to describing current macroeconomic issues and evolutions, it includes a data appendix, with data for many macroeconomic variables. The data typically go back to the 1980s and are reported consistently, both across time and across countries.
- The second is the *OECD Employment Outlook*, published annually. It focuses more specifically on labor-market issues and numbers.
- Occasionally, the OECD puts together current and past data, and publishes a set of OECD Historical Statistics in which various years are grouped together.

The main strength of the publications of the **International Monetary Fund** (IMF for short, located in Washington, D.C.) is that they cover nearly all of the countries of the world. The IMF has 187 member countries and provides data on each of them (www.imf.org).

- A particularly useful IMF publication is the *World Economic Outlook* (WEO for short), which is published twice a year and which describes major economic events in the world and in specific member countries. Selected series associated with the Outlook are available in the WEO database, available on the IMF site (www.imf.org/external/data.htm). Most of the data shown in this chapter come from this database.
- Two other useful publications are the *Global Financial Stability Report* (GFSR for short), which focuses on financial developments, and the *Fiscal Monitor*, which focuses on fiscal developments. All three publications are available on the IMF Web site (www.imf.org/external/index.htm).

Historical Statistics

- For long-term historical statistics for the United States, the basic reference is *Historical Statistics of the United States, Colonial Times to 1970*, Parts 1 and 2, published by the U.S. Department of Commerce, Bureau of the Census (www.census.gov/prod/www/abs/statab.html).
- For long-term historical statistics for several countries, a precious data source is Angus Maddison's *Monitoring the World Economy,* 1820–1992, Development Centre Studies, OECD, Paris, 1995. This study gives data going back to 1820 for 56 countries. Two even longer and broader sources are *The World Economy: A Millenial Perspective*, Development Studies, OECD, 2001, and *The World Economy: Historical Statistics*, Development Studies, OECD 2004, both also by Angus Maddison.

Current Macroeconomic Issues

A number of Web sites offer information and commentaries about the macroeconomic issues of the day. In addition to *The Economist* Web site mentioned earlier, the site maintained by Nouriel Roubini (www.rgemonitor.com) offers an extensive set of links to articles and discussions on macroeconomic issues (by subscription).

Finally, if you still have not found what you were looking for, a site maintained by Bill Goffe at the State University of New York (SUNY) (www.rfe.org), lists not only many more data sources, but also sources for economic information in general, from working papers, to data, to jokes, to jobs in economics, and to blogs.

Key Terms

Organization for Economic Cooperation and Development (OECD), 17
International Monetary Fund (IMF), 18

2

A Tour of the Book

The words *output, unemployment*, and *inflation* appear daily in newspapers and on the evening news. So when we used these words in Chapter 1, you knew roughly what we were talking about. It is now time to define these words more precisely, and this is what we do in the first three sections of this chapter.

Section 2-1 looks at output.

Section 2-2 looks at the unemployment rate.

Section 2-3 looks at the inflation rate.

Section 2-4 introduces two important relations between these three variables: Okun's law and the Phillips curve.

Section 2-5 then introduces the three central concepts around which the book is organized:

- The *short run*: What happens to the economy from year to year
- The *medium run*: What happens to the economy over a decade or so
- The *long run*: What happens to the economy over a half century or longer

Building on these three concepts, Section 2-6 gives you the road map to the rest of the book.

2-1 Aggregate Output

Economists studying economic activity in the nineteenth century or during the Great Depression had no measure of aggregate activity (*aggregate* is the word macroeconomists use for *total*) on which to rely. They had to put together bits and pieces of information, such as the shipments of iron ore or sales at some department stores, to try to infer what was happening to the economy as a whole.

Two economists, Simon Kuznets, from Harvard University, and Richard Stone, from Cambridge University, were given the Nobel Prize for their contributions to the development of the national income and product accounts—a gigantic intellectual and empirical achievement.

It was not until the end of World War II that **national income and product accounts** (or national income accounts, for short) were put together. Measures of aggregate output have been published on a regular basis in the United States since October 1947. (You will find measures of aggregate output for earlier times, but these have been constructed retrospectively.)

Like any accounting system, the national income accounts first define concepts and then construct measures corresponding to these concepts. You need only to look at statistics from countries that have not yet developed such accounts to realize that precision and consistency in such accounts are crucial. Without precision and consistency, numbers that should add up do not; trying to understand what is going on feels like trying to balance someone else's checkbook. We shall not burden you with the details of national income accounting here. But because you will occasionally need to know the definition of a variable and how variables relate to each other, Appendix 1 at the end of the book gives you the basic accounting framework used in the United States (and, with minor variations, in most other countries) today. You will find it useful whenever you want to look at economic data on your own.

GDP: Production and Income

You may come across another term, **gross national product**, or **GNP**. There is a subtle difference between "domestic" and "national," and thus between GDP and GNP. We examine the distinction in Chapter 18 and in Appendix 1 at the end of the book. For now, ignore it.

The measure of **aggregate output** in the national income accounts is called the **gross domestic product**, or **GDP**, for short. To understand how GDP is constructed, it is best to work with a simple example. Consider an economy composed of just two firms:

- Firm 1 produces steel, employing workers and using machines to produce the steel. It sells the steel for $100 to Firm 2, which produces cars. Firm 1 pays its workers $80, leaving $20 in profit to the firm.
- Firm 2 buys the steel and uses it, together with workers and machines, to produce cars. Revenues from car sales are $200. Of the $200, $100 goes to pay for steel and $70 goes to workers in the firm, leaving $30 in profit to the firm.

In reality, not only workers and machines are required for steel production, but so are iron ore, electricity, and so on. We shall ignore these to keep the example simple.

We can summarize this information in a table:

Steel Company (Firm 1)			Car Company (Firm 2)		
Revenues from sales		$100	Revenues from sales		$200
Expenses		$80	Expenses		$170
Wages	$80		Wages	$70	
			Steel purchases	$100	
Profit		$20	Profit		$30

How would you define aggregate output in this economy? As the sum of the values of all goods produced in the economy—the sum of $100 from the production of steel and $200 from the production of cars, so $300? Or as just the value of cars, which is equal to $200?

An intermediate good is a good used in the production of another good. Some goods can be both final goods and intermediate goods. Potatoes sold directly to consumers are final goods. Potatoes used to produce potato chips are intermediate goods. Can you think of other examples?

Some thought suggests that the right answer must be $200. Why? Because steel is an **intermediate good**: It is used in the production of cars. Once we count the

production of cars, we do not want to count the production of the goods that went into the production of these cars.

This motivates the first definition of GDP:

1. GDP Is the Value of the Final Goods and Services Produced in the Economy during a Given Period.

The important word here is **final**. We want to count only the production of final goods, not intermediate goods. Using our example, we can make this point in another way. Suppose the two firms merged, so that the sale of steel took place inside the new firm and was no longer recorded. The accounts of the new firm would be given by the following table:

Steel and Car Company	
Revenues from sales	$200
Expenses (wages)	$150
Profit	$50

All we would see would be one firm selling cars for $200, paying workers $80 + $70 = $150, and making $20 + $30 = $50 in profits. The $200 measure would remain unchanged—as it should. We do not want our measure of aggregate output to depend on whether firms decide to merge or not.

This first definition gives us one way to construct GDP: by recording and adding up the production of all final goods—and this is indeed roughly the way actual GDP numbers are put together. But it also suggests a second way of thinking about and constructing GDP:

2. GDP Is the Sum of Value Added in the Economy during a Given Period.

The term **value added** means exactly what it suggests. The value added by a firm is defined as the value of its production minus the value of the intermediate goods used in production.

In our two-firms example, the steel company does not use intermediate goods. Its value added is simply equal to the value of the steel it produces, $100. The car company, however, uses steel as an intermediate good. Thus, the value added by the car company is equal to the value of the cars it produces minus the value of the steel it uses in production, $200 − $100 = $100. Total value added in the economy, or GDP, equals $100 + $100 = $200. (Note that aggregate value added would remain the same if the steel and car firms merged and became a single firm. In this case, we would not observe intermediate goods at all—as steel would be produced and then used to produce cars within the single firm—and the value added in the single firm would simply be equal to the value of cars, $200.)

This definition gives us a second way of thinking about GDP. Put together, the two definitions imply that the value of final goods and services—the first definition of GDP—can also be thought of as the sum of the value added by all the firms in the economy—the second definition of GDP.

So far, we have looked at GDP from the *production side*. The other way of looking at GDP is from the *income side.* Go back to our example and think about the revenues left to a firm after it has paid for its intermediate goods: Some of the revenues go to pay workers—this component is called *labor income.* The rest goes to the firm—that component is called *capital income* or *profit income*.

Of the $100 of value added by the steel manufacturer, $80 goes to workers (labor income) and the remaining $20 goes to the firm (capital income). Of the $100 of value added by the car manufacturer, $70 goes to labor income and $30 to capital income. For the economy as a whole, labor income is equal to $150 ($80 + $70), capital income is equal to $50 ($20 + $30). Value added is equal to the sum of labor income and capital income is equal to $200 ($150 + $50).

◀ The labor share in the example is thus 75%. In advanced countries, the share of labor is indeed typically between 65 and 75%.

This motivates the third definition of GDP:

3. GDP Is the Sum of Incomes in the Economy during a Given Period.

To summarize: You can think about aggregate output— *GDP*—in three different but equivalent ways.

Two lessons to remember:

i. GDP is the measure of aggregate output, which we can look at from the production side (aggregate production), or the income side (aggregate income); and

ii. Aggregate production and aggregate income are always equal.

- From the *production side*: GDP equals the value of the final goods and services produced in the economy during a given period.
- Also from the *production side*: GDP is the sum of value added in the economy during a given period.
- From the *income side*: GDP is the sum of incomes in the economy during a given period.

