

MACROECONOMICS

Rudiger Dornbusch

Stanley Fischer

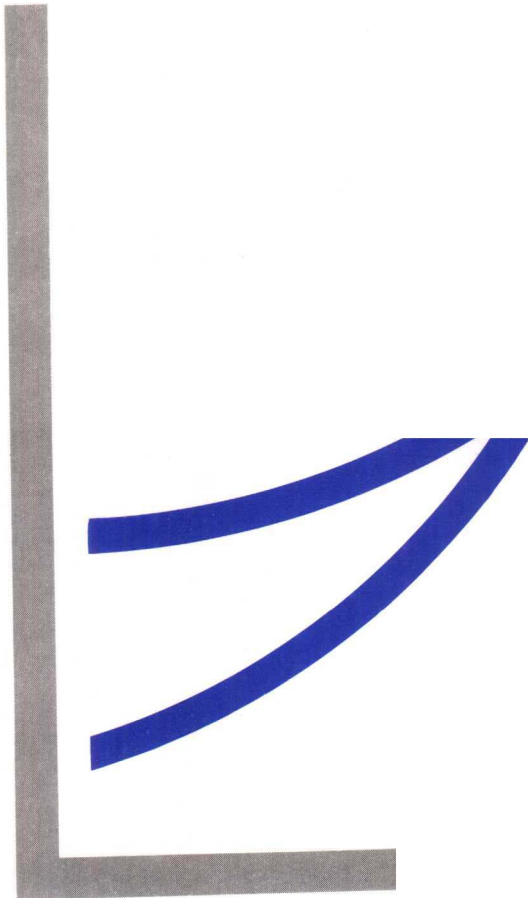
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MACRO-^{FOURTH} ECONOMICS^{EDITION}

RUDIGER DORNBUSCH
STANLEY FISCHER

Department of Economics
Massachusetts Institute of Technology



MACRO- ECONOMICS

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ABOUT THE AUTHORS

Rudiger Dornbusch did his undergraduate work in Switzerland, and holds a Ph.D. from the University of Chicago. He has taught at Chicago, Rochester, and since 1975 at MIT. His research is primarily in international economics, with a major macroeconomic component. His special research interests are the behavior of exchange rates and, more recently, high inflation and hyperinflation. He visits and lectures extensively in Europe and in Latin America, where he takes an active interest in problems of stabilization policy, and has held visiting appointments in Brazil and Argentina. His writing includes *Open Economy Macroeconomics* and, with Stanley Fischer, *Economics*. His interests in public policy take him frequently to testify before Congress and to participate in international conferences. He regularly contributes newspaper editorials on current policy issues here and abroad.

Stanley Fischer was an undergraduate at the London School of Economics and has a Ph.D. from MIT. He taught at the University of Chicago while Rudi Dornbusch was a student there, starting a long friendship and collaboration. Since 1973 he has taught at MIT, and spent several leaves at the Hebrew University in Jerusalem. His main research interests are in monetary theory and macroeconomic policy. He has published widely in these areas and participates regularly in scholarly meetings. He is the editor of the *NBER Macroeconomics Annual*, initiated by the National Bureau of Economic Research to bridge the gap between theory and policy in the macroeconomic area. He frequently testifies before Congress, and has served as a consultant to the World Bank.

**TO
RHODA**

PREFACE

This fourth edition started out to be a modest revision, and ended as the most radical of our three revisions of *Macroeconomics*. There are three major organizational changes:

- Chapter 6, "International Linkages," brings the introduction to open economy macroeconomics up front, where it belongs, as the United States becomes an increasingly open economy—in both the goods and the capital markets.
- We have moved "Aggregate Supply and Demand: An Introduction" to Chapter 7, so that instructors can present a complete aggregate supply-demand model earlier in the course. Students can now discuss inflation using a simple model well before the midterm. Those instructors who prefer the arrangement of the first three editions, in which the detailed material developing the aggregate demand side of the economy (contained now in Chapters 8 to 12) precedes aggregate supply, may choose to defer Chapter 7 for later.
- We have added a new Chapter, 17, "Money, Deficits, and Inflation," that both presents new material and brings together material on these topics previously spread through the book. Our experience has shown that students are fascinated by the topics treated in this chapter.

