MACRO ECONOMICS

Theory and Policy

FRED R. GLAHE

THIRD EDITION

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ECONOMICS

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FRED R. GLAHE
UNIVERSITY OF COLORADO

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To my parents

Macroeconomics: Theory and Policy, Third Edition

PREFACE

Like the previous two editions, the Third Edition of *Macroeconomics: Theory and Policy* is a thorough and systematic presentation of macroeconomic thought, designed primarily for the intermediate-level macroeconomic theory course. The book is suitable for use as an introductory and review text in the first-semester graduate course in macroeconomic theory. Algebraic and graphic analyses are the primary methods of presentation. A knowledge of calculus is not required; its use is limited to explanatory footnotes.

Although most students of intermediate macroeconomics will already have been exposed to an introductory course in the principles of economics, this prior knowledge is not assumed. The theory and the theoretical applications are presented in logical sequence from simple to more complex and sophisticated concepts, so that students can gain a more profound understanding of macroeconomics. Where appropriate, the enduring and productive *IS–LM* model and its many extensions are employed to present the theory and to explain its policy implications. Within this basic framework, the policy prescriptions of all competing schools of economic thought—from classical, Keynesian, monetarist, and neo-Keynesian, to post-Keynesian, Austrian, and new-classical—are discussed and analyzed. Throughout this examination of the wide range of contemporary views on macroeconomics, the results of relevant empirical research are cited to focus attention on the most probable explanations for specific economic events.

The Third Edition of *Macroeconomics: Theory and Policy* has been completely revised and rewritten. The most obvious changes are the adoption of a more readable typeface and a two-color printing. The second color has been added not simply to improve visual design but primarily to increase student comprehension of the economic theory and its application to policy issues.

Less obvious changes, perhaps, are the additions to and reorganization of the text. The most significant change in this edition is the greater emphasis placed on the formation of price expectations, their subsequent impact on prices and employment, and their implications for monetary and fiscal policy. This is accomplished first by expanding the theory of price-level determination to explain what will happen when a positive rate of inflation is correctly anticipated. The theory of adaptive expectations and the more recent theory of rational expectations are examined next. The new-classical economic view is then shown to be an extension of monetarism and the theory of rational expectations. The monetary and fiscal policy implications of new-classical economics are examined in detail in the concluding chapter, which concentrates on contemporary policy issues.

To prevent students from being bewildered by a steady diet of macroeconomic theory, 14 applications have been added to the Third Edition. Each of these sections

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deals with the practical application of the economic theory examined in a particular chapter.

The most significant organizational change in this edition is the movement of the chapter on aggregate supply from the beginning to the middle of the text (Chapter 10) to place the rigorous development of the theory of aggregate supply closer to the discussion of the expanded theory of income determination (Chapter 11). The innovative use of aggregate supply in the analysis of the simple theory of income determination has not, however, been abandoned in this edition. Instead, a simple and intuitive theory of aggregate supply is introduced in Chapter 2 to allow students to grasp, at an early stage, some of the limitations inherent in the Keynesian model.

Another organizational change is the reversal of Chapters 15 and 16. In addition to Keynesian and neoclassical economic growth theory, Chapter 15 contains a discussion of what is commonly called "supply-side economics." The application in Chapter 15 analyzes the Laffer curve from the perspective of public-choice theory. Chapter 16 considers macroeconomic policy prescriptions from all major economic viewpoints.

In addition to the summary section found at the end of each chapter in previous editions, the Third Edition contains a new "Terms and Concepts" section, which lists the terms and concepts of primary importance in each chapter. Also, every chapter now concludes with a section of ten or more problems. To enhance student comprehension, a supplementary *Student Workbook* has been especially prepared for this edition. The Workbook contains a summary and overview section, a key-concepts quiz, true/false and multiple-choice questions, and mathematical and graphic problems for each chapter. Answers are provided to all questions and problems; students are referred to pages in the text where they can corroborate their answers and locate additional information.

Fred R. Glahe

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MEASURING NATIONAL INCOME

INTRODUCTION

Macroeconomics is the branch of economics that seeks to answer such questions as: What determines the level of unemployment? How is the general level of prices determined? What determines a nation's overall level of economic activity and its increase or decrease over time?

In contrast to macroeconomics, the other main branch of economics, *microeconomics*, seeks to answer such questions as: How is the purchasing behavior of an individual influenced by the price of a commodity? How does a firm determine the quantities of resources to buy and the manner in which they are to be combined to produce goods and services? What determines the pattern of distribution of the goods and services that the economy produces?

In the field of microeconomics, we are concerned with understanding the behavior of individual persons and firms. In the field of macroeconomics, we are concerned with understanding the behavior of the total of—or major segments of—a nation's economy. To do this, we must consider the

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aggregate behavior of individuals and firms. For this reason macroeconomics is also called *aggregate economics*.

