



GLOBAL  
EDITION



# Macroeconomics

*Theories and Policies*

TENTH EDITION

Richard T. Froyen

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PEARSON

# *Macroeconomics: Theories and Policies*

**Global Edition**

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# MACROECONOMICS

## Theories and Policies

**TENTH EDITION**

**GLOBAL EDITION**

**Richard T. Froyen**

*University of North Carolina—Chapel Hill*

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*The publisher's policy is to use paper manufactured from sustainable forests.*

To Linda, Katherine, Sara, and Andrea

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# Preface

The term macroeconomics was first used by the Norwegian economist Ragnar Frisch in 1933. Macroeconomics is clearly the younger sibling of the economics family. It is no coincidence that macroeconomics emerged as a major branch of economics amid the chaotic conditions of the Great Depression of the 1930s. The severe economic problems of the time lent importance to the subject matter of macroeconomics—the behavior of the economy as a whole. A book by John Maynard Keynes, *The General Theory of Employment, Interest, and Money*, developed a framework in which to systematically consider the behavior of aggregate economic variables such as employment and output. During the two decades following World War II, Keynes's followers elaborated and extended his theories.

The years since the late 1960s, however, have witnessed major challenges to Keynesian economics. The 1970s saw increased interest in *monetarism*, the body of theory Milton Friedman and others had developed beginning in the 1940s.

A new school of macroeconomic theory, the *new classical* economics, also came on the scene during the 1970s. In the 1980s, Keynesian policy prescriptions came under attack from a group called the *supply-side* economists. The 1980s and 1990s also witnessed the development of two new lines of macroeconomic research: the *real business cycle* theory and the *new Keynesian* economics.

In this book I have tried to explain macroeconomics, inclusive of recent developments, in a coherent way but without glossing over the fundamental disagreements among macroeconomists on issues of both theory and policy. The major modern macroeconomic theories are presented and compared. Important areas of agreement as well as differences are discussed.

---

## New in the Tenth Edition

- The financial crisis and deep recession of 2007–09 were the most serious macroeconomic shocks to hit the world economy since the Great Depression. The discussion of the theoretical models in Parts 2 and 3 of the book has been revised to reflect this experience. Many examples have been added to show how the models explain recent events. The way the crisis and deep recession affect an evaluation of the different macroeconomic theories is examined.
- Chapters in Part 5 on Economic Policy have been extended to consider policy responses to the financial crisis and recession. Throughout the book, major policy initiatives are described and evaluated.
- Chapters 16 and 17 have been revised to include more detail on banks and other parts of the financial sector. The freezing up of credit markets during the financial crisis is explained within the context of deposit and credit creation. Material has been added on the new monetary policy instruments and initiatives that come

under the heading of *quantitative easing*. The zero-bound problem that led to the need for these new policy initiatives is explained.

- Chapter 14 on the open economy includes an updated discussion of the evolution of current account imbalances over the 2007–11 period and new coverage of the European sovereign debt crisis.
- The discussion of fiscal policy in Chapter 18 now includes material on the U.S. public debt. The debt burden issue is also considered.
- New Perspectives boxes have been added and others expanded on topics including: the efficient markets hypothesis of asset pricing, the fiscal stimulus program (ARRA) of 2009, European bond interest rates, the financial sector in the Keynesian model, and the sequence of events during the recent financial crisis.

## Organization

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Part 1 (Chapters 1 and 2) discusses the subject matter of macroeconomics, the behavior of the U.S. economy over the past several decades, and questions of measurement. Part 2 (Chapters 3–8) begins our comparison of macroeconomic models. We start with the classical system and then go on to the Keynesian model. Part 3 considers challenges to the Keynesian system and rebuttals to these challenges. Chapter 9 examines monetarism and the issues in the monetarist–Keynesian controversy. Chapter 10 examines alternative views of the unemployment–inflation trade-off and the *natural rate* theory. Chapter 11 presents the new classical theory with its central concepts of *rational expectations* and market clearing. In Chapter 12 two newer directions in macroeconomic research are examined. One, strongly rooted in the classical tradition, is the real business cycle theory. The second, the new Keynesian economics, is, as its name suggests, firmly in the Keynesian tradition. Chapter 13 summarizes and compares the models considered in Parts 2 and 3.

Part 4 considers open-economy macroeconomics. Chapter 14 focuses on exchange rate determination and the international monetary system. Chapter 15 utilizes the Mundell–Fleming model to examine the effects of monetary and fiscal policy in the open economy.

Part 5 deals with macroeconomic policy. Chapters 16 and 17 focus on monetary policy. Chapter 18 considers fiscal policy.

Part 6 lengthens the time horizon of the analysis beyond the short run. Chapter 19 is concerned with growth over intermediate-run periods of a decade or two. Chapter 20 considers long-run equilibrium growth.

## Ancillaries

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- *Instructor's Manual with Test Bank*: This resource manual provides the instructor with detailed chapter summaries, answers to end-of-chapter questions, and a complete test bank. For each chapter, there are 50 to 70 multiple-choice questions as well as 10 to 15 problems and essay questions. The Instructor's Manual is available for download via [www.pearsonglobaleditions.com/froyen](http://www.pearsonglobaleditions.com/froyen). Further resources for both students and instructors may also be found on the companion website.

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### **Contributors**

Ahmad Zafarullah Abdul Jalil, Universiti Utara Malaysia

### **Reviewers**

Marcus Brueckner, National University of Singapore

David Dickinson, University of Birmingham

Kwan-wai Ko, Chinese University of Hong Kong

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# PART ONE

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## Introduction and Measurement

### CHAPTER 1

#### *Introduction*

### CHAPTER 2

#### *Measurement of Macroeconomic Variables*

**P**art I discusses the subject matter of macroeconomics, the behavior of the U.S. economy, and the measurement of macroeconomic variables. Chapter 1 defines macroeconomics and traces the macroeconomic trends in the United States since World War II. The chapter then poses some central questions in macroeconomics. Chapter 2 deals with measurement and defines the main macroeconomic aggregates. Central to this task is an examination of the U.S. national income accounts.

# CHAPTER I

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## Introduction

### 1.1 What is Macroeconomics?

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This book examines the branch of economics called *macroeconomics*. The British economist Alfred Marshall defined economics as the “study of mankind in the ordinary business of life; it examines that part of individual and social action which is most closely connected with the attainment and with the use of the material requisites of well-being.”<sup>1</sup> In macroeconomics, we study this “ordinary business of life” in the aggregate. We look at the behavior of the economy as a whole. The key variables we study include total output in the economy, the aggregate price level, employment and unemployment, interest rates, wage rates, and foreign exchange rates. The subject matter of macroeconomics includes factors that determine both the levels of these variables and how the variables change over time: the rate of growth of output, the inflation rate, changing unemployment in periods of expansion and recession, and appreciation or depreciation in foreign exchange rates.

Macroeconomics is policy oriented. It asks, to what degree can government policies affect output and employment? To what degree is inflation the result of unfortunate government policies? What government policies are *optimal* in the sense of achieving the most desirable behavior of aggregate variables, such as the level of unemployment or the inflation rate? Should government policy attempt to achieve a *target level* for foreign exchange rates?

For example, we might ask to what degree government policies were to blame for the massive unemployment during the Great Depression of the 1930s or for the simultaneously high unemployment and inflation of the 1970s. What role did “Reaganomics” play in the sharp decline in inflation and rise in unemployment in the early 1980s? To what degree have government policies been responsible for the sharp decline in the average inflation rate in the United States and other industrialized countries that occurred over the past two decades? How effective were the stimulus programs enacted in the wake of the financial crisis of 2007–09.

Economists disagree on policy questions. In part, the controversy over policy questions stems from differing views of the factors that determine the key variables mentioned previously. Questions of theory and policy are interrelated. Our analysis examines different macroeconomic theories and the policy conclusions that follow from those theories. It would be more satisfying to present the macroeconomic theory and policy prescription. Satisfying, but such a presentation would be misleading because of fundamental differences among schools of macroeconomics. In comparing different theories, however, we see substantial areas of agreement as well as disagreement. Controversy does not mean chaos. Our approach is to isolate key issues that divide macroeconomists and to explain the theoretical basis for each position.

We analyze macroeconomic orthodoxy as it existed when the 1970s began, what is termed *Keynesian economics*. The roots of Keynesian theory as an attack on an earlier orthodoxy, *classical economics*, are explained. We then examine the challenges to the Keynesian position, theories that have come to be called *monetarism* and the *new*

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<sup>1</sup>Alfred Marshall, *Principles of Economics*, 8th ed. (New York: Macmillan, 1920), p. 1.