As to our general approach, we repeat here what we said in the preface to the third edition. We have remained faithful to our basic approach—presenting the relevant theory and at the same time showing both its empirical relevance and policy applications. We have, of course, stayed with our general eclectic outlook on macroeconomics. But there have been changes in details of the presentation and the weight given various topics, to meet the changing emphasis of macroeconomic issues and theory over the last few years.

In this edition we have added material on the microfoundations of macroeconomics, and substantially increased the space devoted to the rational expectations-equilibrium approach to macroeconomics. Chapter 18, "Macroeconomics: The Interaction of Events and Ideas," presents the ideas underlying frontier developments in the field at a level appropriate for an intermediate text. The instructor who makes a detailed comparison with the third edition will find changes throughout—for instance, in the addition of material on the share economy in Chapter 18, on base drift in Chapter 11, on the sacrifice ratio and disinflation in Chapter 14, on debt and adjustment in developing countries in Chapter 20.

By popular request we have restored to this edition the dynamic model of aggregate supply and demand (originally Chapter 13), whose removal from the third edition caused far more dismay than we had anticipated. That now appears in Chapter 14, and is used also in Chapter 17. The simplest aggregate supply-demand model (now Chapter 7) has also been revised after suggestions by users (including ourselves) and reviewers.

Although there are major changes from earlier editions, the book remains recognizably the same in that it develops, and teaches students to use, a broad-based, critical, and useful macroeconomics. Our overriding objective is to explain how modern macroeconomics is used in understanding important economic issues, and to help the reader analyze macroeconomic issues for herself or himself. The book provides full coverage of all major topics in macroeconomics. No important topic has been omitted because it is too difficult, but we have taken great pains to make nothing more difficult than it need be.

TEACHING AIDS

An *Instructor's Manual*, prepared by Professor Patricia Pando of Houston Baptist University, is available to accompany this edition. Professor Pando has updated and improved the *Instructor's Manual* that she prepared for the third edition. The *Study Guide* by Professor Richard Startz of the University of Washington, Seattle, has also been updated.

Professor Ben Bernanke of Princeton, one of the profession's best teachers, has prepared a book of case studies and readings to accompany *Macroeconomics*. Further assistance comes from a data diskette, from Data Resources Inc., which includes data series, numerical problems, and answers to some of the questions in this book. A major benefit of the diskette is that it will be updated annually.

For this fourth edition, as for the first and third, we shall be preparing a yearly *Update* to the book, which will be made available to instructors by McGraw-Hill. Instructors who have adopted the text may obtain copies of the *Instructor's Manual*, and, in due course, the *Update*, from their local McGraw-Hill sales representative.

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In writing this book in its various editions we have had much help from friends, present and former students, and colleagues who advised us on how to improve the book. We wish to thank especially Andrew Abel, Richard Anderson, Yves Balcer, Robert Bishop, Olivier Blanchard, Cary Brown, Eliana Cardoso, Jacques Cremer, Allen Drazen, Robert Feldman, Jeffrey Frankel, Jacob Frenkel, Ronald Jones, Paul Joskow, Edi Karni, Tim Kehoe, Robert Pindyck, Donald Richter, David Romer, Michael Rothschild, Paul Samuelson, Steven Sheffrin, Robert Solow, Richard Startz, Larry Summers, Peter Temin, Michael Schmid, Charles Steindel, Hal Varian, and Michael Veall.

Many readers and users of our book have given us the benefit of their teaching experience and particular suggestions. We would like to thank especially Eskarder Alvi, Joseph Aubareda, Alan Auerbach, Francis Bator, Thomas Bonsor, Carl Christ, David Colander, Giacomo Costa, Kevin Davis, Jim Devine, Clifford B. Donn, Gerald Egerer, Robert Eisner, Liang Shing Fan, George Feiwel, Rendigs Fels, Benjamin Friedman, Joanna Froyden, James Gale, Charles C. Gillete, Micha Gisser, Kalmon Goldberg, Robert J. Gordon, Joseph Guerin, John Haltiwanger, Raundi Halvorson, Dennis J. Hanseman, Brian Horrigan, Mike Jacobson, James Johannes, O. Honkalehto, Yoshiaki Kaoru, S. W. Kardasz, John Kareken, M. P. Kidd, David Laidler, Kathleen Langley, David Levhari, Michael Lopez, Barry A. Love, Jaime Marquez, David McClain, Erwin Miller, Richard Miller, Douglas W. Mitchell, Masanori Morita, Robert Murphy, John Naylor, Norman Obst, Edward Akova Offenbacher, Patricia Pando, Lochlan H. Rose, Thomas Russell, Walter Salant, Robert Schenk, Edward Shapiro, Masaki Shinbo, Richard Startz, Kirker Stevens, Houston Stokes, Earl Thompson, Hal Varian, David H. Vrooman, Shinichi Watanabe, Ken West and Randy Williams.