Nominal and Real GDP

U.S. GDP was $14,660 billion in 2010, compared to $526 billion in 1960. Was U.S. output really 28 times higher in 2010 than in 1960? Obviously not: Much of the increase reflected an increase in prices rather than an increase in quantities produced. This leads to the distinction between nominal GDP and real GDP.

Warning! People often use *nominal* to denote small amounts. Economists use *nominal* for variables expressed in current prices. And they surely do not refer to small amounts: The numbers typically run in the billions or trillions of dollars.

Nominal GDP is the sum of the quantities of final goods produced times their current price. This definition makes clear that nominal GDP increases over time for two reasons:

- First, the production of most goods increases over time.
- Second, the prices of most goods also increase over time.

If our goal is to measure production and its change over time, we need to eliminate the effect of increasing prices on our measure of GDP. That's why **real GDP** is constructed as the sum of the quantities of final goods times *constant* (rather than *current*) prices.

If the economy produced only one final good, say, a particular car model, constructing real GDP would be easy: We would use the price of the car in a given year and then use it to multiply the quantity of cars produced in each year. An example will help here. Consider an economy that only produces cars—and to avoid issues we shall tackle later, assume the same model is produced every year. Suppose the number and the price of cars in three successive years are given by:

Nominal GDP, which is equal to the quantity of cars times their price, goes up from $200,000 in 2004 to $288,000 in 2005—a 44% increase—and from $288,000 in 2005 to $338,000 in 2006—a 16% increase.

Year	Quantity of Cars	Price of Cars	Nominal GDP	Real GDP (in 2005 dollars)
2004	10	$20,000	$200,000	$240,000
2005	12	$24,000	$288,000	$288,000
2006	13	$26,000	$338,000	$312,000

- To construct real GDP, we need to multiply the number of cars in each year by a *common* price. Suppose we use the price of a car in 2005 as the common price. This approach gives us in effect *real GDP in 2005 dollars.*
- Using this approach, real GDP in 2004 (in 2005 dollars) equals 10 cars $\times$ $24,000 per car $=$ $240,000. Real GDP in 2005 (in 2005 dollars) equals 12 cars $\times$ $24,000 per car $=$ $288,000, the same as nominal GDP in 2005. Real GDP in 2006 (in 2005 dollars) is equal to 13 $\times$ $24,000 $=$ $312,000.

So real GDP goes up from $240,000 in 2004 to $288,000 in 2005—a 20% increase—and from $288,000 in 2005 to $312,000 in 2006—an 8% increase.

- How different would our results have been if we had decided to construct real GDP using the price of a car in, say, 2006 rather than 2005? Obviously, the level of real GDP in each year would be different (because the prices are not the same in 2006 as in 2005); but its rate of change from year to year would be the same as above.

To be sure, compute real GDP in 2006 dollars, and compute the rate of growth from 2004 to 2005, and from 2005 to 2006.

The problem in constructing real GDP in practice is that there is obviously more than one final good. Real GDP must be defined as a weighted average of the output of all final goods, and this brings us to what the weights should be.

The *relative prices* of the goods would appear to be the natural weights. If one good costs twice as much per unit as another, then that good should count for twice as much as the other in the construction of real output. But this raises the question: What if, as is typically the case, relative prices change over time? Should we choose the relative prices of a particular year as weights, or should we change the weights over time? More discussion of these issues, and of the way real GDP is constructed in the United States, is left to the appendix to this chapter. Here, what you should know is that the measure of real GDP in the U.S. national income accounts uses weights that reflect relative prices and which change over time. The measure is called **real GDP in chained (2005) dollars**. We use 2005 because, as in our example above, 2005 is the year when, by construction, real GDP is equal to nominal GDP. It is our best measure of the output of the U.S. economy, and its evolution shows how U.S. output has increased over time.

Figure 2-1 plots the evolution of both nominal GDP and real GDP since 1960. By construction, the two are equal in 2005. The figure shows that real GDP in 2010 was about 4.7 times its level of 1960—a considerable increase, but clearly much less than the 28-fold increase in nominal GDP over the same period. The difference between the two results comes from the increase in prices over the period.

Suppose real GDP was measured in 2000 dollars rather than 2005 dollars. Where would the nominal GDP and real GDP lines on the graph intersect?

The terms *nominal GDP* and *real GDP* each have many synonyms, and you are likely to encounter them in your readings:

- Nominal GDP is also called **dollar GDP** or **GDP in current dollars**.

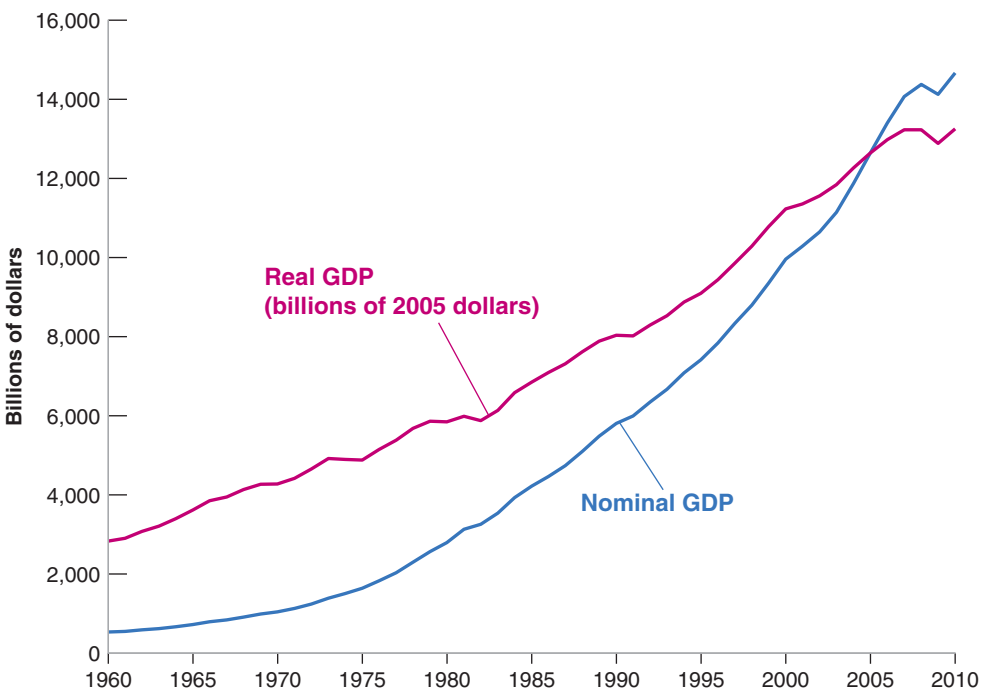


Figure 2-1

Nominal and real U.S. GDP, 1960–2010

From 1960 to 2010, nominal GDP increased by a factor of 28. Real GDP increased by a factor of about 5.

Source: Series GDPCA,GDPA: Federal Reserve Economic Data (FRED) http://research.stlouisfed.org/fred2/

- Real GDP is also called **GDP in terms of goods**, **GDP in constant dollars**, **GDP adjusted for inflation**, or **GDP in (chained) 2005 dollars** or **GDP in 2005 dollars**—if the year in which real GDP is set equal to nominal GDP is 2005, as is the case in the United States at this time.

In the chapters that follow, unless we indicate otherwise,

- GDP will refer to *real GDP* and Y_t will denote *real GDP in year t*.
- Nominal GDP, and variables measured in current dollars, will be denoted by a dollar sign in front of them—for example, $\$Y_t$ for nominal GDP in year t.

GDP: Level versus Growth Rate

We have focused so far on the level of real GDP. This is an important number that gives the economic size of a country. A country with twice the GDP of another country is economically twice as big as the other country. Equally important is the level of **real GDP per person**, the ratio of real GDP to the population of the country. It gives us the average standard of living of the country.

Warning: One must be careful about how one does the comparison: Recall the discussion in Chapter 1 about the standard of living in China. This is discussed further in Chapter 10.

In assessing the performance of the economy from year to year, economists focus, however, on the rate of growth of real GDP, often called just **GDP growth**. Periods of positive GDP growth are called **expansions**. Periods of negative GDP growth are called **recessions**.

The evolution of GDP growth in the United States since 1960 is given in Figure 2-2. GDP growth in year t is constructed as $(Y_t - Y_{t-1})/Y_{t-1}$ and expressed as a percent. The figure shows how the U.S. economy has gone through a series of expansions, interrupted by short recessions. Again, you can see the effects of the crisis: zero growth in 2008, and a large negative growth rate in 2009.

It is actually the subject of one of the boxes in Chapter 5.