Whereas microeconomics can be studied without any reference to macroeconomics, the converse is not true; consequently, we must employ certain tools and theories of microeconomics in our study of macroeconomics. Except for a basic knowledge of supply-and-demand analysis, no knowledge of microeconomics is assumed. When specific microeconomic tools and theories are required, they are explained prior to their use.

Macroeconomic analysis is concerned with why aggregate economic activity is at a given level and how this level can be raised or lowered. It is evident that, prior to any understanding or control of this activity, we must first be able to measure it. The branch of macroeconomics that is concerned with measuring macroeconomic activity is called *national income accounting*. In this chapter, we will examine the conceptual framework on which national income accounting is based and define certain macroeconomic variables which we will be using extensively.[1]

1-2   STOCKS AND FLOWS

In this text, we will be dealing with two kinds of variables: *stock* variables and *flow* variables. *Stock variables* are measured *at a given instant in time*, whereas flow *variables* are measured *over a period of time*. For example, consider a barrel of cider. When the barrel is full (say, at 12 noon on July 4, 1985), it contains 33 gallons of cider. This quantity is the *stock* of cider at this instant in time. Now suppose that the barrel is tapped and one 12-ounce glass is poured every 30 seconds. The *flow* of cider is 24 ounces per minute, or 11.25 gallons per hour. Note that the flow variable has a time, dimension (gallons per hour), whereas the stock variable does not—it merely exists. In this particular example, with a flow of 11.25 gallons per hour, the stock of cider at 1 P.M. on July 4, 1985 will have declined to 33 − 11.25 = 21.75 gallons.

Now consider the following example, in which a continuous flow is produced by a stock that does not diminish but remains constant. Suppose that on January 1 you deposit $100,000 in a savings account in a bank that pays an annual interest rate of 10% on such accounts. Your deposit, which is a stock, will pay in interest 0.10 × $100,000 = $10,000 per year. This

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[1] In this chapter, we will not attempt to explain all the details and complexities involved in the actual measurement of these variables. To do so would require the equivalent of a small book. For those wishing to explore this topic further, the following references are suggested: J.P. Powelson, *Economic Accounting* (New York: McGraw-Hill, 1955), Chapters 14–20; U.S. Department of Commerce, *National Income: A Supplement to the Survey of Current Business* (Washington, D.C.: U.S. Government Printing Office, 1954); U.S. Department of Commerce, *U.S. Income and Output: A Supplement to the Survey of Current Business* (Washington, D.C.: U.S. Government Printing Office, 1958); and various issues of *The Survey of Current Business* (Washington, D.C.: U.S. Government Printing Office).

payment of interest has a time dimension and is therefore a flow variable. However, in contrast to our previous example, as long as the bank continues to pay the 10% interest rate and you make no withdrawals from the initial deposit, the flow of $10,000 per year will continue indefinitely. If you leave all or a portion of the interest payment in the account and make no withdrawals, then the stock and flow variables will grow simultaneously.

In this example, if your entire stock of wealth were the $100,000 and you did not work, then the $10,000 interest payment per year would be your *personal income*. If the rate of interest remained at 10%, you would be able to consume $10,000 of goods and services per year permanently. Hence, economists would call this $10,000 per year your *permanent income*.

1-3 NATIONAL INCOME

One of the most widely used measures of macroeconomic activity is the *gross national product* (GNP), which is defined as *the market value of all final goods and services produced by a nation's economy during the course of a year*. Because the GNP is measured in dollars of goods and services per year, it is a flow variable. The goods produced can be subdivided into *consumer* goods and *producer* goods. *Consumer goods* include those products that are usually purchased by households (examples are bread, milk, and shoes). *Producer goods*, or as we will more often refer to them, *capital goods*, include those products that are usually purchased by business firms (examples are machinery, warehouses, and factories). Clearly, many goods could serve as either consumer goods or capital goods. If a firm purchases a camera to photograph its products, then the camera is a capital good; if a household purchases a camera to photograph its members, then the camera is a consumer good. The ultimate purchaser determines whether a good is a consumer good or a capital good.

In our definition of gross national product, the word "final" is critical; without it, we might end up with an exaggerated measure of real production due to *double counting*. For example, when we buy a newspaper its market value should obviously be added to the national product figures. But what about the newsprint and ink purchased by the newspaper publisher? Should they be included in the gross national product as well? No, because newsprint and ink production are already included in the production of the newspaper. Adding their value to the GNP would result in their being counted twice. The ink and newsprint are examples of *intermediate goods*. Only *final goods and services*, which are' composed of intermediate goods and services, are included in the gross national product.

Production of the final goods and services that constitute the GNP occurs when the three primary factor inputs—*land*, *labor*, and *capital*—are employed by business firms. If we assume that the quantity of land is constant and that departures from the labor force are exactly matched by arrivals, then the only *factor of production* subject to change is the capital stock. The capital

stock can change because, as capital is used in the production process, it undergoes wear and tear and, unless it is replaced as it wears out, the stock will gradually decline. Now if the stock of capital is allowed to decline, then the economy's maximum attainable GNP in any given year will similarly decline. To prevent this decline in output and to maintain a constant GNP potential, the portion of the capital stock that is consumed in the production process must be replaced. Some of the goods produced by the economy are capital goods, and if the quantity of capital goods produced is equal to the quantity of capital consumed, the capital stock will remain constant.