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Over the years we have enjoyed and benefitted from the most competent and dedicated research assistance. We would like to thank particularly Carl Shapiro and David Modest who helped us with the first two editions and Michael Gavin and Patricia Mosser who did the work for the third edition. Carol McIntire, Liz Walb, Barbara Ventresco, Nancy Johnson, and Carolyn Dedutis have at different times performed valiant and cheerful feats in handling drafts of chapters. For this edition we are grateful for assistance by Takeo Hoshi and Pat Petraccia.

TO THE STUDENT

Macroeconomics is not cut and dried. There are disputes over basic issues—for instance, over whether the government should try actively to fight unemployment. That makes macroeconomics unsatisfying if you are looking for clearcut, definite answers to all the economy's problems. But it should also make it more interesting because you have to think hard and critically about the material being presented.

Despite the disagreements, there is a substantial basic core of macroeconomics that we present in this book, and that will continue to be useful in understanding the

behavior of the economy. We have not hesitated to say where we think theories are incomplete, or where the evidence on a question is not yet decisive. But we have not hesitated, either, to describe the many areas in which macroeconomic theory does a good job of explaining the real world.

Because we have not shied away from important topics even if they are difficult, parts of the book require careful reading. There is no mathematics except simple algebra. Some of the analysis, however, involves sustained reasoning. Careful reading should therefore pay off in enhanced understanding. Chapter 1 gives you suggestions on how to learn from this book. The single most important suggestion is that you learn actively. Some of the chapters (such as Chapter 12) are suitable for bedtime reading, but most are not. Use pencil and paper to be sure you are following the argument. See if you can find reasons to disagree with arguments we make. Work the problem sets! Be sure you understand the points contained in the summaries to each chapter. Follow the economic news in the press, and see how that relates to what you are learning. Try to follow the logic of the budget or any economic packages the administration may present. Occasionally, the chairpersons of the Federal Reserve Board or the Council of Economic Advisers testify before the Congress. Read what they have to say, and see if it makes sense to you.

A *Study Guide*, prepared and updated by Richard Startz of the University of Washington, Seattle, is available to accompany this edition. The *Study Guide* contains a wide range of questions, starting from the very easy and progressing in each chapter to material that will challenge the more advanced student. It is a great help in studying, particularly since active learning is so important.

Rudiger Dornbusch
Stanley Fischer

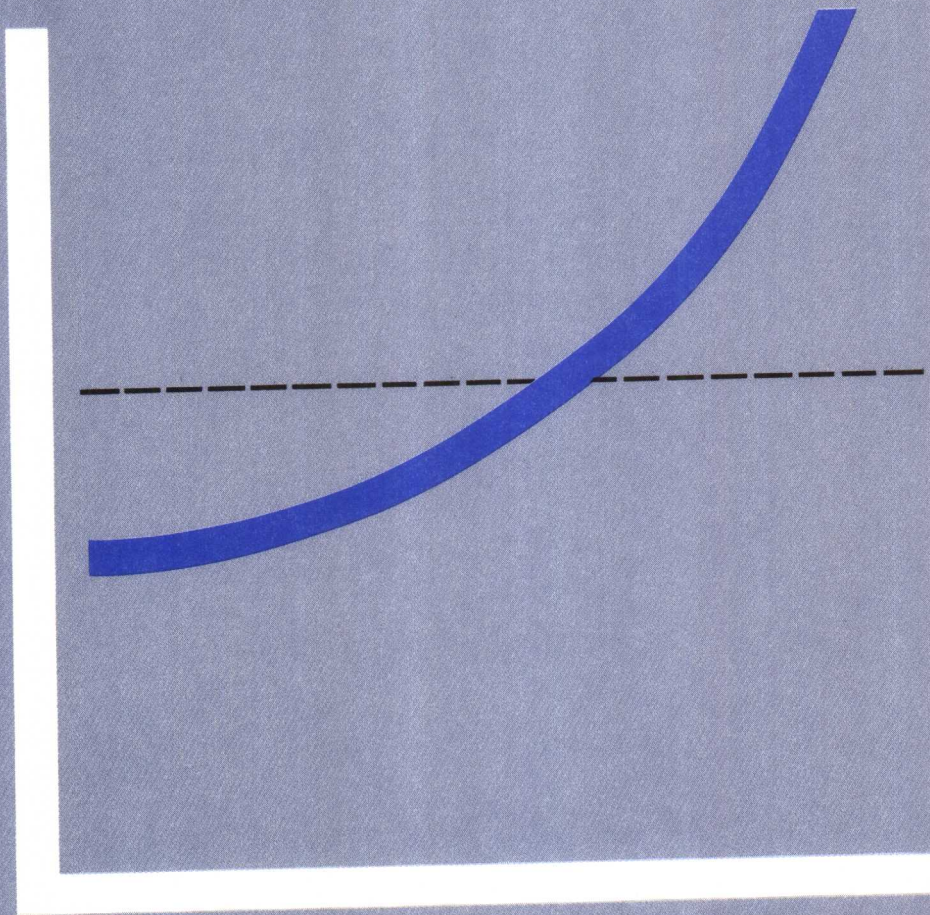
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PART ONE