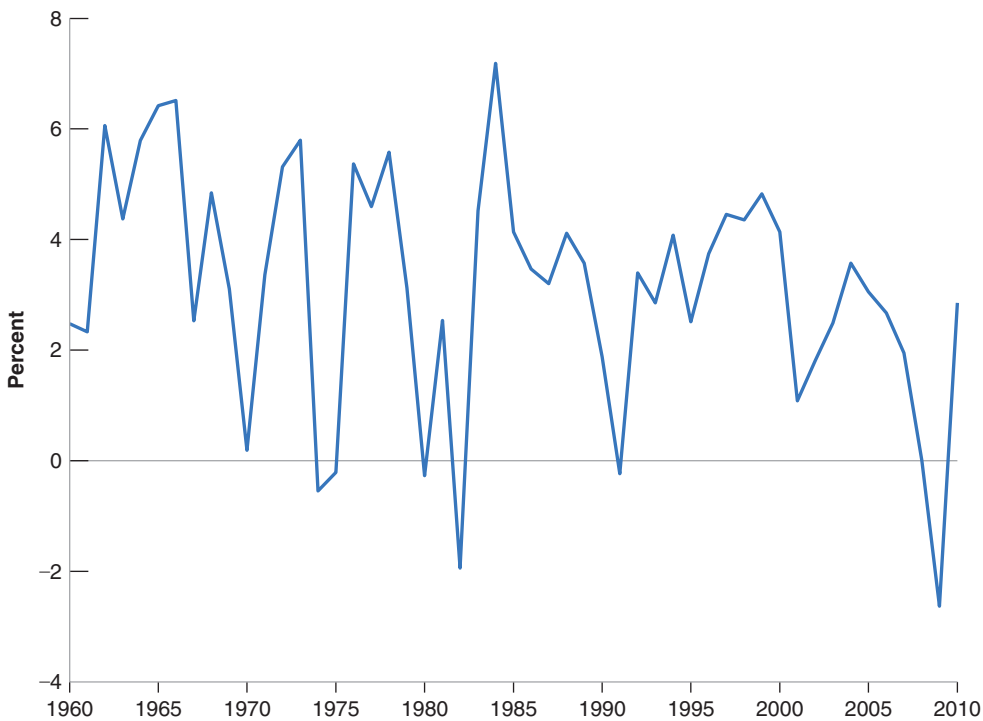
The figure raises a small puzzle. According to the graph, growth was positive in 2001. But you may have heard people refer to the "recession of 2001." Why do they do so? Because they look at GDP growth quarter by quarter, rather than year by year. There

Figure 2-2

Growth rate of U.S. GDP, 1960–2010

Since 1960, the U.S. economy has gone through a series of expansions, interrupted by short recessions. The most recent recession was the most severe recession in the period from 1960 to 2010.

Source: Calculated using series GDPCA in Figure 2-1



Real GDP, Technological Progress, and the Price of Computers

FOCUS

A tough problem in computing real GDP is how to deal with changes in quality of existing goods. One of the most difficult cases is computers. It would clearly be absurd to assume that a personal computer in 2010 is the same good as a personal computer produced in 1981 (the year in which the IBM PC was introduced): The same amount of money can clearly buy much more computing in 2010 than it could in 1981. But how much more? Does a 2010 computer provide 10 times, 100 times, or 1,000 times the computing services of a 1981 computer? How should we take into account the improvements in internal speed, the size of the random access memory (RAM) or of the hard disk, the fact that computers can access the Internet, and so on?

The approach used by economists to adjust for these improvements is to look at the market for computers and how it values computers with different characteristics in a given year. Example: Suppose the evidence from prices of different models on the market shows that people are willing to pay 10% more for a computer with a speed of 3 GHz (3,000 megahertz) rather than 2 GHz. (The first edition of this book, published in 1996, compared two computers, with speeds of 50 and 16 megaherz, respectively. This change is a good indication of technological progress. A further indication of technological progress is that, for the past few years, progress has not been made by increasing the speed of processors, but rather by using multicore processors. We shall leave this aspect aside here, but people in charge of national income accounts cannot; they have to take this change into account as well.) Suppose new computers this year have a speed of 3 GHz compared to a speed of 2 GHz for new computers last year. And suppose the dollar price of new computers this year is the same as the dollar price of new computers last year. Then economists in charge of computing the adjusted price of computers will conclude that new computers are in fact 10% cheaper than last year.

This approach, which treats goods as providing a collection of characteristics—for computers, speed, memory, and so on—each with an implicit price, is called **hedonic pricing** ("hedone" means "pleasure" in Greek). It is used by the Department of Commerce—which constructs real GDP—to estimate changes in the price of complex and fast changing goods, such as automobiles and computers. Using this approach, the Department of Commerce estimates that, for a given price, the quality of new computers has increased on average by 18% a year since 1981. Put another way, a typical personal computer in 2010 delivers $1.18^{29} = 121$ times the computing services a typical personal computer delivered in 1981.

Not only do computers deliver more services, they have become cheaper as well: Their dollar price has declined by about 10% a year since 1981. Putting this together with the information in the previous paragraph, this implies that their quality–adjusted price has fallen at an average rate of 18% + 10% = 28% per year. Put another way, a dollar spent on a computer today buys $1.28^{29} = 1{,}285$ times more computing services than a dollar spent on a computer in 1981.

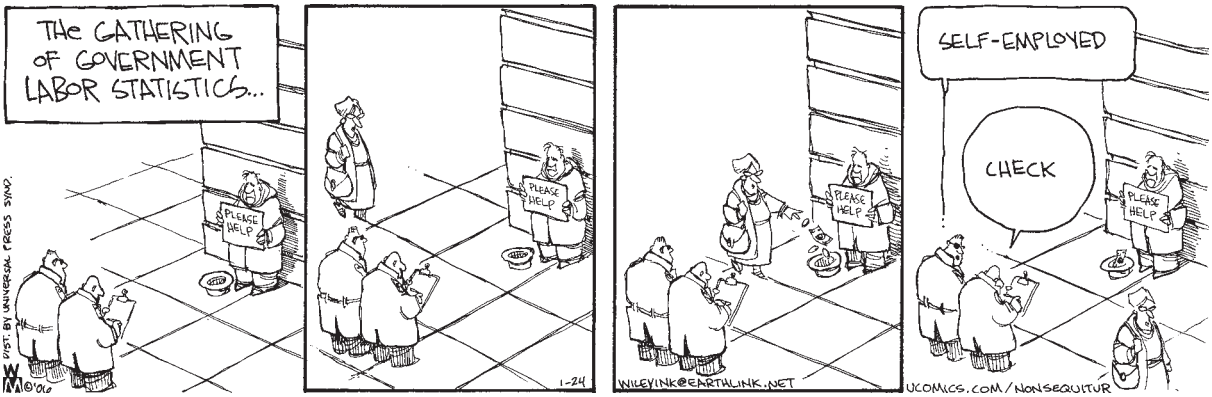
is no official definition of what constitutes a recession, but the convention is to refer to a "recession" if the economy goes through at least two consecutive quarters of negative growth. Although GDP growth was positive for 2001 as a whole, it was negative during each of the first three quarters of 2001; thus 2001 qualifies as a (mild) recession.

2-2 The Unemployment Rate

Because it is a measure of aggregate activity, GDP is obviously the most important macroeconomic variable. But two other variables, unemployment and inflation, tell us about other important aspects of how an economy is performing. This section focuses on the unemployment rate.

We start with two definitions: **Employment** is the number of people who have a job. **Unemployment** is the number of people who do not have a job but are looking for one. The **labor force** is the sum of employment and unemployment:

$$\begin{array}{ccccc} L & = & N & + & U \\ \text{labor force} & = & \text{employment} & + & \text{unemployment} \end{array}$$



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The **unemployment rate** is the ratio of the number of people who are unemployed to the number of people in the labor force:

$$u = \frac{U}{L}$$

$$\text{unemployment rate} = \text{unemployment}/\text{labor force}$$

Constructing the unemployment rate is less obvious than you might have thought. The cartoon above not withstanding, determining whether somebody is employed is straightforward. Determining whether somebody is unemployed is harder. Recall from the definition that, to be classified as unemployed, a person must meet two conditions: that he or she does not have a job, and he or she is looking for one; this second condition is harder to assess.

Until the 1940s in the United States, and until more recently in most other countries, the only available source of data on unemployment was the number of people registered at unemployment offices, and so only those workers who were registered in unemployment offices were counted as unemployed. This system led to a poor measure of unemployment. How many of those looking for jobs actually registered at the unemployment office varied both across countries and across time. Those who had no incentive to register—for example, those who had exhausted their unemployment benefits—were unlikely to take the time to come to the unemployment office, so they were not counted. Countries with less generous benefit systems were likely to have fewer unemployed registering, and therefore smaller measured unemployment rates.

Today, most rich countries rely on large surveys of households to compute the unemployment rate. In the United States, this survey is called the **Current Population Survey (CPS)**. It relies on interviews of 50,000 households every month. The survey classifies a person as employed if he or she has a job at the time of the interview; it classifies a person as unemployed if he or she does not have a job *and has been looking for a job in the last four weeks.* Most other countries use a similar definition of unemployment. In the United States, estimates based on the CPS show that, during 2010, an average of 139.0 million people were employed, and 14.8 million people were unemployed, so the unemployment rate was $14.8/(139.0 + 14.8) = 9.6\%$.

Note that only those *looking for a job* are counted as unemployed; those who do not have a job and are not looking for one are counted as **not in the labor force**. When unemployment is high, some of the unemployed give up looking for a job and therefore are no longer counted as unemployed. These people are known as **discouraged workers.** Take an extreme example: If all workers without a job gave up looking for one, the

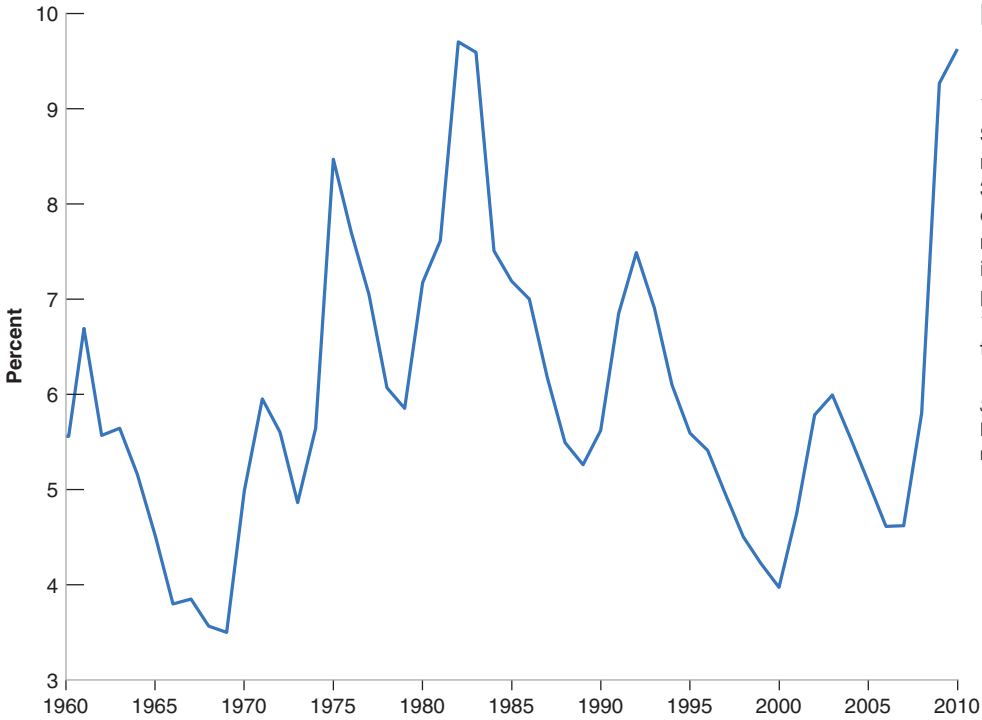


Figure 2-3

U.S. unemployment rate, 1960–2010

Since 1960, the U.S. unemployment rate has fluctuated between 3 and 10%, going down during expansions, and going up during recessions. The effect of the crisis is highly visible, with the unemployment rate reaching close to 10%, the highest such rate since the 1980s.