*classical economics*. Finally, we consider two recent theories. One, strongly rooted in the classical tradition, is the *real business cycle theory*. The other, the *new Keynesian theory*, is, as its name suggests, in the Keynesian tradition. How each theory explains the events from the 1970s to the present, as well as the policies each group of economists propose to provide for better future economic performance, is a central concern of our analysis.

## 1.2 Post–World War II U.S. Economic Performance

Our tasks here are to sketch the broad outline of U.S. macroeconomic performance over the post–World War II period and to suggest some central questions addressed in our later analysis.

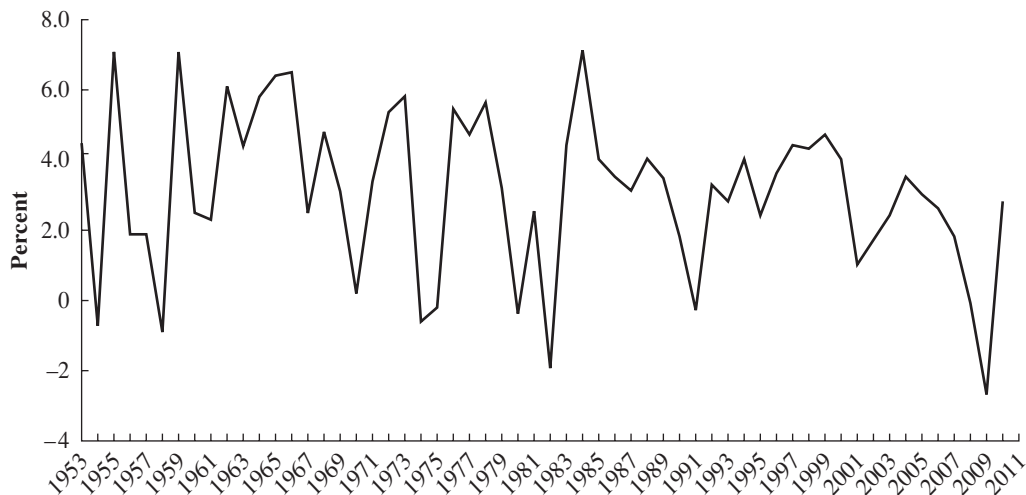
### OUTPUT

**gross domestic product (GDP)**  
a measure of all currently produced final goods and services

Figure 1-1 shows the growth rate of output for the United States for the years 1953–2010. The output measure in the figure is **real gross domestic product (GDP)**. Gross domestic product measures current production of goods and services; *real* means that the measures in Figure 1-1 have been corrected for price change. The data measure growth in the quantity of goods and services produced.

The data in the figure show considerable variation in GDP growth over the past five decades. During the 1960s, there was steady, relatively high growth in GDP. In all other decades, there were years of negative growth; GDP declined in at least 1 year. Still it is the case that the period from the mid-1980s to 2007 was one of relative stability. Notice that over this period of more than 20 years there was only one year when GDP declined. Generally over this period year to year movements in GDP were moderate. This led economists to call this period the “great moderation.” It appeared that the business cycle had become less pronounced. Thus, the steep drop in GDP as the economy entered the severe recession of 2007–09 took many by surprise.

**FIGURE I-1** Annual Percentage Change in Real GDP, 1953–2010



**TABLE 1-1** Real GDP Growth in the United States, Average Percentage Change for Selected Periods

<i>Years</i>	<i>Percent</i>
1953–69	3.8
1970–81	2.7
1982–95	3.0
1996–2006	3.2
2007–11	1.0

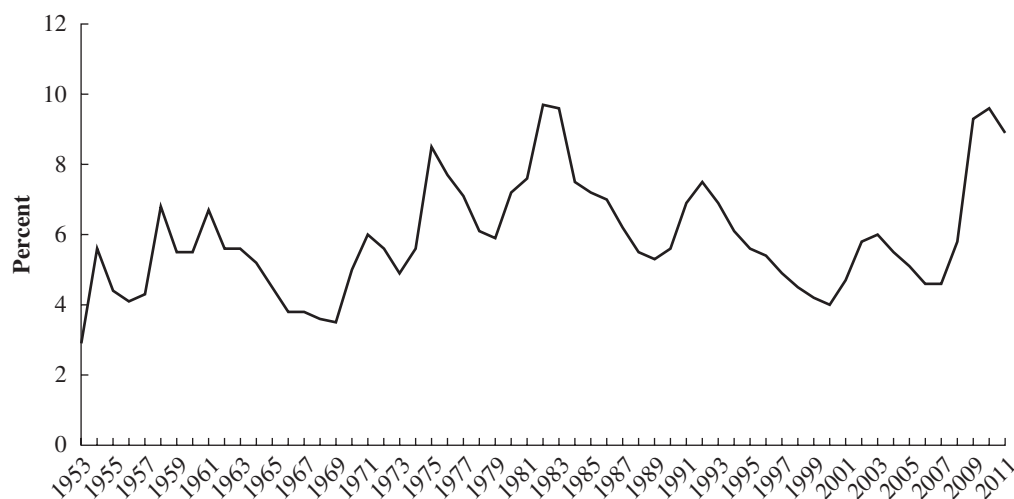
Table 1-1 summarizes growth trends over the past half century. The table indicates a decline of about 1 percentage point in the GDP growth rate in the post-1970 period. There were some signs of a modest reversal of this growth slowdown starting in the mid-1990s. Growth for the 2007–2011 period is low due to the recession that began in late 2007 and the slow pace of the recovery in the later part of the period.

## UNEMPLOYMENT

**unemployment rate**  
the number of unemployed persons expressed as a percentage of the labor force

Figure 1-2 shows the U.S. **unemployment rate** for each year since 1953. The unemployment rate is the percentage of the labor force that is not employed.

The slower output growth in the post-1970 period is reflected in rising unemployment during these years, as can also be seen in Table 1-2, which shows average unemployment rates for selected periods. In the late 1990s there seemed to be a reversal of this trend as the unemployment rate fell to a 30-year low of just under 4 percent. Then as output growth slowed after 2000, the unemployment rate rose to nearly 6 percent. Although this rate is not especially high by the standard of previous recessions, unemployment did remain high even as output growth picked up after 2002, causing talk of a “jobless recovery.” Unemployment rose sharply during the most recent recession beginning in 2007 and has remained very high even more than two years into the recovery.

**FIGURE 1-2** U.S. Unemployment Rate, 1953–2010

**TABLE I-2** U.S. Unemployment Rate,  
Averages for Selected Periods

<i>Years</i>	<i>Percent</i>
1953–69	4.8
1970–81	6.4
1982–95	6.9
1996–2006	5.0
2007–11	7.7

**inflation**

a rise in the general level of prices

**price index**

a measure of the aggregate price level relative to a chosen base year

**consumer price index (CPI)**

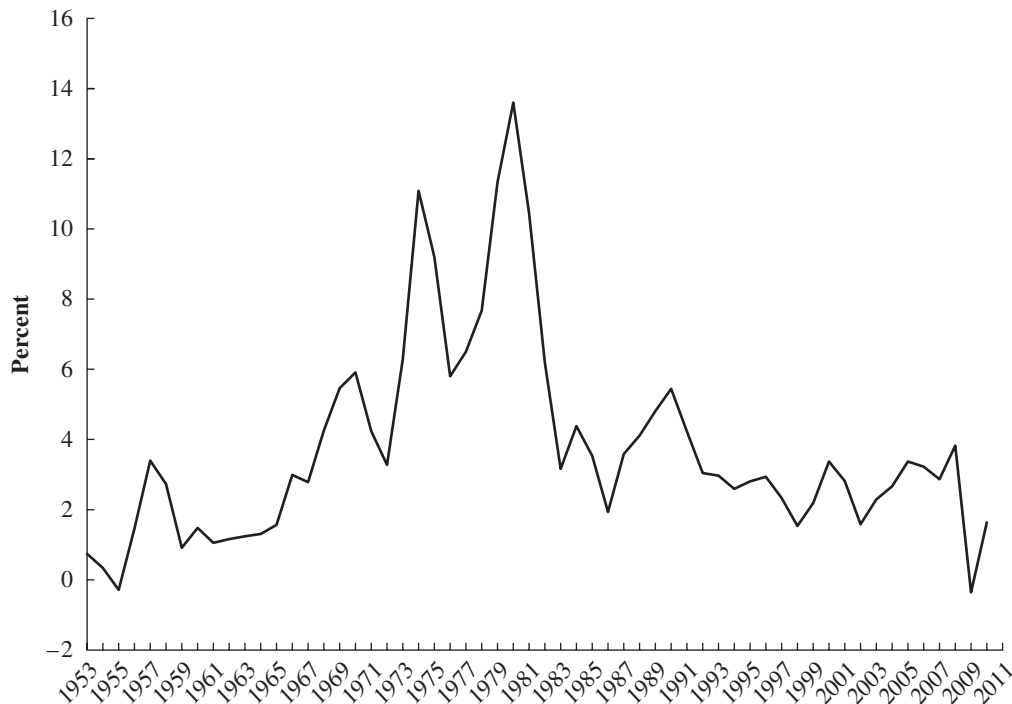
a measure of the retail prices of a fixed “market basket” of several thousand goods and services purchased by households