INTRODUCTION

Macroeconomics is concerned with the behavior of the economy as a whole — with booms and recessions, the economy's total output of goods and services and the growth of output, the rates of inflation and unemployment, the balance of payments, and exchange rates. To study the overall performance of the economy, macroeconomics focuses on the economic behavior and policies that affect that performance — on consumption and investment, the determinants of changes in wages and prices, monetary and fiscal policies, the money stock, the federal budget, interest rates, the national debt. In brief, macroeconomics deals with the major economic issues and problems of the day.

Macroeconomics is interesting because it deals with important issues. But it is fascinating and challenging too, because it reduces complicated details of the economy to manageable essentials. *Those essentials lie in the interactions among the goods, labor, and assets markets of the economy.*

In dealing with the essentials, we have to disregard details of the behavior of individual economic units, such as households and firms, or the determination of prices in particular markets, or the effects of monopoly on individual markets. These are the subject matter of microeconomics. In macroeconomics we deal with the market for goods as a whole, treating all the markets for different goods — such as the markets for agricultural products and for medical services — as a single market. Similarly, we deal with the labor market as a whole, abstracting from differences between the markets for, say, migrant labor and doctors. We deal with the assets markets as a whole, abstracting from

the differences between the markets for IBM shares and Rembrandt paintings. The cost of the abstraction is that omitted details sometimes matter. The benefit of the abstraction is increased understanding of the vital interactions among the goods, labor, and assets markets.

Despite the contrast between macroeconomics and microeconomics, there is no basic conflict between them. After all, the economy in the aggregate is nothing but the sum of its submarkets. The difference between microeconomics and macroeconomics is therefore primarily one of emphasis and exposition. In studying price determination in a single industry, it is convenient for microeconomists to assume that prices in other industries are given. In macroeconomics, where we study the price level, it is for the most part sensible to ignore changes in relative prices of goods among different industries. In microeconomics, it is convenient to assume the total income of all consumers is given and to ask how consumers divide their spending out of that income among different goods. In macroeconomics, by contrast, the aggregate level of income or spending is among the key variables to be studied.

The great macroeconomists, including Keynes, and modern American leaders in the field—the older Nobel Prize-winning generation such as Milton Friedman of the University of Chicago and the Hoover Institution, Franco Modigliani of the Massachusetts Institute of Technology, and James Tobin of Yale University, and the younger generation such as Martin Feldstein of Harvard University, Robert Lucas of the University of Chicago, and Thomas Sargent of the University of Minnesota—have all had a keen interest in the applications of macrotheory to problems of policy making. Indeed, developments in macrotheory are closely related to the economic problems of the day. Keynesian economics developed during the great depression of the 1930s and showed the way out of such depressions. Monetarism developed during the 1960s, promising a way of solving the inflation problem. *Supply-side economics* became the fad of the early 1980s, promising an easy way out of the economic mess of the time, by cutting taxes. But supply-side economics overpromised, and there was no easy way out.