Source: Series UNRATE: Federal Reserve Economic Data (FRED) http://research.stlouisfed.org/fred2/

unemployment rate would equal zero. This would make the unemployment rate a very poor indicator of what is happening in the labor market. This example is too extreme; in practice, when the economy slows down, we typically observe both an increase in unemployment and an increase in the number of people who drop out of the labor force. Equivalently, a higher unemployment rate is typically associated with a lower **participation rate**, defined as the ratio of the labor force to the total population of working age.

At the start of economic reform in Eastern Europe in the early 1990s, unemployment increased dramatically. But equally dramatic was the fall in the participation rate. In Poland in 1990, 70% of the decrease in employment was reflected in early retirements—by people dropping out of the labor force rather than becoming unemployed.

Figure 2-3 shows the evolution of unemployment in the United States since 1970. Since 1960, the U.S. unemployment rate has fluctuated between 3 and 10%, going up during recessions and down during expansions. Again, you can see the effect of the crisis, with the unemployment rate reaching a peak at nearly 10% in 2010, the highest such rate since the 1980s.

Why Do Economists Care about Unemployment?

Economists care about unemployment for two reasons. First, they care about unemployment because of its direct effect on the welfare of the unemployed. Although unemployment benefits are more generous today than they were during the Great Depression, unemployment is still often associated with financial and psychological suffering. How much suffering depends on the nature of the unemployment. One image of unemployment is that of a stagnant pool, of people remaining unemployed for long periods of time. In normal times, in the United States, this image is not right: Every month, many people become unemployed, and many of the unemployed find jobs. When unemployment increases, however, as is the case now, the image becomes more accurate. Not only are more people unemployed, but also many of them are unemployed for a long time. For example, the mean duration of unemployment, which was 9 weeks on average during 2000–2007, increased to 33 weeks in 2010. In short, when the unemployment increases, not only does unemployment become both more widespread, but it also becomes more painful.

FOCUS

Did Spain Have a 24% Unemployment Rate in 1994?

In 1994, the official unemployment rate in Spain reached 24%. (It then decreased steadily, reaching a low of 8% in 2007, only to increase dramatically again since the beginning of the crisis. It now exceeds 20% and is still increasing. Thus, many of the issues in this Focus box are becoming relevant again.) This was roughly the same unemployment rate as in the United States in 1933, the worst year of the Great Depression. Yet Spain in 1994 looked nothing like the United States in 1933: There were few homeless, and most cities looked prosperous. Can we really believe that nearly one–fifth of the Spanish labor force was looking for work?

To answer this question, we must first examine how the Spanish unemployment number is put together. Like the CPS in the United States, unemployment is measured using a large survey of 60,000 households. People are classified as unemployed if they indicate that they are not working but are seeking work.

Can we be sure that people tell the truth? No. Although there is no obvious incentive to lie—answers to the survey are confidential and are not used to determine whether people are eligible for unemployment benefits—those who are working in the underground economy may prefer to play it safe and report that they are unemployed instead.

The size of the **underground economy**—the part of economic activity that is not measured in official statistics, either because the activity is illegal or because firms and workers would rather not report it and thus not pay taxes—is an old issue in Spain. And because of that, we actually know more about the underground economy in Spain than in many other countries: In 1985, the Spanish government tried to find out more and organized a detailed survey of 60,000 individuals. To try to elicit the truth from those interviewed, the questionnaire asked interviewees for an extremely precise account of the use of their time, making it more difficult to misreport. The answers were interesting. The underground economy in Spain—defined as the number of people working without declaring it to the social security administration—accounted for between 10 and 15% of employment. But it was composed mostly of people who already had a job and were taking a second or even a third job. The best estimate from the survey was that only about 15% of the unemployed were in fact working. This implied that the unemployment rate, which was officially 21% at the time, was in fact closer to 18%, still a very high number. In short, the Spanish underground economy was significant, but it just was not the case that most of the Spanish unemployed work in the underground economy.

How did the unemployed survive? Did they survive because unemployment benefits were unusually generous in Spain? No. Except for very generous unemployment benefits in two regions, Andalusia and Extremadura—which, not surprisingly, had even higher unemployment than the rest of the country—unemployment benefits were roughly in line with unemployment benefits in other OECD countries. Benefits were typically 70% of the wage for the first six months, and 60% thereafter. They were given for a period of 4 to 24 months, depending on how long people had worked before becoming unemployed. The 30% of the unemployed who had been unemployed for more than two years did not receive unemployment benefits.

So how did they survive? A key to the answer lies with the Spanish family structure. The unemployment rate was highest among the young: In 1994, it was close to 50% for those between 16 and 19, and around 40% for those between 20 and 24. The young typically stay at home until their late 20s, and have increasingly done so as unemployment increased. Looking at households rather than at individuals, the proportion of households where nobody was employed was less than 10% in 1994; the proportion of households that received neither wage income nor unemployment benefits was around 3%. In short, the family structure, and transfers from the rest of the family, were the factors that allowed many of the unemployed to survive.

Second, economists also care about the unemployment rate because it provides a signal that the economy may not be using some of its resources efficiently. Many workers who want to work do not find jobs; the economy is not utilizing its human resources efficiently. From this viewpoint, can very low unemployment also be a problem? The answer is yes. Like an engine running at too high a speed, an economy in which unemployment is very low may be overutilizing its resources and run into labor shortages. How low is "too low"? This is a difficult question, a question we will take up at more length later in the book. The question came up in 2000 in the United States. At the end of 2000, some economists worried that the unemployment rate, 4% at the time, was indeed too low. So, while they did not advocate triggering a recession, they favored lower (but positive) output growth for some time, so as to allow the unemployment rate to increase to a somewhat higher level. It turned out that they got more than they had asked for: a recession rather than a slowdown.

It is probably because of statements like this that economics is known as the "dismal science."

2-3 The Inflation Rate

Inflation is a sustained rise in the general level of prices—the **price level.** The **inflation rate** is the rate at which the price level increases. (Symmetrically, **deflation** is a sustained decline in the price level. It corresponds to a negative inflation rate).

Deflation is rare, but it happens. Japan has had deflation, off and on, since the late 1990s. The United States experienced deflation in the 1930s during the Great Depression.

The practical issue is how to define the price level so the inflation rate can be measured. Macroeconomists typically look at two measures of the price level, at two *price indexes*: the GDP deflator and the Consumer Price Index.

The GDP Deflator

We saw earlier how increases in nominal GDP can come either from an increase in real GDP, or from an increase in prices. Put another way, if we see nominal GDP increase faster than real GDP, the difference must come from an increase in prices.

This remark motivates the definition of the GDP deflator. The **GDP deflator** in year t, P_t, is defined as the ratio of nominal GDP to real GDP in year t:

$$P_t = \frac{\text{Nominal GDP}_t}{\text{Real GDP}_t} = \frac{\$Y_t}{Y_t}$$

Index numbers are often set equal to 100 (in the base year) rather than to 1. If you look at the Economic Report of the President (see Chapter 1) you will see that the GDP deflator, reported in Table B-3, is equal to 100 for 2005 (the base year), 103.2 in 2006, and so on.

Note that, in the year in which, by construction, real GDP is equal to nominal GDP (2005 at this point in the United States), this definition implies that the price level is equal to 1. This is worth emphasizing: The GDP deflator is called an **index number**. Its level is chosen arbitrarily—here it is equal to 1 in 2005—and has no economic interpretation. But its rate of change, $(P_t - P_{t-1})/P_{t-1}$ (which we shall denote by π_t in the rest of the book), has a clear economic interpretation: It gives the rate at which the general level of prices increases over time—the rate of inflation.

Compute the GDP deflator and the associated rate of inflation from 2004 to 2005 and from 2005 to 2006 in our car example in Section 2-1, when real GDP is constructed using the 2005 price of cars as the common price.

One advantage to defining the price level as the GDP deflator is that it implies a simple relation among *nominal GDP*, *real GDP*, and the *GDP deflator*. To see this, reorganize the previous equation to get:

$$\$Y_t = P_t Y_t$$

Nominal GDP is equal to the GDP deflator times real GDP. Or, putting it in terms of rates of change: The rate of growth of nominal GDP is equal to the rate of inflation plus the rate of growth of real GDP.

For a refresher, see Appendix 2, Proposition 7.

The Consumer Price Index

The GDP deflator gives the average price of output—the final goods *produced* in the economy. But consumers care about the average price of consumption—the goods they *consume*. The two prices need not be the same: The set of goods produced in the economy is not the same as the set of goods purchased by consumers, for two reasons:

- Some of the goods in GDP are sold not to consumers but to firms (machine tools, for example), to the government, or to foreigners.
- Some of the goods bought by consumers are not produced domestically but are imported from abroad.