**INFLATION**

Figure 1-3 shows the rate of **inflation** for 1953–2010. To calculate the rate of inflation, we use a **price index** that measures the aggregate (or general) price level relative to a base year. The inflation rate is then computed as the percentage rate of change in the price index over a given period. In Figure 1-3 the inflation rate is measured by the **consumer price index (CPI)**; other price indices are considered in the next chapter. The CPI measures the retail prices of a fixed “market basket” of several thousand goods and services purchased by households.

It can be seen from the figure and from Table 1-3 that the inflation rate was low and relatively stable in the 1950s and early 1960s. In the late 1960s, an upward trend in inflation is apparent. This upward trend continued and intensified in the 1970s. The early 1980s were a period of *disinflation*, meaning a decline in the inflation rate. The inflation rate remained fairly low throughout the 1980s. There was an upward blip in the inflation rate in 1990, partly due to a sharp rise in energy prices after Iraq’s invasion of oil-rich Kuwait. This was reversed as energy prices fell with the allied victory in the Persian Gulf War in early 1991. Inflation then remained low over the rest of the period.

A new element in considering the behavior of the CPI or other indices is suggested by the dip below zero in the inflation rate in 2009 as seen in Figure 1-3. The concern

**FIGURE I-3** U.S. Inflation Rate, 1953–2010

**TABLE I-3** U.S. Inflation Rate, Averages for Selected Periods

<i>Years</i>	<i>Percent</i>
1953–60	1.4
1961–69	2.6
1970–81	8.0
1982–95	3.8
1996–06	2.6
2007–10	2.1

related to the price level during the post–World War II period had always been that prices would rise too rapidly, and inflation would be high. Over the past decade deflation, a decline in the price level, became a concern for the first time since the Great Depression of the 1930s. The goal of policy has been price stability. For reasons we will consider, neither high inflation nor deflation is desirable.

### INFLATION AND UNEMPLOYMENT

Figure 1-4 plots the annual unemployment rate for 1953–2010 together with the annual inflation rate during that same time period. Note that the early portion of this period, through the late 1960s, shows a negative relationship between the inflation rate and the unemployment rate; years of relatively high inflation are years of relatively low unemployment. In the period since 1970, no such simple relationship is evident. During parts of the 1970s—for example, 1973–75—the unemployment and inflation rates both rose sharply. In the early 1980s, the negative relationship seemed to return, with unemployment rising sharply as inflation declined. Later in the 1980s, the inflation rate remained low while the unemployment rate steadily declined. Between 1990 and 1991, the unemployment rate rose and the inflation rate fell, but the behavior of the inflation rate

**FIGURE I-4** U.S. Unemployment and Inflation Rates, 1953–2010

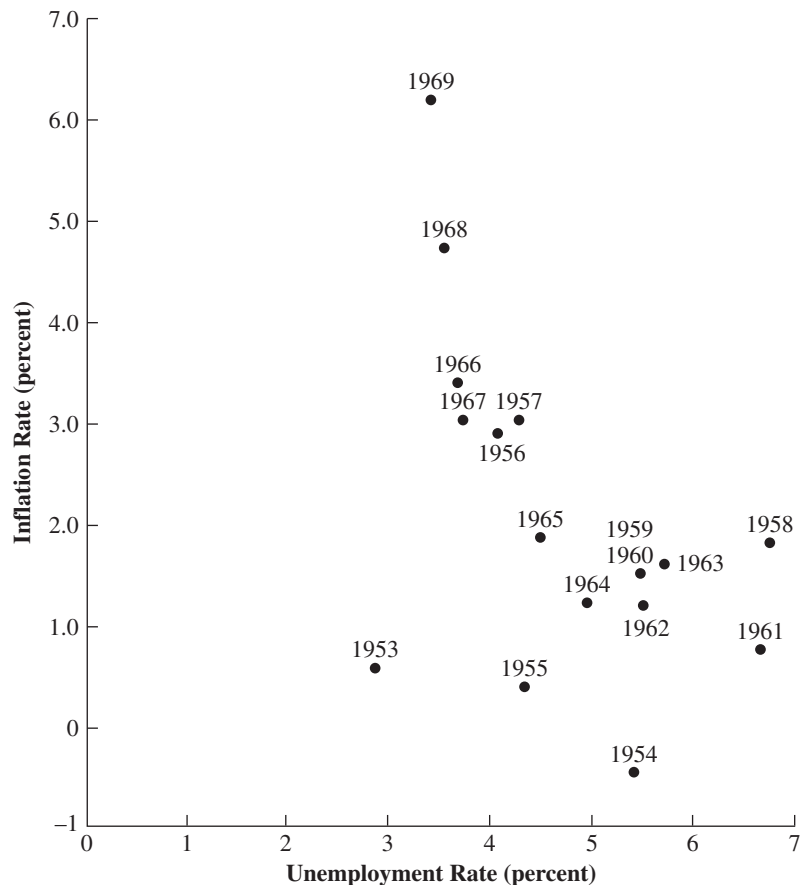
appears to have been due to factors connected with the Persian Gulf War rather than any underlying unemployment–inflation relationship. From 1992 to 1999, both the inflation and unemployment rates fell. Beginning in 2001, unemployment rose as the inflation rate fell. Both series reversed course in 2003, again moving in opposite directions. During the recession of 2007–09, unemployment rose sharply while inflation fell.

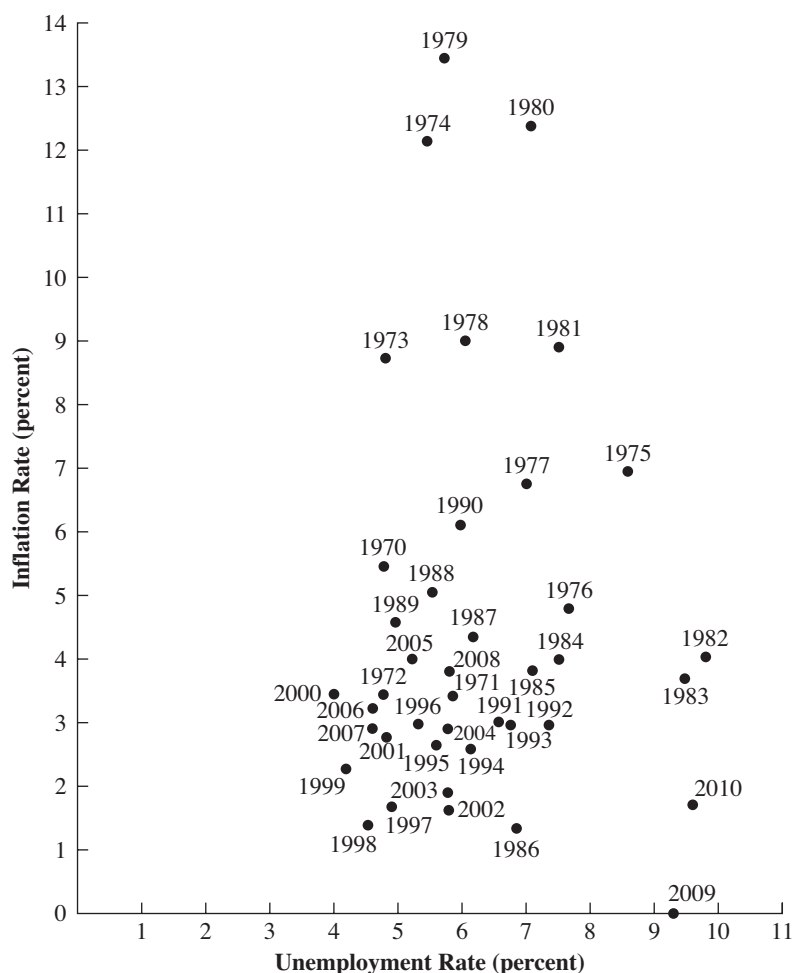
These changes in the relationship between the inflation rate and the unemployment rate can be seen in Figure 1-5. In parts *a* and *b* of the graph, the inflation rate is measured on the vertical axis and the unemployment rate on the horizontal axis. Part *a* is for the years 1953–69, and the negative relationship between the two variables is evident. Part *b* is for 1970–2010, and for these years there is no apparent relationship between inflation and unemployment.