Because macroeconomics is closely related to the economic problems of the day, it does not yield its greatest rewards to those whose primary interest is theoretical. The need for compromise between the comprehensiveness of the theory and its manageability inevitably makes macrotheory a little untidy at the edges. And the emphasis in macroeconomics is on the manageability of the theory and on its applications. To demonstrate that emphasis, this book uses the theories we present to illuminate economic events from the great depression to the 1980s. We also refer continually to real world events to elucidate the meaning and the relevance of the theoretical material.

Schools of Thought

There have for long been two intellectual traditions in macroeconomics. One school of thought believes that markets work best if left to themselves; another

believes that government intervention can significantly improve the operation of the economy. In the 1960s the debate on these questions involved *monetarists*, led by Milton Friedman, on one side and *Keynesians*, including Franco Modigliani and James Tobin, on the other side. In the 1970s the debate on much the same issues brought to the fore a new group—the *new classical macroeconomists*—including among the leaders Robert Lucas and Thomas Sargent. That group remains influential in the macroeconomics of the 1980s.

The new classical macroeconomics shares many policy views with Friedman. It sees the world as one where individuals act rationally in their self-interest in markets that adjust rapidly to changing conditions. The government, it is claimed, is likely only to make things worse by intervening. That model is a challenge to traditional macroeconomics, which sees a role for useful government action in an economy which is viewed as adjusting sluggishly, with rigidities, poor information, and social customs impeding the rapid clearing of markets.

Macroeconomics is often presented as the battleground between implacably opposed schools of thought. There is no denying that there are conflicts of opinion and even theory between different camps. And because macroeconomics is about the real world, the differences that exist are sure to be highlighted in political and media discussions of economic policy. But it is also the case that there are significant areas of agreement and that the different groups, through discussion and research, continually evolve new areas of consensus and a sharper idea of where precisely the differences lie. In this book we do not emphasize the debate, preferring to discuss the substantive matters while indicating alternative views of an issue whenever relevant.

We shall now in Section 1-1 present an overview of the key concepts with which macroeconomics deals. Section 1-2 examines relationships among the main macroeconomic variables, while Section 1-3 discusses stabilization policy. Section 1-4 presents a diagrammatic introduction to aggregate demand and supply and their interaction; it gives a very general perspective on the fundamentals of macroeconomics and the organization of this book. Then, in Section 1-5, we outline the approach of the book to the study of macroeconomics and macropolicy making, and present a preview of the order in which topics are taken up. Section 1-6 contains brief remarks on how to use the book.

1-1 KEY CONCEPTS

Gross National Product

Gross National Product (GNP) is the value of all goods and services produced in the economy in a given time period (quarter or year). GNP is the basic measure of economic activity.