To measure the average price of consumption, or, equivalently, the **cost of living**, macroeconomists look at another index, the **Consumer Price Index, or CPI.** The CPI has been in existence in the United States since 1917 and is published monthly (in contrast, numbers for GDP and the GDP deflator are only constructed and published quarterly).

Do not confuse the CPI with the PPI, or *producer price index*, which is an index of prices of domestically produced goods in manufacturing, mining, agriculture, fishing, forestry, and electric utility industries.

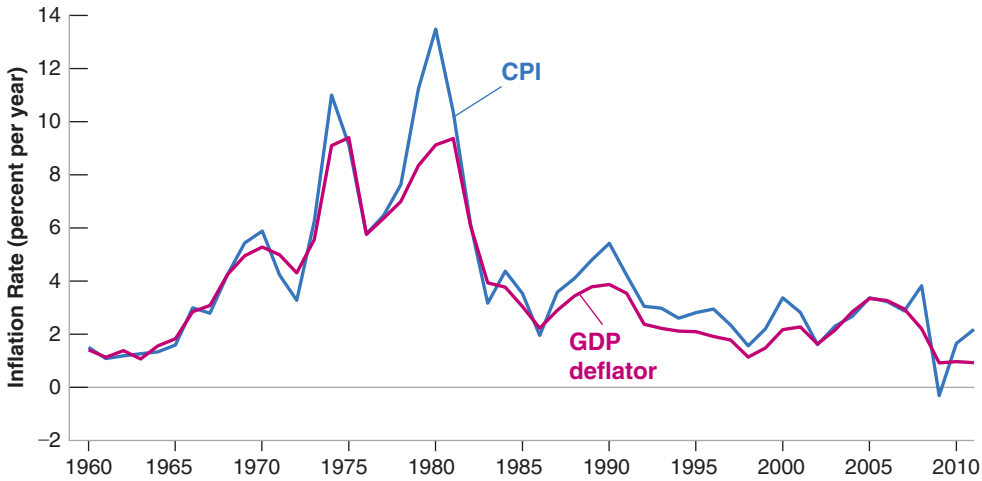
The CPI gives the cost in dollars of a specific list of goods and services over time. The list, which is based on a detailed study of consumer spending, attempts to

Figure 2-4

Inflation rate, using the CPI and the GDP deflator, 1960–2010

The inflation rates, computed using either the CPI or the GDP deflator, are largely similar.

Source: Calculated using series GDPDEF, CPI-AUSCL Federal Reserve Economic Data (FRED) http://research.stlouisfed.org/fred2/



represent the consumption basket of a typical urban consumer and is updated roughly only once every 10 years.

Each month, Bureau of Labor Statistics (BLS) employees visit stores to find out what has happened to the price of the goods on the list; prices are collected in 87 cities, from about 23,000 retail stores, car dealerships, gas stations, hospitals, and so on. These prices are then used to construct the Consumer Price Index.

Like the GDP deflator (the price level associated with aggregate output, GDP), the CPI is an index. It is set equal to 100 in the period chosen as the base period and so its level has no particular significance. The current base period is 1982 to 1984, so the average for the period 1982 to 1984 is equal to 100. In 2010, the CPI was 222.8; thus, it cost more than twice as much in dollars to purchase the same consumption basket than in 1982–1984.

Do not ask why such a strange base period was chosen. Nobody seems to remember.

You may wonder how the rate of inflation differs depending on whether the GDP deflator or the CPI is used to measure it. The answer is given in Figure 2-4, which plots the two inflation rates since 1960 for the United States. The figure yields two conclusions:

- The CPI and the GDP deflator move together most of the time. In most years, the two inflation rates differ by less than 1%.
- But there are clear exceptions. In 1979 and 1980, the increase in the CPI was significantly larger than the increase in the GDP deflator. The reason is not hard to find. Recall that the GDP deflator is the price of goods *produced* in the United States, whereas the CPI is the price of goods *consumed* in the United States. That means when the price of imported goods increases relative to the price of goods produced in the United States, the CPI increases faster than the GDP deflator. This is precisely what happened in 1979 and 1980. The price of oil doubled. And although the United States is a producer of oil, it produces much less than it consumes: It was and still is a major oil importer. The result was a large increase in the CPI compared to the GDP deflator.

You may wonder why the effect of the increases in the price of oil since 1999 is much less visible in the figure. The answer: The increases have taken place more slowly over time, and other factors have worked in the opposite direction.

In what follows, we shall typically assume that the two indexes move together so we do not need to distinguish between them. we shall simply talk about *the price level* and denote it by P_t, without indicating whether we have the CPI or the GDP deflator in mind.

Why Do Economists Care about Inflation?

If a higher inflation rate meant just a faster but proportional increase in all prices and wages—a case called *pure inflation*—inflation would be only a minor inconvenience, as relative prices would be unaffected.

Take, for example, the workers' *real wage*—the wage measured in terms of goods rather than in dollars. In an economy with 10% more inflation, prices would increase by 10% more a year. But wages would also increase by 10% more a year, so real wages would be unaffected by inflation. Inflation would not be entirely irrelevant; people would have to keep track of the increase in prices and wages when making decisions. But this would be a small burden, hardly justifying making control of the inflation rate one of the major goals of macroeconomic policy.

So why do economists care about inflation? Precisely because there is no such thing as pure inflation:

- During periods of inflation, not all prices and wages rise proportionately. Because they don't, inflation affects income distribution. For example, retirees in many countries receive payments that do not keep up with the price level, so they lose in relation to other groups when inflation is high. This is not the case in the United States, where Social Security benefits automatically rise with the CPI, protecting retirees from inflation. But during the very high inflation that took place in Russia in the 1990s, retirement pensions did not keep up with inflation, and many retirees were pushed to near starvation.
- Inflation leads to other distortions. Variations in relative prices also lead to more uncertainty, making it harder for firms to make decisions about the future, such as investment decisions. Some prices, which are fixed by law or by regulation, lag behind the others, leading to changes in relative prices. Taxation interacts with inflation to create more distortions. If tax brackets are not adjusted for inflation, for example, people move into higher and higher tax brackets as their nominal income increases, even if their real income remains the same.

This is known as *bracket creep*. In the United States, the tax brackets are adjusted automatically for inflation: If inflation is 5%, all tax brackets also go up by 5%—in other words, there is no bracket creep.

If inflation is so bad, does this imply that deflation (negative inflation) is good?

The answer is no. First, high deflation (a large negative rate of inflation) would create many of the same problems as high inflation, from distortions to increased uncertainty. Second, as we shall see later in the book, even a low rate of deflation limits the ability of monetary policy to affect output. So what is the "best" rate of inflation? Most macroeconomists believe that the best rate of inflation is a low and stable rate of inflation, somewhere between 1 and 4%. We shall look at the pros and cons of different rates of inflation later in the book.

Newspapers sometimes confuse deflation and recession. They may happen together but they are not the same. Deflation is a decrease in the price level. A recession is a decrease in real output.

2-4 Output, Unemployment, and the Inflation Rate: Okun's Law and the Phillips Curve

We have looked separately at the three main dimensions of aggregate economic activity: output growth, the unemployment rate, and the inflation rate. Clearly they are not independent, and much of this book will be spent looking at the relations among them in detail. But it is useful to have a first look now.

Okun's Law

Intuition suggests that if output growth is high, unemployment will decrease, and this is indeed true. This relation was first examined by American economist Arthur Okun and for this reason has become known as **Okun's law**. Figure 2-5 plots the change in the unemployment rate on the vertical axis against the rate of growth of output on the horizontal axis for the United States since 1960. It also draws the line that best fits the cloud of points in the figure. Looking at the figure and the line suggests two conclusions:

Arthur Okun was an adviser to President Kennedy in the 1960s. Okun's law is, of course, not a law, but an empirical regularity.

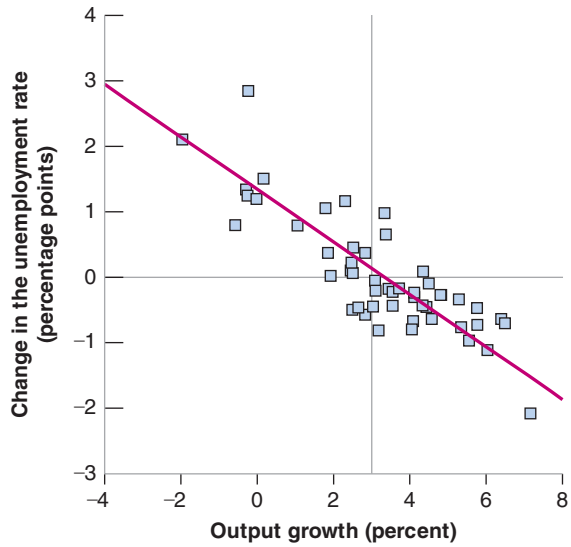
- The line is downward sloping and fits the cloud of points quite well. Put in economic terms: There is a tight relation between the two variables: Higher output

Figure 2-5

Changes in the unemployment rate versus output growth in the United States, 1960–2010

Output growth that is higher than usual is associated with a reduction in the unemployment rate; output growth that is lower than usual is associated with an increase in the unemployment rate.

Source: See Figures 2-2 and 2-3.



Such a graph, plotting one variable against another, is called a scatterplot. The line is called a regression line. For more on regressions, see Appendix 3.

growth leads to a decrease in unemployment. The slope of the line is −0.4. This implies that, on average, an increase in the growth rate of 1% decreases the unemployment rate by roughly −0.4%. This is why unemployment goes up in recessions and down in expansions. This relation has a simple but important implication: The key to decreasing unemployment is a high enough rate of growth.