### THE U.S. FEDERAL BUDGET AND TRADE DEFICITS

As has been noted, the period from the mid-1980s to 2007 has been termed the great moderation because of relative stability of output growth during those years. Inflation was also moderate. For much of the period, however, there was concern over two structural imbalances: large federal budget deficits and a skyrocketing foreign trade deficit. These concerns grew as the economy slipped into a deep recession in 2007–08.

**FIGURE I-5A** Relationship Between Inflation and Unemployment, 1953–69



**FIGURE I-5B** Relationship Between Inflation and Unemployment, 1970–2010**federal budget deficit**

federal government  
tax revenues  
minus outlays

**trade deficit**

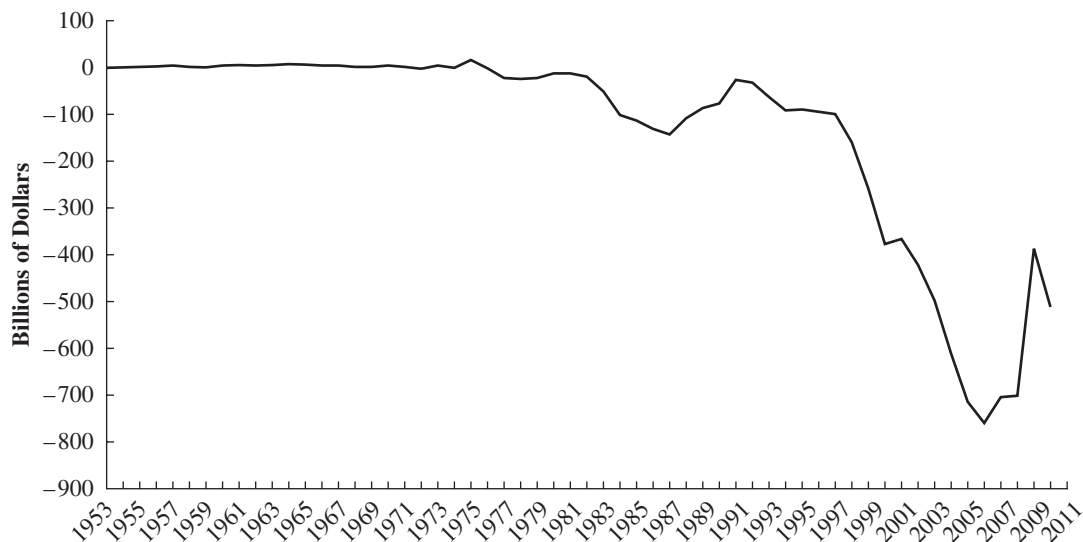
the excess of  
imports over  
exports

Figure 1-6 plots the **federal budget deficit** for the years 1953–2010. In the 1950s and 1960s, budget deficits were small, and sometimes the budget was actually in surplus. Budget deficits were somewhat larger in the 1970s, particularly during periods of recession. It was in the 1980s and early 1990s that very large deficits emerged. For example, the deficits of 1985–86 and 1990–91 each totaled approximately 5 percent of GDP, a level unseen since World War II. Then, beginning in 1993, a combination of government spending cuts and tax increases began to reduce the deficit, and by 1998 the budget moved into surplus. Early in the new century, however, the budget moved back into deficit, with deficits similar in magnitude to those of the 1980s and 1990s. The deep recession of 2007–2009 and stimulus programs to reverse the contraction caused the deficit to grow to unprecedented peacetime levels both in absolute magnitude (as shown in Figure 1-6) and as a percent of GDP. Between 2007 and 2010, tax revenues fell from 18.9 to 16.7 percent of GDP. Federal government expenditures rose from 20.6 to 25.5 percent of GDP.

Figure 1-7 shows the U.S. merchandise **trade deficit** for the years since 1953. The trade deficit is the excess of U.S. imports over exports. The United States began to run

**FIGURE I-6** U.S. Federal Budget Deficit, 1953–2010

trade deficits in the 1970s, but as with federal budget deficits, it was in the 1980s that the trade deficit ballooned, rising to over \$150 billion in 1988. The trade deficit then declined for a few years, but it began to rise in the mid-1990s, exceeding \$260 billion by 1999, rising to over \$500 billion by 2003 and then to over \$700 billion in 2005. The recent recession caused the trade deficit to fall as import growth slowed more than export growth. Still the trade deficit remained at historically high levels into 2011.

**FIGURE I-7** U.S. Balance on Goods and Services, 1953–2010

## 1.3 Central Questions in Macroeconomics

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The data in the foregoing tables and figures suggest some important macroeconomic questions.

### INSTABILITY OF OUTPUT

In the 1970s and early 1980s, output, employment, and unemployment became significantly more unstable following a steady expansion in the 1960s. In the years since the late 1980s, the stability of output and employment has increased. During the period from 1970 to 1984 there were four recessions—times when there was a sustained fall in output and employment. Two of these recessions were severe. In the years from 1985 to 2007, there were only two recessions, and neither was severe. The apparently increased stability of output during the period from the mid-1980s to 2007 was termed the “great moderation.” Then came the severe recession of 2007–09, which was termed by some the “great recession.”

**Question 1:** What determines the *cyclical* behavior of output and employment? What causes recessions?

Answering this question requires a theory of the behavior of output and employment over periods of 1 to 4 years, a theory of the cyclical behavior of output and employment.

### MOVEMENTS IN THE INFLATION RATE

In our overview of the U.S. economy, we have seen that there have been significant variations in inflation over time. The 1970s was the period of the “great peacetime inflation.” Both before and after that period, the rate of inflation was much lower.

**Question 2:** What are the determinants of the rate of inflation? What role do macroeconomic policies play in determining inflation?

### THE OUTPUT–INFLATION RELATIONSHIP

**Question 3:** What relationship exists between inflation and unemployment? Why were both the unemployment rate and the inflation rate so high during much of the 1970s? What became of the negative relationship that existed between these two variables in the 1950s and 1960s (see Figure 1-5a)?

The presence of both high inflation rates and high unemployment rates during the 1970s was especially puzzling to macroeconomists. The experience of the 1950s and the 1960s had led economists to explain substantial inflation as a symptom of too high a level of total demand for output. Substantial unemployment was considered the result of inadequate demand. This explanation is consistent with the negative relationship between inflation and unemployment during the 1953–69 period, as shown in Figure 1-5a. When demand was high, inflation was high and unemployment was low; when demand was low, inflation was low but unemployment was high. But this line of reasoning cannot explain simultaneously high unemployment and high inflation. Total demand for output cannot be both too high and too low.

**aggregate demand**  
the sum of the  
demands for  
current output by  
each buying sector  
of the economy:  
households,  
businesses, the  
government, and  
foreign purchasers  
of exports

The events of the 1970s caused economists to reconsider and modify earlier theories of inflation and unemployment, as we see in the analysis that follows. An important part of this reconsideration of existing theory concerns the role of total demand for output, what is termed **aggregate demand**, in determining output, employment, and inflation.

Additional questions about the relationship between inflation and unemployment were raised by the behavior of the two variables in the mid- to late 1990s. As unemployment fell to low levels, many economists expected rising inflation. Instead, inflation remained low. Why?

All in all, the relationship between unemployment and inflation has been much more complex in the post-1970 period than in earlier years. The macroeconomic theories we consider try to explain why.

## GROWTH SLOWDOWN AND TURNAROUND?

What explains the decline in the growth rate of output, as measured by GDP, over the years after 1970? As we saw in Table 1-1, output grew at an average annual rate of 3.8 percent for the 1953–69 period compared with 2.7 percent for 1970–81 and 3.0 percent for 1982–95. Accompanying the decline in output growth were declines in growth of labor productivity and real wages. By the mid-1990s, many Americans, especially young people, were complaining about the shortage of good jobs.