It is evident that if an economy wishes to maintain a constant standard of living as its minimum goal, then the total annual output of its goods and services cannot be entirely devoted to the satisfaction of individual or social wants. Some of the economy's total output must be used for capital replacement, and hence the maximum amount of goods and services that can be consumed will be less than the GNP. This measure of the maximum amount of goods and services available for consumption is called the *net national product* (NNP) and is obtained by subtracting the value of the capital consumed in the production process K_c from the GNP, or symbolically

$$\text{NNP} = \text{GNP} - K_c \tag{1-1}$$

Individual income is defined by economists as an individual's maximum continuous command over goods and services. *National income*, which is the sum of all individual incomes, must therefore be equal to *a nation's maximum continuous command over goods and services*. This definition of national income is equivalent to our definition of net national product, so that

$$Y \equiv \text{NNP} \tag{1-2}$$

where Y is national income.[2]

THE CIRCULAR FLOW OF INCOME

Because national income is measured over a period of time (usually one year), it is obviously a flow variable.[3] This flow of national income can be diagrammed as a *circular flow* between consumers and producers. The circular flow of income for a simple economy composed of only firms and households is illustrated in Figure 1-1.

Households are the owners of the factors of production, the services of which they sell to firms. This is illustrated by the solid black arrow extending

[2] In the national-income accounting procedures of the U.S. Department of Commerce, a narrower definition of national income is employed, with the result that the government's published measure of national income is slightly less than NNP. For our purposes, identity (1-2) is conceptually correct.

[3] Sometimes national income is reported on a three-month basis for each of the four quarters of the year. When this is done, it is a common practice to multiply the three-month data by four to present the results on an annual rate basis.
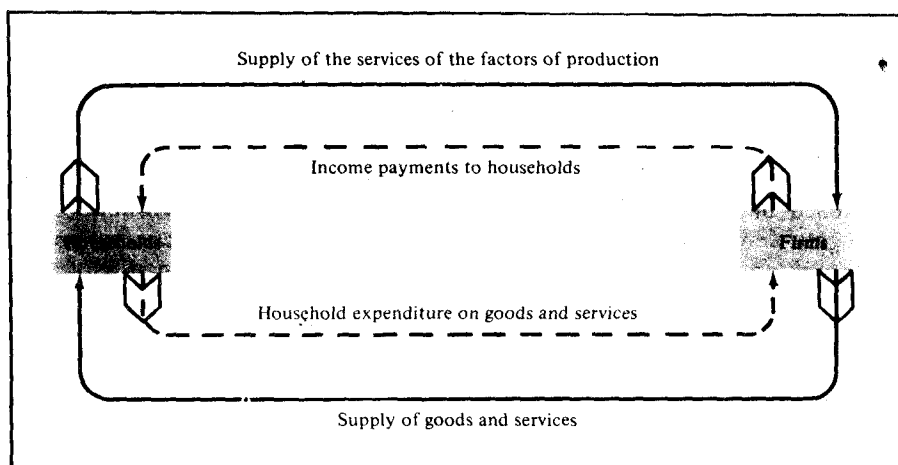
FIGURE 1-1 THE CIRCULAR FLOW OF INCOME AND EXPENDITURE

from firms to households in the lower portion of Figure 1-1. The firms in turn employ the services of the factors of production to produce goods and services that are then sold to the households. This is represented by the solid color arrow extending from households to firms in the upper portion of Figure 1-1.

In a money-using economy, firms pay the households in dollars for use of the services provided by the factors owned by the households. The households, in turn, use these dollars to purchase the goods and services produced by the firms. This flow of dollar payments from firms to households and from households to firms is illustrated by the dashed arrows in Figure 1-1.

In our simple economy, the dollar value of the factor payments received by households is the dollar value of national income and is equal to the dollar value of the goods and services sold by the firms to the households. Because the dollar values of the flows illustrated in the upper and lower portions of Figure 1-1 are equal to national income, it follows that national income can be calculated by measuring the dollar value of either flow. These two approaches are called the *expenditure approach* and the *income-received approach*. The former measures the flow indicated by the dashed black arrow in the lower portion of Figure 1-1; the latter measures the flow illustrated by the dashed color arrow in the upper portion of the figure.

INCOME-RECEIVED APPROACH

Using the income-received approach, we define national income as

$$Y = Y_w + Y_r + Y_i + Y_{\pi r} + Y_{\pi d} \qquad (1\text{-}3)$$

where Y_w = income paid to individuals in the form of wages, salaries, commissions, bonuses, and other forms of employee earnings before deductions for taxes