- This vertical line crosses the horizontal axis at the point where output growth is roughly equal to 3%. In economic terms: It takes a growth rate of about 3% to keep unemployment constant. This is for two reasons. The first is that population, and thus the labor force, increases over time, so employment must grow over time just to keep the unemployment rate constant. The second is that output per worker is also increasing with time, which implies that output growth is higher than employment growth. Suppose, for example, that the labor force grows at 1% and that output per worker grows at 2%. Then output growth must be equal to 3% (1% + 2%) just to keep the unemployment rate constant.

The Phillips Curve

Okun's law implies that, with strong enough growth, one can decrease the unemployment rate to very low levels. But intuition suggests that, when unemployment becomes very low, the economy is likely to overheat, and that this will lead to upward pressure on inflation. And, to a large extent, this is true. This relation was first explored in 1958 by a New Zealand economist, A. W. Phillips, and has become known as the **Phillips curve**. Phillips plotted the rate of inflation against the unemployment rate. Since then, the Phillips curve has been redefined as a relation between the *change in the rate of inflation* and the unemployment rate. Figure 2-6 plots the change in the inflation rate (measured using the CPI) on the vertical axis against the unemployment rate on the horizontal axis, together with the line that fits the cloud of points best, for the United States since 1960. Looking at the figure again suggests two conclusions:

It should probably be known as the Phillips relation, but it is too late to change that.

- The line is downward sloping, although the fit is not as tight as it was for Okun's law: Higher unemployment leads, on average, to a decrease in inflation; lower unemployment leads to an increase in inflation. But this is only true on average. Sometimes, high unemployment is associated with an increase in inflation.

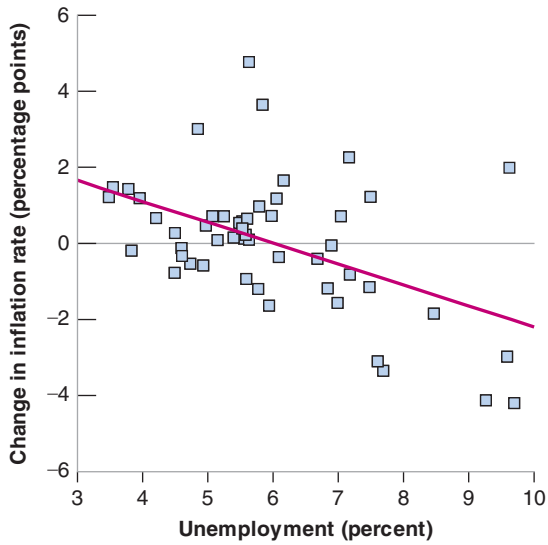


Figure 2-6

Changes in the inflation rate versus the unemployment rate in the United States, 1960–2010

A low unemployment rate leads to an increase in the inflation rate, a high unemployment rate to a decrease in the inflation rate.

Source: See Figures 2-3 and 2-4.

- The line crosses the horizontal axis at the point where the unemployment rate is roughly equal to 6%. In economic terms: When unemployment has been below 6%, inflation has typically increased, suggesting that the economy was overheating, operating above its potential. When unemployment has been above 6%, inflation has typically decreased, suggesting that the economy was operating below potential. But, again here, the relation is not tight enough that the unemployment rate at which the economy overheats can be pinned down very precisely. This explains why some economists believe that we should try to maintain a lower unemployment rate, say 4 or 5%, and others believe that it may be dangerous, leading to overheating and increasing inflation.

Clearly, a successful economy is an economy that combines high output growth, low unemployment, and low inflation. Can all these objectives be achieved simultaneously? Is low unemployment compatible with low and stable inflation? Do policy makers have the tools to sustain growth, to achieve low unemployment while maintaining low inflation? These are the questions we shall take up as we go through the book. The next two sections give you the road map.

2-5 The Short Run, the Medium Run, the Long Run

What determines the level of aggregate output in an economy?

- Reading newspapers suggests a first answer: Movements in output come from movements in the demand for goods. You probably have read news stories that begin like this: "Production and sales of automobiles were higher last month due to a surge in consumer confidence, which drove consumers to showrooms in record numbers." Stories like these highlight the role demand plays in determining aggregate output; they point to factors that affect demand, ranging from consumer confidence to interest rates.
- But, surely, no amount of Indian consumers rushing to Indian showrooms can increase India's output to the level of output in the United States. This suggests a second answer: What matters when it comes to aggregate output is the supply side—how much the economy can produce. How much can be produced depends on how advanced the technology of the country is, how much capital it is using, and the size and the skills of its labor force. These factors—not consumer confidence—are the fundamental determinants of a country's level of output.

- The previous argument can be taken one step further: Neither technology, nor capital, nor skills are given. The technological sophistication of a country depends on its ability to innovate and introduce new technologies. The size of its capital stock depends on how much people save. The skills of workers depend on the quality of the country's education system. Other factors are also important: If firms are to operate efficiently, for example, they need a clear system of laws under which to operate and an honest government to enforce those laws. This suggests a third answer: The true determinants of output are factors like a country's education system, its saving rate, and the quality of its government. If we want to understand what determines the level of output, we must look at these factors.

You might be wondering at this point, which of the three answers is right? The fact is that all three are right. But each applies over a different time frame:

- In the **short run**, say, a few years, the first answer is the right one. Year-to-year movements in output are primarily driven by movements in demand. Changes in demand, perhaps due to changes in consumer confidence or other factors, can lead to a decrease in output (a recession) or an increase in output (an expansion).
- In the **medium run**, say, a decade, the second answer is the right one. Over the medium run, the economy tends to return to the level of output determined by supply factors: the capital stock, the level of technology, and the size of the labor force. And, over a decade or so, these factors move sufficiently slowly that we can take them as given.
- In the **long run**, say, a few decades or more, the third answer is the right one. To understand why China has been able to achieve such a high growth rate since 1980, we must understand why both the capital stock and the level of technology in China are increasing so fast. To do so, we must look at factors like the education system, the saving rate, and the role of the government.

This way of thinking about the determinants of output underlies macroeconomics, and it underlies the organization of this book.

2-6 A Tour of the Book

The book is organized in three parts: A core; two extensions; and, finally, a comprehensive look at the role of macroeconomic policy. This organization is shown in Figure 2-7. We now describe it in more detail.

The Core

The core is composed of three parts—the short run, the medium run, and the long run.

- Chapters 3 to 5 look at how output is determined in the short run. To focus on the role of demand, we assume that firms are willing to supply any quantity at a given price. In other words, we ignore supply constraints. Chapter 3 looks at the goods market. Chapter 4 focuses on financial markets. Chapter 5 puts the goods and financial markets together. The resulting framework is known as the *IS–LM* model. Developed in the late 1930s, the *IS–LM* model still provides a simple way of thinking about the determination of output in the short run, and it remains a basic building block of macroeconomics. It also allows for a first pass at studying the effects of fiscal policy and monetary policy on output.

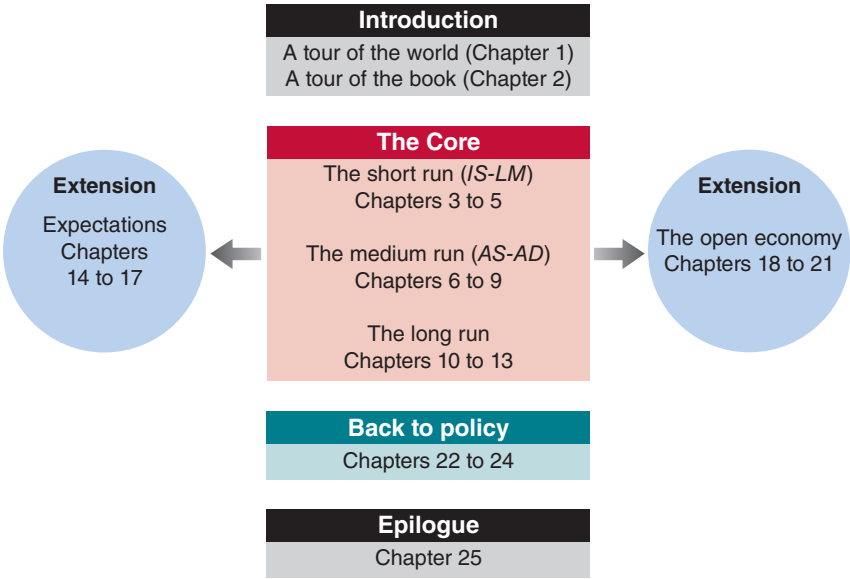


Figure 2-7

The organization of the book

- Chapters 6 to 9 develop the supply side and look at how output is determined in the medium run. Chapter 6 introduces the labor market. Chapter 7 puts together goods, financial, and labor markets and shows you how to think about the determination of output both in the short run and in the medium run. The resulting framework is called the aggregate supply–aggregate demand *AS–AD* model and, together with the *IS–LM*, is another workhorse of macroeconomics. Chapter 8 focuses on the relation between unemployment, inflation, and money growth. By then, you will have all the elements we need to take a first detailed look at the crisis. The crisis is unusual in a number of ways. The initial shock is a major shock to the financial system. Both monetary and fiscal policies are facing sharp constraints. As a result, the crisis is much deeper than a standard recession, and the recovery is proving to be very slow. This is the subject of Chapter 9.
- Chapters 10 to 13 focus on the long run. Chapter 10 introduces the relevant facts by looking at the growth of output both across countries and over long periods of time. Chapters 11 and 12 discuss how both capital accumulation and technological progress determine growth. Chapter 13 looks at the interaction among technological progress, wages, and unemployment.