Over much of the period, there was also the question of the shortage of jobs per se. This was certainly the case after the deep recession of 2007–09. In late 2011 the unemployment rate was at 9.0 percent. Teenage unemployment (ages 16–19) was at 24 percent.

In the United States during the 1990s, there were signs that the growth slowdown was being reversed. A mild recession in 2001 was a bump in what seemed to be a road to higher growth in output and labor productivity. Again here the cyclical downturn in the economy beginning in late 2007 made it hard to discern any long-run trends.

**Question 4:** What determines the rate of growth in output over periods of one or two decades? Over longer periods such as a century?

One can ask this question for one country across time periods or across countries. Why have some countries grown very rapidly and some more slowly?

## IMPLICATIONS OF DEFICITS AND SURPLUSES

As the U.S. federal budget deficit rose rapidly in the 1980s, observers speculated about their effects. The *Financial Times* asked whether the economy was headed for a “rendezvous with disaster.” Others believed that the deficit posed problems of a subtler, long-term kind more akin to “termites in the basement” than “the wolf at the door.” As the budget moved into surplus in the late 1990s, the problem receded. There was actually concern about the huge projected surpluses, which implied that the national debt would be retired completely by 2012. The concern was unwarranted.

Today we are once again concerned with large current and projected future deficits. Given the debt the country will pile up, how will the government commitment to the retiring baby boom generation, in terms of Social Security benefits and Medicare, be financed? Will government borrowing to finance the deficits raise interest rates and retard investment and growth? Will there be a debt crisis such as that faced by some European countries?

The rapidly growing U.S. trade deficit has also been a cause of concern. The United States effectively borrows from abroad to finance this deficit. Thus, continuing deficits have been mirrored by a growing U.S. foreign debt. Many worry about the effects of the deficits and debt on the future stability of the dollar and of U.S. asset markets. By 2006 the trade deficit had grown to 6 percent of GDP. Questions about the sustainability of deficits in this range were widespread. Then the downturn in the economy cut import growth faster than export growth, and the trade deficit was cut in half before reversing the trend and beginning to rise again by 2010.

## 1.4 Conclusion

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There is no shortage of questions. The chapters that follow present theories that try to explain the data discussed here and provide answers to the questions we have raised. Prior to examining these theories, in Chapter 2 we consider the measurement of the major macroeconomic variables of interest.

## Key Terms

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- |                                   |                                 |                       |
|-----------------------------------|---------------------------------|-----------------------|
| • gross domestic product (GDP) 23 | • price index 25                | • trade deficit 28    |
| • unemployment rate 24            | • consumer price index (CPI) 25 | • aggregate demand 31 |
| • inflation 25                    | • federal budget deficit 28     |                       |

## Review Questions and Problems

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1. Provide examples of the types of policy questions that macroeconomists ask. Why would macroeconomists disagree on these questions?
2. Summarize the behavior of the inflation and unemployment rates since 1990. Did the movement of these rates over this period more closely resemble those of the 1970s or those of the 1950s and 1960s?
3. There were several shifts in the output–inflation relationship over the 1953–2010 period. Explain the nature of these shifts.
4. Explain how inflation rate is calculated. Summarize the behavior of inflation rates during the period from the 1980s onward.
5. Summarize the behavior of U.S. federal government budget deficits and U.S. merchandise trade deficits since 1953. Does this behavior suggest a relationship between the two deficits? Perhaps at some times and not at others?

# CHAPTER 2

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## Measurement of Macroeconomic Variables

*Now what I want is, Facts. Teach these boys and girls nothing but Facts. Facts alone are wanted in life. Plant nothing else, and root out everything else. You can only form the minds of reasoning animals upon Facts; nothing else will ever be of any service to them. . . . Stick to the Facts, sir!*<sup>1</sup>

In subsequent chapters, we examine macroeconomic models. These models are simplified representations of the economy that attempt to capture important factors determining aggregate variables such as output, employment, and the price level. Elements of the models are theoretical relationships among aggregative economic variables, including policy variables. As a prelude to understanding such relationships, this chapter begins by defining the real-world counterparts of the variables in our models. It also considers accounting relationships that exist among these variables because we use these relationships to construct our models. We begin by describing the key variables measured in the national income accounts.

### 2.1 The National Income Accounts

---

Economists read with dismay of Presidents Hoover and then Roosevelt designing policies to combat the Great Depression of the 1930s on the basis of sketchy data such as stock price indices, freight car loadings, and incomplete indices of industrial production. Comprehensive measures of national income and output did not exist at that time. The Depression emphasized the need for such measures and led to the development of a comprehensive set of national income accounts.<sup>2</sup>

Like the accounts of a business, national income accounts have two sides: a product side and an income side. The product side measures production and sales. The income side measures the distribution of the proceeds from sales.

On the product side are two widely reported measures of overall production: gross domestic product (GDP), which we looked at in Chapter 1, and gross national product (GNP). They differ in their treatment of international transactions. GNP includes earnings of U.S. corporations overseas and U.S. residents working overseas; GDP does not. Conversely, GDP includes earnings in the United States of foreign residents or foreign-owned firms; GNP excludes those items. For example, profits earned in the United States by a foreign-owned firm would be included in GDP but not in GNP.

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<sup>1</sup>Charles Dickens, *Hard Times* (New York: Norton, 1966), p. 1.

<sup>2</sup>Nobel Prize-winning economists Simon Kuznets and Richard Stone played pioneering roles in the development of national income accounting. See Simon Kuznets, *National Income and Its Composition, 1919–38* (New York: National Bureau of Economic Research, 1941). During World War II, the Commerce Department took over the maintenance of the national income accounts. National income accounts data are published in the *Survey of Current Business*. A description of recent revisions in the national income accounts is “Preview of the Comprehensive NIPA Revision: Changes in Definitions and Classifications,” *Survey of Current Business* (November 2010), pp.11–29.

For the United States, there is little difference between these two measures because relatively few U.S. residents work abroad, and the overseas earnings of U.S. firms are about the same as the U.S. earnings of foreign firms. The difference between GNP and GDP is large for a country such as Pakistan, with a large number of residents working overseas, or Canada, where there is much more foreign investment than there is Canadian investment abroad. In 1991, the U.S. national income accountants shifted emphasis from GNP to GDP. Our explanation of the product side of the national accounts therefore concentrates on GDP. The GNP concept enters into the discussion at a later point.

On the income side of the national accounts, the central measure is national income, although we also discuss some related income concepts.

## 2.2 Gross Domestic Product

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**gross domestic product (GDP)**  
measure of all  
currently produced  
final goods and  
services

**Gross domestic product (GDP)** is a measure of all currently produced final goods and services evaluated at market prices. Some aspects of this definition require clarification.

### CURRENTLY PRODUCED

GDP includes only currently produced goods and services. It is a flow measure of output per time period—for example, per quarter or per year—and includes only goods and services produced during this interval. Market transactions such as exchanges of previously produced houses, cars, or factories do not enter into GDP. Exchanges of assets, such as stocks and bonds, are examples of other market transactions that do not directly involve current production of goods and services and are therefore not in GDP.

### FINAL GOODS AND SERVICES

Only the production of final goods and services enters GDP. Goods used to produce other goods rather than being sold to final purchasers—what are termed *intermediate goods*—are not counted separately in GDP. Such goods show up in GDP because they contribute to the value of the final goods they are used to produce. Counting them separately is double counting. For example, we would not want to count the value of flour used in making bread separately and then again when the bread is sold.

However, two types of goods used in the production process are counted in GDP. The first is currently produced **capital goods**—business plant and equipment purchases. Such capital goods are ultimately used up in the production process, but within the current period only a portion of the value of the capital good is used up in production. This portion, termed **depreciation**, can be thought of as embodied in the value of the final goods that are sold. Not including capital goods separately in GDP would be equivalent to assuming that they depreciated fully in the current time period. In GDP, the whole value of the capital good is included as a separate item. In a sense this is double counting because, as just noted, the value of depreciation is embodied in the value of final goods. At a later point, we will subtract depreciation to construct a *net* output measure.

The other type of intermediate goods that is part of GDP is *inventory investment*—the net change in inventories of final goods awaiting sale or of materials used in the production process. Additions to inventory stocks of final goods belong in GDP

**capital goods**  
capital resources  
such as factories  
and machinery  
used to produce  
other goods

**depreciation**  
portion of the  
capital stock that  
wears out each year

because they are currently produced output. These additions should be counted in the current period as they are added to stocks so that the timing of national product is defined correctly; they should not be counted later, when they are sold to final purchasers. Inventory investment in materials similarly belongs in GDP because it also represents currently produced output whose value is not embodied in *current* sales of final output. Notice that inventory investment can be negative or positive. If final sales exceed production—for example, because of a rundown of inventories (negative inventory investment)—GDP will fall short of final sales.