Figure 1-1 shows two measures of GNP—*nominal*, or *current dollar*,

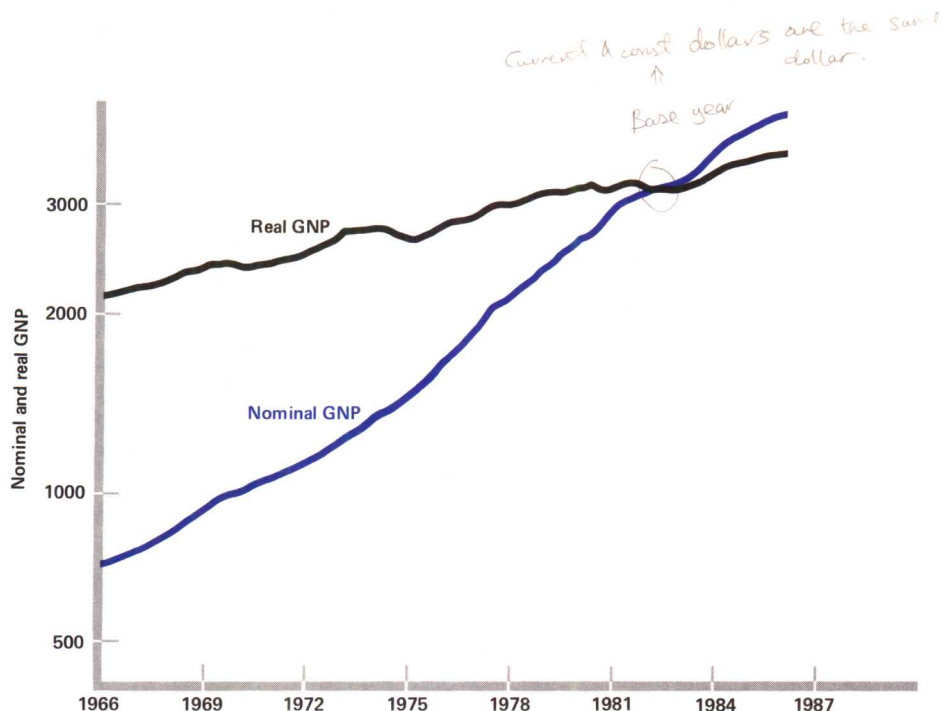


FIGURE 1-1 REAL AND NOMINAL GNP, 1966–1986. (Source: Data Resources, Inc.) Nominal GNP measures the output of final goods and services produced in the economy in a given period, using the prices of that period. Real GNP measures the value of the output using the prices of a *given* year, in this case 1982. Nominal GNP has risen more rapidly than real GNP because prices have been rising.

GNP and *real*, or *constant dollar*, GNP.¹ Nominal GNP measures the value of output at the prices prevailing in the period the output is produced, while real GNP measures the output produced in any one period at the prices of some base year. At present, 1982 serves as the base year for real output measurement. GNP statistics become available quarterly.

In Figure 1-1 nominal GNP is equal to \$3,989 billion in 1985 and \$1,598 billion in 1975. Thus nominal GNP grew at an average rate of 9.6 percent during that period. If we divide total GNP by population, we obtain per capita nominal GNP, which was \$16,700 in 1985. Accordingly, the average value of output produced in the U.S. economy in 1985 was \$16,700 per

¹ Notice that the scale for GNP in Fig. 1-1 is not linear. The scale is logarithmic, which means that equal ratios are represented by equal distances. For instance, the distance from 900 to 1,800 is the same as the distance from 1,200 to 2,400 since GNP doubles in both cases. On a logarithmic scale, a variable growing at a constant rate (e.g., 4 percent per annum) is represented by a straight line.

member of the population. Real GNP was \$3,570 billion in 1985 and \$2,695 billion in 1975, implying an average annual growth rate of real GNP of only 2.9 percent over the period.

Inflation and Nominal GNP

Figure 1-1 shows that nominal GNP has risen much more rapidly than real GNP. The difference between the growth rates of real and nominal GNP occurs because the prices of goods have been rising, or there has been *inflation*. The inflation rate is the percentage rate of increase of the level of prices during a given period.

Real GNP grew at an average rate of 2.9 percent over the 10 years from 1975 to 1985, while nominal GNP grew at an average annual rate of 9.6 percent per year. Because real GNP is calculated holding the prices of goods constant, the difference is entirely due to inflation, or rising prices. Over the 10-year period, prices were on average rising at 6.7 percent per year. In other words, the average rate of inflation over that period was 6.7 percent per year.

With 1982 as the base year for the prices at which output is valued, we observe in Figure 1-1 two implications of the distinction between nominal and real GNP. First, in 1982 the two are equal, because in the base year, current and constant dollars are the same dollars. Second, with inflation, nominal GNP rises faster than real GNP, and therefore, after 1982, nominal GNP exceeds real GNP. The converse is, of course, true before 1982.

Growth and Real GNP

We turn next to the reasons for the growth of real GNP. The *growth rate* of the economy is the rate at which real GNP is increasing. Anytime we refer to growth or the growth rate without any other qualifying word, we mean the growth rate of GNP. On average, most economies grow by a few percent per year over long periods. For instance, U.S. real GNP grew at an average rate of 3.1 percent per year from 1960 to 1985. But this growth has certainly not been smooth, as Figure 1-1 confirms.

What causes GNP to grow? The first reason real GNP changes is that the available amount of resources in the economy changes. The resources are conveniently split into capital and labor. The labor force, consisting of people either working or looking for work, grows over time and thus provides one source of increased production. The capital stock, including buildings and machines, likewise has been rising over time, providing another source of increased output. Increases in the availability of factors of production—the labor and capital used in the production of goods and services—thus account for part of the increase in real GNP.

The second reason for real GNP to change is that the efficiency with which