Extensions

The core chapters give you a way of thinking about how output (and unemployment, and inflation) is determined over the short, medium, and long run. However, they leave out several elements, which are explored in two extensions:

- Expectations play an essential role in macroeconomics. Nearly all the economic decisions people and firms make—whether or not to buy a car, whether to buy bonds or to buy stocks, whether or not to build a new plant—depend on their expectations about future income, future profits, future interest rates, and so on. Fiscal and monetary policy affect economic activity not only through their direct effects, but also through their effects on people's and firms' expectations. While we touch on these issues in the core, Chapters 14 to 17 offer a more detailed treatment and draw the implications for fiscal and monetary policy.

- The core chapters treat the economy as *closed*, ignoring its interactions with the rest of the world. But the fact is, economies are increasingly *open*, trading goods and services and financial assets with one another. As a result, countries are becoming more and more interdependent. The nature of this interdependence and the implications for fiscal and monetary policy are the topics of Chapters 18 to 21.

Back to Policy

Monetary policy and fiscal policy are discussed in nearly every chapter of this book. But once the core and the extensions have been covered, it is useful to go back and put things together in order to assess the role of policy.

- Chapter 22 focuses on general issues of policy, whether macroeconomists really know enough about how the economy works to use policy as a stabilization tool at all, and whether policy makers can be trusted to do what is right.
- Chapters 23 and 24 return to the role of fiscal and monetary policy.

Epilogue

Macroeconomics is not a fixed body of knowledge. It evolves over time. The final chapter, Chapter 25, looks at the history of macroeconomics and how macroeconomists have come to believe what they believe today. From the outside, macroeconomics sometimes looks like a field divided among schools—"Keynesians," "monetarists," "new classicals," "supply-siders," and so on—hurling arguments at each other. The actual process of research is more orderly and more productive than this image suggests. We identify what we see as the main differences among macroeconomists, the set of propositions that define the core of macroeconomics today, and the challenges posed to macroeconomists by the crisis.

Summary

- We can think of GDP, the measure of aggregate output, in three equivalent ways: (1) GDP is the value of the final goods and services produced in the economy during a given period; (2) GDP is the sum of value added in the economy during a given period; and (3) GDP is the sum of incomes in the economy during a given period.
- Nominal GDP is the sum of the quantities of final goods produced times their current prices. This implies that changes in nominal GDP reflect both changes in quantities and changes in prices. Real GDP is a measure of output. Changes in real GDP reflect changes in quantities only.
- A person is classified as unemployed if he or she does not have a job and is looking for one. The unemployment rate is the ratio of the number of people unemployed to the number of people in the labor force. The labor force is the sum of those employed and those unemployed.
- Economists care about unemployment because of the human cost it represents. They also look at unemployment because it sends a signal about how efficiently the economy is using its resources. High unemployment indicates that the country is not utilizing its resources efficiently.
- Inflation is a rise in the general level of prices—the price level. The inflation rate is the rate at which the price level increases. Macroeconomists look at two measures of the price level. The first is the GDP deflator, which is the average price of the goods produced in the economy. The second is the Consumer Price Index (CPI), which is the average price of goods consumed in the economy.
- Inflation leads to changes in income distribution, to distortions, and to increased uncertainty.
- There are two important relations among output, unemployment, and inflation. The first, called Okun's law, is a relation between output growth and the change in unemployment: High output growth typically leads to a decrease in the unemployment rate. The second, called the Phillips curve, is a relation between unemployment and inflation: A low unemployment rate typically leads to an increase in the inflation rate.
- Macroeconomists distinguish between the short run (a few years), the medium run (a decade), and the long run (a few decades or more). They think of output as being determined by demand in the short run. They think of output as being determined by the level of technology, the capital stock, and the labor force in the medium run. Finally, they think of output as being determined by factors like education, research, saving, and the quality of government in the long run.

Key Terms

national income and product accounts, 20
aggregate output, 20
gross domestic product, GDP, 20
gross national product, GNP, 20
intermediate good, 20
final good, 21
value added, 21
nominal GDP, 22
real GDP, 22
real GDP in chained (2005) dollars, 23
dollar GDP, GDP in current dollars, 23
GDP in terms of goods, GDP in constant dollars, GDP adjusted for inflation, GDP in 2005 dollars, 24
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short run, medium run, and long run, 34

Questions and Problems

QUICK CHECK

All Quick Check questions and problems are available on MyEconLab.

1. Using the information in this chapter, label each of the following statements true, false, or uncertain. Explain briefly.

a. U.S. GDP was 28 times higher in 2010 than it was in 1960.
b. When the unemployment rate is high, the participation rate is also likely to be high.
c. The rate of unemployment tends to fall during expansions and rise during recessions.
d. If the Japanese CPI is currently at 108 and the U.S. CPI is at 104, then the Japanese rate of inflation is higher than the U.S. rate of inflation.
e. The rate of inflation computed using the CPI is a better index of inflation than the rate of inflation computed using the GDP deflator.
f. Okun's law shows that when output growth is lower than normal, the unemployment rate tends to rise.
g. Periods of negative GDP growth are called recessions.
h. When the economy is functioning normally, the unemployment rate is zero.
i. The Phillips curve is a relation between the level of inflation and the level of unemployment.

2. Suppose you are measuring annual U.S. GDP by adding up the final value of all goods and services produced in the economy. Determine the effect on GDP of each of the following transactions.

a. A seafood restaurant buys $100 worth of fish from a fisherman.
b. A family spends $100 on a fish dinner at a seafood restaurant.
c. Delta Air Lines buys a new jet from Boeing for $200 million.
d. The Greek national airline buys a new jet from Boeing for $200 million.
e. Delta Air Lines sells one of its jets to Denzel Washington for $100 million.

3. During a given year, the following activities occur:

i. A silver mining company pays its workers $200,000 to mine 75 pounds of silver. The silver is then sold to a jewelry manufacturer for $300,000.
ii. The jewelry manufacturer pays its workers $250,000 to make silver necklaces, which the manufacturer sells directly to consumers for $1,000,000.

a. Using the production-of-final-goods approach, what is GDP in this economy?
b. What is the value added at each stage of production? Using the value-added approach, what is GDP?
c. What are the total wages and profits earned? Using the income approach, what is GDP?

4. An economy produces three goods: cars, computers, and oranges. Quantities and prices per unit for years 2005 and 2006 are as follows:

	2005		2006	
	Quantity	Price	Quantity	Price
Cars	10	$2000	12	$3000
Computers	4	$1000	6	$500
Oranges	1000	$1	1000	$1

a. What is nominal GDP in 2005 and in 2006? By what percentage does nominal GDP change from 2005 to 2006?
b. Using the prices for 2005 as the set of common prices, what is real GDP in 2005 and in 2006? By what percentage does real GDP change from 2005 to 2006?

c. Using the prices for 2006 as the set of common prices, what is real GDP in 2005 and in 2006? By what percentage does real GDP change from 2005 to 2006?
d. Why are the two output growth rates constructed in (b) and (c) different? Which one is correct? Explain your answer.

5. Consider the economy described in Problem 4.

a. Use the prices for 2005 as the set of common prices to compute real GDP in 2005 and in 2006. Compute the GDP deflator for 2005 and for 2006 and compute the rate of inflation from 2005 to 2006.
b. Use the prices for 2006 as the set of common prices to compute real GDP in 2005 and in 2006. Compute the GDP deflator for 2005 and for 2006 and compute the rate of inflation from 2005 to 2006.
c. Why are the two rates of inflation different? Which one is correct? Explain your answer.

6. Consider the economy described in Problem 4.

a. Construct real GDP for years 2005 and 2006 by using the average price of each good over the two years.
b. By what percentage does real GDP change from 2005 to 2006?
c. What is the GDP deflator in 2005 and 2006? Using the GDP deflator, what is the rate of inflation from 2005 to 2006?
d. Is this an attractive solution to the problems pointed out in Problems 4 and 5 (i.e., two different growth rates and two different inflation rates, depending on which set of prices is used)? (The answer is yes and is the basis for the construction of chained-type deflators. See the appendix to this chapter for more discussion.)

7. Using macroeconomic relations:

a. Okun's law stated that when output growth is higher than usual, the unemployment rate tends to fall. Explain why usual output growth is positive.
b. In which year, a year where output growth is 2% or a year where output growth is –2%, will the unemployment rate rise more?
c. The Phillips curve is a relation between the change in the inflation rate and the level of the unemployment rate. Using the Phillips curve, is the unemployment rate zero when the rate of inflation is neither rising nor falling.
d. The Phillips curve is often portrayed a line with a negative slope. In the text, the slope is –0.4. In your opinion, is this a "better" economy if the line has a large slope, say –0.8, or a smaller slope, say –0.2?

DIG DEEPER

All Dig Deeper questions and problems are available on MyEconLab.

8. Hedonic pricing

As the first Focus box in this chapter explains, it is difficult to measure the true increase in prices of goods whose characteristics change over time. For such goods, part of any price increase can be attributed to an increase in quality. Hedonic pricing offers a method to compute the quality-adjusted increase in prices.

a. Consider the case of a routine medical checkup. Name some reasons you might want to use hedonic pricing to measure the change in the price of this service.

Now consider the case of a medical checkup for a pregnant woman. Suppose that a new ultrasound method is introduced. In the first year that this method is available, half of doctors offer the new method, and half offer the old method. A checkup using the new method costs 10% more than a checkup using the old method.

b. In percentage terms, how much of a quality increase does the new method represent over the old method? (*Hint:* Consider the fact that some women *choose* to see a doctor offering the new method when they could have chosen to see a doctor offering the old method.)

Now, in addition, suppose that in the first year the new ultrasound method is available, the price of checkups using the new method is 15% higher than the price of checkups in the previous year (when everyone used the old method).

c. How much of the higher price for checkups using the new method (as compared to checkups in the previous year) reflects a true price increase of checkups and how much represents a quality increase? In other words, how much higher is the quality-adjusted price of checkups using the new method as compared to the price of checkups in the previous year?