## EVALUATED AT MARKET PRICES

GDP is the value of goods and services determined by the common measuring rod of market prices. This is the trick to being able to measure apples plus oranges plus railroad cars plus. . . . But this does exclude from GDP goods that are not sold in markets, such as the services of homemakers or the output of home gardens, as well as unreported output from illegal activities, such as the sale of narcotics, gambling, and prostitution.<sup>3</sup> Also, because it is a measure of the value of output in terms of market prices, GDP, which is essentially a quantity measure, is sensitive to changes in the average price level. The same physical output will correspond to a different GDP level as the average level of market prices varies. To correct for this, in addition to computing GDP in terms of current market prices, a concept termed *nominal GDP*, the national income accountants also calculate *real GDP*, which is the value of domestic product in terms of constant prices. The way the latter calculation is made is discussed later in this chapter.

GDP can be broken down into the components shown in Table 2-1. The values of each component for selected years are also given in the table.

The **consumption** component of GDP consists of the household sector's purchases of currently produced goods and services. Consumption can be broken down into

**consumption**  
household sector's  
demand for output  
for current use

**TABLE 2-1** Nominal GDP and Its Components, Selected Years (billions of dollars)

	<i>GDP</i>	<i>Consumption</i>	<i>Investment</i>	<i>Government Purchases of Goods and Services</i>	<i>Net Exports</i>
1929	103.7	77.5	16.5	9.4	0.4
1933	56.4	45.9	1.7	8.7	0.1
1939	92.0	67.2	9.3	14.7	0.8
1945	223.0	119.8	10.8	93.2	-0.9
1950	294.3	192.7	54.1	46.9	0.7
1960	527.4	332.3	78.9	113.8	2.4
1970	1,039.6	648.9	152.4	237.1	1.2
1980	2,795.6	1,762.9	477.9	569.7	-14.9
1990	5,803.2	3,831.5	861.7	1,181.4	-71.4
2000	9,824.6	6,683.7	1,755.4	1,751.0	-365.5
2007	14,441.4	10,129.9	2,136.1	2,883.2	-707.8
2010	14,660.4	10,349.1	1,827.5	3,000.2	-516.4

*Note: Components may not sum to the total due to rounding error.*

SOURCE: Bureau of Economic Analysis, Department of Commerce.

<sup>3</sup>For some services that are not sold on the market, the Commerce Department does try to *impute* the market value of the service and include it in GDP. An example is the services of owner-occupied houses, which the Commerce Department estimates on the basis of rental value.

**investment**  
part of GDP  
purchased by the  
business sector  
plus residential  
construction

consumer durable goods (e.g., automobiles, televisions), nondurable consumption goods (e.g., foods, beverages, clothing), and consumer services (e.g., medical services, haircuts). Consumption is the largest component of GDP, comprising between 65 and 70 percent of GDP in recent years.

The **investment** component of GDP in Table 2-1 consists of three subcomponents. The largest of these is business fixed investment. Business fixed investment consists of purchases of newly produced plant and equipment—the capital goods discussed previously. The second subcomponent of investment is residential construction investment, the building of single- and multifamily housing units. The final subcomponent of investment is inventory investment, which is the change in business inventories. As noted, inventory investment may be positive or negative. In 2010, inventory investment was \$71.7 billion, meaning that there was an increase in that amount of inventories during that year.

Over the years covered by Table 2-1, investment was a volatile component of GDP, ranging from 3.0 percent of GDP in 1933 to 18.4 percent of GDP in 1950. In 2010 investment was 12.5 percent of GDP down from 14.8 percent in 2007 when a recession began. The cyclical volatility of investment has implications for the macroeconomic models considered later.

The figures in Table 2-1 are *gross* rather than *net*, meaning that no adjustment for depreciation has been made. The investment total in the table is gross investment, not net investment (net investment equals gross investment minus depreciation). In 2010, for example, depreciation, which is also called the *capital consumption allowance*, was approximately two-thirds of gross investment.<sup>4</sup>

**government purchases**  
goods and services  
that are the part of  
current output  
that goes to the  
government  
sector—the federal  
government as  
well as state and  
local governments

The next component of GDP in the table is **government purchases** of goods and services. This is the share of the current output bought by the government sector, which includes the federal government as well as state and local governments. Not all government expenditures are part of GDP because not all government expenditures represent a demand for currently produced goods and services.

Government transfer payments to individuals (e.g., Social Security payments) and government interest payments are examples of expenditures that are not included in GDP. The table shows that government's share of GDP has increased in the post-World War II period relative to the prewar period. In 1929, government purchases of goods and services were 9.1 percent of total output. Not surprisingly, in 1945, the government component of output, swollen by the military budget during World War II, rose to 42 percent. In the postwar period, the government sector did not return to its prewar size. Government purchases of goods and services were approximately 20 percent of GDP in 1960, 1990, and 2010. Trends in the size of the government budget—both purchases of goods and services and other components not included in the national income accounts—are analyzed in a later chapter when we consider *fiscal* policy.

**net exports**  
total (gross)  
exports minus  
imports

The final component of GDP given in Table 2-1 is **net exports**. Net exports equal total (gross) exports minus imports. Gross exports are currently produced goods and services sold to foreign buyers. They are a part of GDP. Imports are purchases by domestic buyers of goods and services produced abroad and should not be counted in GDP. Imported goods and services are, however, included in the consumption, investment, and government spending totals in GDP. Therefore, we need to subtract the value of imports to arrive at the total value of domestically produced goods and

<sup>4</sup>In 1933, depreciation was \$7.6 billion. Because gross investment was only \$1.7 billion, *net* investment was negative. This means that the capital stock declined in that year because gross investment was insufficient to replace the portion of the capital stock that wore out.

services. Net exports remain as the (net) direct effect of foreign-sector transactions on GDP. As the table shows, net exports were strongly negative in 2007, reflecting the large U.S. trade deficit. Net exports were still negative but smaller in magnitude in 2010; the trade deficit had fallen during the recession.

Read Perspectives 2-1.

## PERSPECTIVES 2-1

### What GDP Is Not

GDP is the most comprehensive measure of a nation's economic activity. Policymakers use GDP figures to monitor short-run fluctuations in economic activity as well as long-run growth trends. It is worthwhile, however, to recognize important limitations of the GDP concept.

#### Nonmarket Productive Activities Are Left Out

Because goods and services are evaluated at market prices in GDP, nonmarket production is left out (e.g., noted earlier, for instance, homemaker services). Intercountry comparisons of GDP overstate the gap in production between highly industrialized countries and less-developed nations, where largely agrarian nonmarket production is of greater importance.

#### The Underground Economy Is Left Out

Also left out of GDP are illegal economic activities and legal activities that are not reported to avoid paying taxes—the *underground economy*. Gambling and the drug trade are examples of the former. Activities not reported to avoid paying taxes take many forms; for example, repairmen who are paid in cash for services may underreport or fail to report the income. It is hard to estimate the size of the underground economy for obvious reasons. Rough estimates for the United States range from 5 to 15 percent of GDP.

#### GDP Is Not a Welfare Measure

GDP measures production of goods and services; it is not a measure of welfare or even of material well-being. For one thing, GDP gives no weight to leisure. If we all began to work 60-hour weeks, GDP would increase, yet would we be better off?

GDP also fails to subtract for some welfare costs of production. For example, if production of electricity causes acid rain, and consequently water pollution and dying forests, we count the production of electricity in GDP but do not subtract the economic loss from the pollution. In fact, if the government spends money to try to clean up the pollution, we count that too!

GDP is a useful measure of the overall level of economic activity, not of welfare.

#### GDP and Happiness

If it is not a welfare measure, one would not expect GDP to measure happiness. In recent years, however, there has been a great deal of interest in the relationship, or lack of relationship, between GDP and happiness. Surveys show that GDP and happiness, measured by “life satisfaction,” have little relationship. People in Ghana are more satisfied with their lives than people in the United States; those in Nigeria are as satisfied as those in France. Although surveys may be unreliable, other evidence also indicates little relationship between GDP and various measures of happiness. Perhaps relative income in a society is more important than absolute income. Alternatively, income relative to past income may matter. In surveys early in this century, people in the former Soviet republics were least satisfied with their lives. Their incomes had on average declined.

In the Himalayan kingdom of Bhutan, the government has focused on gross national happiness (GNH), not GDP. The United Nations provides indices of social welfare as alternatives to standard measures of GDP. It would take us too far afield to consider these alternatives, but note that happiness is another thing that GDP is not.

## 2.3 National Income

We turn now to the income side of the national accounts. In computing national income, our starting point is the GNP total, not GDP. The reason is that, as explained earlier, GNP includes income earned abroad by U.S. residents and firms but excludes earnings of foreign residents and firms from production in the United States. This is the proper starting point because we want a measure of the income of U.S. residents and firms.

To go from GDP to GNP, we add foreign earnings of U.S. residents and firms. We then subtract earnings in the United States by foreign residents and firms. This calculation results in a GNP of \$14,848.7 billion compared with a GDP of \$14,660.4 billion. As noted previously, there is little difference between these two production measures for the United States.

**national income**  
sum of the earnings  
of all factors of  
production that  
come from current  
production

**National income** is the sum of factor earnings from current production of goods and services. Factor earnings are incomes of factors of production: land, labor, and capital. Each dollar of GNP is one dollar of final sales, and if there were no charges against GNP other than factor incomes, GNP and national income would be equal. There are, in fact, some other charges against GNP that cause national income and GNP to diverge, but the two concepts are still closely related. The adjustments required to go from GNP to national income, with figures for the year 2010, are shown in Table 2-2.

**net national product**  
GNP minus  
depreciation

The first charge against GNP that is not included in national income is depreciation. The portion of the capital stock used up must be subtracted from final sales before national income is computed; depreciation represents a cost of production, not factor income. Making this subtraction gives us **net national product (NNP)**, the net production measures referred to earlier. From this total in Table 2-2 we subtract a statistical discrepancy that arises from measures on the income side that don't add up to those on the product side and a few other minor adjustments.

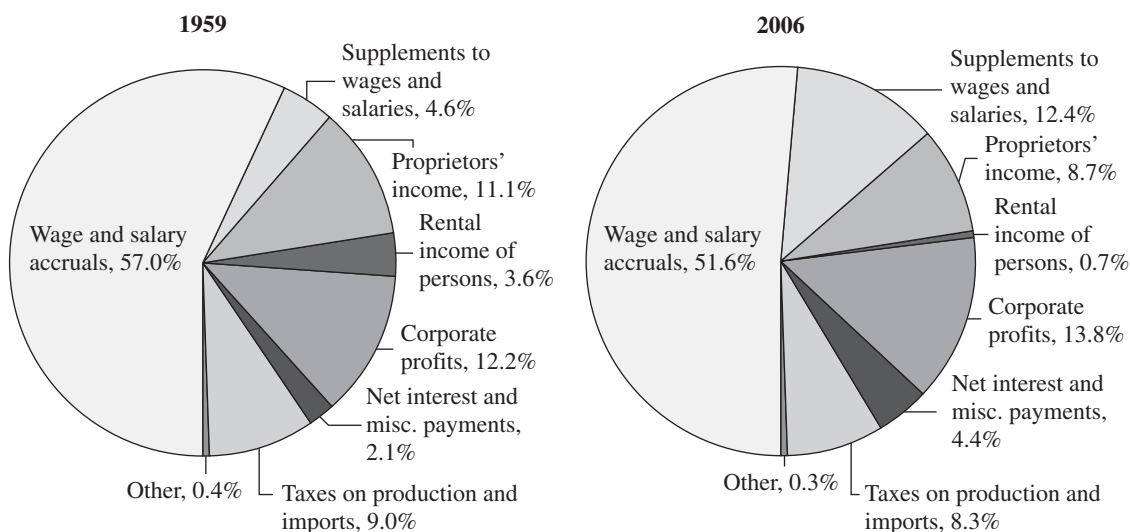
Figure 2-1 shows the components of national income (factor payments) as shares of the total for 1959 and for 2006 (the year before the most recent recession). In 2006 labor's share, which includes wages and salaries as well as supplements (benefits), was 64 percent of national income. This is not much different from the percentage in 1959. Today a greater part of labor compensation is, however, in benefits, and less is in wages and salaries.

Corporate profits were between 12 and 14 percent of national income in both years. The other main components of national income are proprietors' income, which is the income of unincorporated businesses, rental income, and interest income. Finally, a portion of national income is paid in taxes such as excise taxes and import taxes (tariffs).

**TABLE 2-2** Relationship of GNP and National Income, 2010 (billions of dollars)

GNP	14,848.7
Minus: Depreciation	1,868.9
Net national product	12,979.8
Minus: Statistical discrepancy	158.2
National income	12,821.6

SOURCE: Bureau of Economic Analysis, Department of Commerce.

**FIGURE 2-1** Shares of National Income

SOURCE: Department of Commerce, Survey of Current Business (April 2007).

## 2.4 Personal and Disposable Personal Income

**personal income**  
measure of income  
received by persons  
from all sources

National income measures income earned from current production of goods and services. For some purposes, however, it is useful to have a measure of income received by *persons* regardless of source. For example, consumption expenditures by households are influenced by income. The relevant income concept is all income received by persons. Also, we want a measure of income after deducting personal tax payments. **Personal income** is the national income accounts measure of the income received by persons from all sources. When we subtract personal tax payments from personal income, we get disposable (after-tax) personal income.

To go from national income to personal income, we subtract elements of national income that are not received by persons and add income of persons from sources other than current production of goods and services. The details of the necessary adjustments are not central to our focus. In brief, they are the following. The first of the main items subtracted from national income in going to personal income are the parts of corporate profits in the national income accounts that are not paid out as dividends to persons. These portions include corporate profits tax payments and undistributed profits (retained earnings). Also subtracted from national income in computing personal income are contributions to Social Security by both the employer and employee. These payroll taxes are included in the employee compensation term in national income but go to the government, not directly to persons.

The items added in going from national income to personal income are payments to persons that are not in return for current production of goods and services. The first item is *transfer payments*. These are predominantly government transfer payments such as Social Security payments, veterans' pensions, and payments to retired federal government workers. The other item added in going from national income to personal income is interest payments by the government to persons. Government interest payments are made on bonds previously issued by federal, state, and local governments. With these adjustments, we can calculate personal income. We then subtract personal

**TABLE 2-3** Disposition of Personal Disposable Income, 2010 (billions of dollars)

Personal disposable income	11,374.7
Less	
Personal consumption expenditures	10,349.1
Interest paid to business	198.9
Personal transfer payments to foreigners (net)	172.8
Personal saving	653.9

SOURCE: Bureau of Economic Analysis, Department of Commerce.

taxes to get personal disposable income. In 2010, personal disposable income was \$11,374.7 billion.

Table 2-3 shows how U.S. residents used their disposable income in 2010. Most of it was spent for consumption, the household sector's purchases of goods and services. There were two other expenditures. The first was interest paid to business (installment credit and credit card interest). The second, a very small component of personal expenditures, was transfers to foreigners (e.g., gifts to foreign relatives). Personal saving is the part of personal disposable income that is not spent. In 2010, personal saving was \$653.9 billion, or 5.7 percent of personal disposable income. This was a high saving rate relative to the recent past. The recession of 2007–09 had been characterized by falling asset prices. Household wealth was reduced, and households increased saving to restore their balance sheets.

Read Perspectives 2-2.

## PERSPECTIVES 2-2

### National Income Accounts for England and Wales in 1688

National income accounts provide a profile of the economic life of a country. Although it is only in the post–World War II years that governments systematically kept these accounts, there are estimates from previous eras. These are of interest in charting the changes that economies have undergone.

Tables 2-4 and 2-5 show the national GNP and income accounts for England and Wales (combined)

for 1688, the year of the Glorious Revolution. They were compiled by Gregory King, and more than a century passed before administrative records allowed such calculations to be repeated. In terms of completeness and consistency, King's calculations remained unique until the twentieth century.<sup>a</sup>

Table 2-4 shows that for England and Wales in 1688 relative to the 2010 U.S. economy,

**TABLE 2-4** GNP of England and Wales, 1688 (millions of pounds)

Consumption	46.0
Investment	1.7
Government purchases	2.4
Exports	5.1
Less imports	4.4
GNP	50.8

**TABLE 2-5** Components of National Income for England and Wales, 1688 (millions of pounds)

Wages and salaries	17.7
Rents	13.0
Profits and interest	14.7
Cottagers and paupers	2.6
National income	48.0

<sup>a</sup>The estimates in the tables are taken from Phyllis Deane and W. A. Cole, *British Economic Growth: 1688–1959* (London: Cambridge University Press, 1967, p. 2). The estimates are based on King's original manuscripts and worksheets as well as other contemporaneous sources.

consumption was a much larger fraction of total national product (90 percent versus 70 percent). Investment and government spending were much smaller fractions of output. Imports and exports were each about 10 percent of GNP, somewhat smaller than in most modern economies. Still, this was an “open” economy with significant foreign trade.