In many cases, the kind of information we used in parts (b) and (c) is not available. For example, suppose that in the year the new ultrasound method is introduced, all doctors adopt the new method, so the old method is no longer used. In addition, continue to assume that the price of checkups in the year the new method is introduced is 15% higher than the price of checkups in the previous year (when everyone used the old method). Thus, we observe a 15% price increase in checkups, but we realize that the quality of checkups has increased.

d. Under these assumptions, what information required to compute the quality-adjusted price increase of checkups is lacking? Even without this information, can we say anything about the quality-adjusted price increase of checkups? Is it more than 15%? less than 15%? Explain.

9. Measured and true GDP

Suppose that instead of cooking dinner for an hour, you decide to work an extra hour, earning an additional $12. You then purchase some (takeout) Chinese food, which costs you $10.

a. By how much does measured GDP increase?
b. Do you think the increase in measured GDP accurately reflects the effect on output of your decision to work? Explain.

EXPLORE FURTHER

10. Comparing the recessions of 2009 and 2001:

One very easy source for data is the Federal Reserve Bank of St. Louis FRED database. The series that measures real GDP is GDPC1, real GDP in each quarter of the year expressed at a seasonally adjusted annual rate (denoted SAAR). The monthly series for the unemployment rate is UNRATE. You can download these series in a variety of ways from this database.

a. Look at the data on quarterly real GDP growth from 1999 through 2001 and then from 2007 through 2009. Which recession has larger negative values for GDP growth, the recession centered on 2000 or the recession centered on 2008?

b. The unemployment rate is series UNRATE. Is the unemployment rate higher in the 2001 recession or the 2009 recession?

c. The National Bureau of Economic Research (NBER), which dates recessions, identified a recession beginning in March 2001 and ending in November 2001. The equivalent dates for the next, longer recession were December 2007 ending June 2009. In other words, according to the NBER, the economy began a recovery in November 2001 and in June 2009. Given your answers to parts (a) and (b), do you think the labor market recovered as quickly as GDP? Explain.

For more on NBER recession dating, visit www.nber.org. This site provides a history of recession dates and some discussion of their methodology.

Further Readings

- If you want to learn more about the definition and the construction of the many economic indicators that are regularly reported on the news—from the help-wanted index to the retail sales index—two easy-to-read references are:
  The *Guide to Economic Indicators*, by Norman Frumkin, 3rd edition, M.E. Sharpe, 4th edition, New York, 2005.
  The Economist Guide to Economic Indicators, by the staff of *The Economist*, 6th edition, Bloomberg, New York, 2007.
- In 1995, the U.S. Senate set up a commission to study the construction of the CPI and make recommendations about potential changes. The commission concluded that the rate of inflation computed using the CPI was on average about 1% too high. If this conclusion is correct, this implies in particular that real wages (nominal wages divided by the CPI) have grown 1% more per year than is currently being reported. For more on the conclusions of the commission and some of the exchanges that followed, read *Consumer Prices, the Consumer Price Index, and the Cost of Living*, by Michael Boskin et al., *Journal of Economic Perspectives*, 1998, 12(1): pp. 3–26.
- For a short history of the construction of the National Income Accounts, read *GDP: One of the Great Inventions of the 20th Century*, Survey of Current Business, January 2000, 1–9. (www.bea.gov/bea/articles/beawide/2000/0100od.pdf)
- For a discussion of some of the problems involved in measuring activity, read "What We Don't Know Could Hurt Us; Some Reflections on the Measurement of Economic Activity," by Katherine Abraham, *Journal of Economic Perspectives*, 2005, 19(3): pp. 3–18.
- To see why it is hard to measure the price level and output correctly, read "Viagra and the Wealth of Nations" by Paul Krugman, 1998 (www.pkarchive.org/theory/viagra.html). (Paul Krugman is an economist at Princeton University and a columnist at the New York Times. His columns are opinionated, insightful, and fun to read.)

APPENDIX: The Construction of Real GDP, and Chain-Type Indexes

The example we used in the chapter had only one final good—cars—so constructing real GDP was easy. But how do we construct real GDP when there is more than one final good? This appendix gives the answer.

To understand how real GDP in an economy with many final goods is constructed, all you need to do is look at an economy where there are just two final goods. What works for two goods works just as well for millions of goods.

Suppose that an economy produces two final goods, say wine and potatoes:

- In year 0, it produces 10 pounds of potatoes at a price of $1 a pound, and 5 bottles of wine at a price of $2 a bottle.
- In year 1, it produces 15 pounds of potatoes at a price of $1 a pound, and 5 bottles of wine at a price of $3 a bottle.
- Nominal GDP in year 0 is therefore equal to $20. Nominal GDP in year 1 is equal to $30.

This information is summarized in the following table.

Nominal GDP in Year 0 and in Year 1.

	Year 0		
	Quantity	**$ Price**	**$ Value**
Potatoes (pounds)	10	1	10
Wine (bottles),	5	5	10
Nominal GDP			20
	Year 1		
	Quantity	**$ Price**	**$ Value**
Potatoes (pounds)	15	1	15
Wine (bottles)	5	3	15
Nominal GDP			30

The rate of growth of nominal GDP from year 0 to year 1 is equal to $(\$30 - \$20)/\$20 = 50\%$. But what is the rate of growth of real GDP?

Answering this question requires constructing real GDP for each of the two years. The basic idea behind constructing real GDP is to evaluate the quantities in each year using the *same set of prices.*

Suppose we choose, for example, the prices in year 0. Year 0 is then called the **base year**. In this case, the computation is as follows:

- Real GDP in year 0 is the sum of the quantity in year 0 times the price in year 0 for both goods: $(10 \times \$1) + (5 \times \$2) = \$20$.
- Real GDP in year 1 is the sum of the quantity in year 1 times the price in year 0 for both goods: $(15 \times \$1) + (5 \times \$2) = \$25$.
- The rate of growth of real GDP from year 0 to year 1 is then $(\$25 - \$20)/\$20$, or 25%.

This answer raises however an obvious issue: Instead of using year 0 as the base year, we could have used year 1, or any other year. If, for example, we had used year 1 as the base year, then:

- Real GDP in year 0 would be equal to $(10 \times \$1 + 5 \times \$3) = \$25$.
- Real GDP in year 1 would be equal to $(15 \times \$1 + 5 \times \$3) = \$30$.
- The rate of growth of real GDP from year 0 to year 1 would be equal to \$5/\$25, or 20%.

The answer using year 1 as the base year would therefore be different from the answer using year 0 as the base year. So if the choice of the base year affects the constructed percentage rate of change in output, which base year should one choose?

Until the mid-1990s in the United States—and still in most countries today—the practice was to choose a base year and change it infrequently, say, every five years or so. For example, in the United States, 1987 was the base year used from December 1991 to December 1995. That is, measures of real GDP published, for example, in 1994 for both 1994 and for all earlier years were constructed using 1987 prices. In December 1995, national income accounts shifted to 1992 as a base year; measures of real GDP for all earlier years were recalculated using 1992 prices.

This practice was logically unappealing. Every time the base year was changed and a new set of prices was used, all past real GDP numbers—and all past real GDP growth rates—were recomputed: Economic history was, in effect, rewritten every five years! Starting in December 1995, the U.S. Bureau of Economic Analysis (BEA)—the government office that produces the GDP numbers—shifted to a new method that does not suffer from this problem.

The method requires four steps:

- Constructing the rate of change of real GDP from year t to year $t + 1$ in two different ways. First using the prices from year t as the set of common prices; second, using the prices from year $t + 1$ as the set of common prices. For example, the rate of change of GDP from 2006 to 2007 is computed by:
  (1) Constructing real GDP for 2006 and real GDP for 2007 using 2006 prices as the set of common prices, and computing a first measure of the rate of growth of GDP from 2006 to 2007.
  (2) Constructing real GDP for 2006 and real GDP for 2007 using 2007 prices as the set of common prices, and computing a second measure of the rate of growth of GDP from 2006 to 2007.
- Constructing the rate of change of real GDP as the average of these two rates of change.
- Constructing an index for the level of real GDP by *linking*—or *chaining*—the constructed rates of change for each year. The index is set equal to 1 in some arbitrary year. At the time this book is written, the arbitrary year is 2005. Given that the constructed rate of change from 2005 to 2006 by the BEA is 2.6%, the index for 2006 equals $(1 + 2.6\%) = 1.026$. The index for 2006 is then obtained by multiplying the index for 2005 by the rate of change from 2005 to 2006, and so on. (You will find the value of this index—multiplied by 100—in the second column of Table B3 in the Economic Report of the President. Check that it is 100 in 2005 and 102.6 in 2006, and so on.)
- Multiplying this index by nominal GDP in 2005 to derive *real GDP in chained (2005) dollars*. As the index is 1 in 2005, this implies that real GDP in 2005 equals nominal GDP in 2005.

  Chained refers to the chaining of rates of change described above. *(2005)* refers to the year where, by construction, real GDP is equal to nominal GDP. (You will find the value of real GDP in chained (2005) dollars in the first column of Table B2 of the Economic Report of the President.)

  This index is more complicated to construct than the indexes used before 1995. (To make sure you understand the steps, construct real GDP in chained (year 0) dollars for year 1 in our example.) But it is clearly better conceptually: The prices used to evaluate real GDP in two adjacent years are the right prices, namely the average prices for those two years. And, because the rate of change from one year to the next is constructed using the prices in those two years rather than the set of prices in an arbitrary base year, history will not be rewritten every five years—as it used to be when, under the previous method for constructing real GDP, the base year was changed every five years.

(For more details, go to www.bea.doc.gov/bea/ARTICLES/NATIONAL/NIPA/1995/0795od.pdf)

Key Term

base year, 40