The figures in Table 2-5 for the components of national income show that in England and Wales in 1688, wages and salaries comprised a much smaller fraction and rents, profits, and interest a much larger one relative to the U.S. economy today. Wages and salaries were 37 percent of

national income versus a current 64 percent. Rents, profit, and interest were nearly three times higher as a share of national income in England and Wales in 1688 than in the United States today.

Overall, the picture of England and Wales in 1688 is one of an agrarian economy. It is estimated that 70 to 80 percent of the population was engaged in agriculture. But it was an open economy, and there was significant investment. The picture is not one of a subsistence economy. Estimates from other sources suggest that per capita income at the time was perhaps one-eighth of that for England and Wales today.

## 2.5 Some National Income Accounting Identities

The interrelationships among GDP, national income, and personal income form the basis for some accounting definitions or *identities* that are used to construct the macroeconomic models considered in later chapters. In deriving these identities, we simplify the accounting structure by ignoring a number of items discussed previously.

The simplifications we impose are as follows:

1. The foreign sector will be omitted. This means that we drop the net exports term from GDP (see Table 2-1) and the net foreign transfers item from personal outlays in breaking down the disposition of personal income (see Table 2-3). The foreign sector is reintroduced into our models later, when we consider questions of international macroeconomics. In excluding the foreign sector, we also exclude foreign earnings of U.S. residents and firms, as well as U.S. earnings of foreign residents and foreign-owned firms. GNP and GDP are thus equal. The terms *GNP* and *GDP* are used interchangeably except where we reintroduce the foreign sector.
2. Indirect taxes and the other discrepancies between GNP and national income are ignored (see Table 2-2). We assume that national income and national product or output are the same. The terms *national income* and *output* are used interchangeably throughout this book.
3. Depreciation is ignored (except where explicitly noted). Therefore, gross and net national product are identical.
4. Several simplifications are made in the relationship between national income and personal disposable income. We assume that all corporate profits are paid out as dividends; there are no retained earnings or corporate tax payments. We assume that all taxes, including Social Security contributions, are assessed directly on households. Consequently, we can specify personal disposable income as national income (or output) minus tax payments ( $T_x$ ) plus government transfers ( $Tr$ ), which include government interest payments. Letting *net taxes* ( $T$ ) equal tax payments minus transfers,

$$T \equiv T_x - Tr \quad (2.1)$$

we have (personal) disposable income  $Y_D$  equal to national income ( $Y$ ) minus net taxes:

$$Y_D \equiv Y - T_x + T_r \equiv Y - T$$

With these simplifications, we have the following accounting identities. GDP ( $Y$ ) is defined as

$$Y \equiv C + I_r + G \quad (2.2)$$

that is, as consumption ( $C$ ) plus *realized investment* ( $I_r$ ) plus government purchases of goods and services ( $G$ ).<sup>5</sup> The subscript ( $r$ ) on the investment term is included because we want to distinguish between this realized investment total that appears in the national income accounts and the *desired* level of investment spending.

From the income side of the national income accounts, again using simplifications 1 to 4 *and ignoring interest paid to business* (in Table 2-3), we have the identity

$$Y_D \equiv Y - T \equiv C + S \quad (2.3)$$

which states that, with the simplifying assumptions we have made, all disposable income, which equals national income ( $Y$ ) minus *net* tax payments ( $T \equiv$  tax payments minus transfers), goes for consumption expenditures or personal saving ( $S$ ). We can write (2.3) as

$$Y \equiv C + S + T$$

and, because  $Y$  is both national income and output, we can combine (2.2) and (2.3) to write

$$C + I_r + G \equiv Y \equiv C + S + T$$

This identity states that expenditures on GDP ( $C + I_r + G$ ) by definition equal dispositions of national income ( $C + S + T$ ).

## 2.6 Measuring Price Changes: Real versus Nominal GDP

**nominal GDP**  
GDP measured in  
current dollars

So far, the figures we have been discussing are for **nominal GDP**, which measures currently produced goods and services evaluated at current market prices. GDP measured at current market prices will change when the overall price level changes as well as when the volume of production changes. For many purposes, we want a measure of GDP that varies only with the quantity of goods produced. Such a measure would be most closely related to employment.

The GDP measure that changes only when quantities, not prices, change is termed *real GDP*. The traditional way of constructing real GDP is to measure output in terms of constant prices from a base year. Using 2005, for example, we can compute the value of GDP in 1960, 1980, or 2010 in terms of the price level or value of the dollar in 2005. Changes in GDP in 2005-valued dollars then provide a measure of quantity changes between these years. Measuring real GDP in terms of prices from a base year, however, has several shortcomings, which we will discuss. Consequently, in 1995 the

<sup>5</sup>It is important to distinguish identities such as (2.1) and (2.2), which are indicated by the three-bar symbol ( $\equiv$ ), and equations, which are indicated with the usual equal sign ( $=$ ). Identities are relationships that follow from accounting or other definitions and therefore hold for any and all values of the variables.

U.S. Bureau of Labor Statistics began to construct an alternative real GDP measure called *chain-weighted real GDP*. We explain the two procedures in turn.

## REAL GDP IN PRICES FROM A BASE YEAR

Column 1 of Table 2-6 shows nominal GDP for selected years. Column 2 shows the value of real GDP as measured in 2005 prices for each of these years. In 2005, real and nominal income are the same because base-year prices are current prices. In prior years, when current prices were lower than 2005 prices, real GDP was higher than nominal GDP. Conversely, in the years after 2005, when prices were higher, nominal GDP exceeded real GDP.

Table 2-6 shows that real GDP often behaves quite differently from nominal GDP. Nominal GDP changes whenever the quantity of goods produced changes *or* when the market price of those goods changes; real GDP changes only when production changes. Therefore, when prices are changing dramatically, the movements of the two measures diverge sharply. The table shows, for example, that while nominal GDP rose by approximately \$250 billion from 1973 to 1975, real GDP declined. Again, between 1979 and 1980, there was a rapid increase in nominal GDP but a fall in real GDP. In both periods, real GDP declined because production of goods and services declined. Prices, however, rose rapidly enough in these inflationary years to make nominal GDP rise.

Now consider the numbers in column 3 of Table 2-6, which gives the ratio of nominal GDP to real GDP (nominal GDP  $\div$  real GDP), where the ratio is multiplied by 100 (following the procedure in the national income accounts). The ratio of nominal GDP to real GDP is a measure of the value of current production in current prices (e.g., in 2010) relative to the value of the *same* goods and services in prices for the base year (2005). Because the same goods and services appear at the top and bottom, the ratio of nominal GDP to real GDP is just the ratio of the current price level of goods and services relative to the price level in the base year. It is a measure of the aggregate (or overall) price level, which in the previous chapter we called a **price index**. This index of the prices of goods and services in GDP is called the **implicit GDP deflator**.

**price index**  
measures the  
aggregate price  
level relative to a  
chosen base year

**implicit GDP  
deflator**  
index of the prices  
of goods and  
services included  
in GDP

**TABLE 2-6** Nominal GDP, Real GDP, and Implicit GDP Deflator, Selected Years

	<i>Nominal GDP</i> (Billions of Current Dollars)	<i>Real GDP</i> (Billions of 2005 Dollars)	<i>Implicit GDP</i> <i>Deflator</i> ((Column 1/Column 2)*100)
1960	526.4	2,828.5	18.6
1970	1,038.5	4,266.3	24.3
1973	1,382.7	4,912.8	28.1
1974	1,500.0	4,885.7	30.7
1975	1,638.3	4,875.4	33.6
1979	2,563.3	5,850.1	43.8
1980	2,789.5	5,834.0	47.8
1990	5,803.1	8,027.1	72.3
2000	9,817.0	11,216.4	87.5
2005	12,623.0	12,623.0	100.0
2009	13,939.0	12,703.1	109.7
2010	14,526.5	13,088.0	111.0

SOURCE: Bureau of Economic Analysis, Department of Commerce.