# MACROECONOMICS
## Aggregate Theory and Policy

Talavyria M.
Paschenko O.
Gushcha I.

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***Reviewers:***
N.Harchuk
candidate of economic sciences,
docent of department of English National university of life and environmental sciences of Ukraine (Kyiv)

**Authors*:***
**Talavyria Mykola** Doctor of Economic Sciences, Professor
of department of economic theory
National university of life and environmental sciences of Ukraine (Kyiv).
**Paschenko Oksana,** candidate of economic sciences**,**
docent of department of economic theory
National university of life and environmental sciences of Ukraine (Kyiv).
**Gushcha Inna,** candidate of economic sciences,
assistant of department of economic theory
National university of life and environmental sciences of Ukraine (Kyiv)

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**Talavyria M., Paschenko O., Gushcha I.**

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*Themes are offered and to the test of question, that allows to check up the knowledge of discipline.*

*A manual is made to order the students of higher educational establishments for independent and interactive preparation.*

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## BRIEF CONTENTS

## PREFACE

Macroeconomics – that is a familiar title for an intermediate macro textbook. Although the title of the book is familiar, its philosophy is not. The title is simple, straightforward, and to the point. It reflects the philosophy of the text, which is to make the study of the macro economy no more complex than it has to be.

*Macroeconomics* is designed for undergraduate or MBA macro classes that are heavily populated with noneconomics majors. It covers all the traditional theoretical and factual material that is standard in macro courses, but presents that material in a fresh manner. Some economists try to explain the complex macro economy with equally complex models, but in the end, it is doubtful that they have made the economy easier for students to understand. This book reflects my belief that the macro economy can be analyzed, explained, and understood to a strikingly high degree of sophistication in terms of a small number of indisputable relationships that are relatively easy to grasp and retain. Thus, by design, *Macroeconomics* does not include the level of rigor, abstraction, and factual content that can be found in most intermediate macro texts, but which is unnecessary for students in most undergraduate and MBA classes.

Most students in an intermediate macro course will go on to be active participants in the business and financial sectors. These students need a clear and uncluttered picture of the macro economy that they can apply to their future economic dealings. As business decision makers and personal financial investors, they will need to understand the macro economy and, more importantly, to anticipate the impact changes in the macro economy will have on the state of the economy and on their business and financial affairs. How will a change in Federal Reserve policy affect output, prices, and interest rates? Can we expect efforts to balance the budget to cause interest rates and the value of the dollar to fall? Why am I unemployed even

though I got an "A" in macro? Such are the questions graduates of a macro course may encounter. A macro course and its accompanying text are successful only if they help answer questions like these.

The answers probably could be found in almost any aggregate textbook. But a textbook ultimately is useful only if it enables an individual to answer relevant questions long after completing the course and the book. This text presents a picture or model of the macro economy that can be absorbed and retained to such an extent that the answers to macro questions will readily come to mind. Much like a personal computer with good software programs, this book is designed to be user-friendly so that graduates will remember its paradigms long after the more complex ones from other books are forgotten.

The overriding goal of *Macroeconomics* is to teach a sophisticated theoretical core that goes well beyond the naiveté of an introductory course and to keep that core simple enough to assure retention and real-world applicability. When complex abstraction adds more to the difficulty of the material than to the understanding of the economy, it has been eliminated. Instead, this book concentrates on the richness of the fundamental models. In doing so, Macroeconomics is designed to challenge but not to overwhelm or discourage the reader. At the same time, an economics major will find that this book establishes an extremely solid theoretical groundwork for further studies into macroeconomics.

*Macroeconomics* is divided into five parts. The first lays out fundamental facts, tools, and relationships. The first chapter explains the many truths within the circular How model, while the second provides an array of information about the main measures of activity in the macro economy – that is, output, prices, interest rates, and unemployment.

Part 2 is the most important section of the book. In these five chapters we build the models that describe the three macro markets:

product, money, and factor. These models are ultimately combined into a general equilibrium model that can be used to analyze all domestic short-run situations from any philosophical point of view.

The third part concentrates on fiscal and monetary policies from both theoretical and practical viewpoints. The general equilibrium model aids in the presentation of each policy, separately at first and later in an integrated fashion. Finally, the actual policies enacted during two important periods – the last twenty-five years and the Great Depression – are illustrated and assessed.

Part 4 is devoted to in-depth studies of the determinants of consumption and investment expenditures. These two chapters are written in a fashion that allows them to be inserted earlier, used where they are, or deleted without significantly affecting the flow of the book. Although they were placed later in the book so that they would not delay the building of the general equilibrium model or the discussion of policy, these chapters may alternatively be read after Chapter 4 in conjunction with the development of the income-expenditure model. Some instructors may want to make that rearrangement. Other instructors may wish to delete these chapters entirely due to a shortage of time.

The chapters on trade and growth in Part 5 integrate the influences of foreign trade and exchange and economic growth into the general equilibrium model. In the process of doing so, these two chapters present the facts, theories, and policies related to trade and growth in a way that encourages instructors and readers not to skip these topics as often happens.

The sixth and final section concentrates on the causes and costs of inflation and unemployment and on the macro policy options for fighting these two problems. The text compares and assesses the strengths and weaknesses of the options. By the end of the final chapter, it is apparent that definitive answers cannot be provided for all macro questions because opposing interpretations persist.

Nevertheless, the workings of the macro economy are quite clear as are the courses that the economy and policy-makers have taken in the past and may take in the future.

**To the Reader**

Macroeconomics is written so that learning aggregate theory and policy will be as painless as possible. In addition to the style of writing and the organization of chapters, several other aspects of this book are intended to make it more user-friendly. The symbols used throughout the book are chosen to be as obvious as possible. You will find no obscure letters that must be memorized because they seem unrelated to the words they symbolize. Symbols such as *NI* for national income or *FE* for full employment or *L* for labor are examples of how straightforward these abbreviations will be. In addition, at the beginning of each chapter, new symbols introduced in that chapter are listed.

Four learning and study aids accompany each chapter. At the start of each chapter, a list of goals appears. They will help you understand where the chapter is headed before you start reading it. At the end of each chapter is a summary of the main points of the chapter, followed by a list of the key concepts you should know after completing the chapter. Then comes a list of the new terms introduced and defined in the chapter. All four of these aids can be read before, during, or after reading the chapter to enhance the comprehension of the material. Finally, if the chapter has been so interesting that you would like to do a little additional reading on related topics, a list of suggested readings is available as the last feature of each chapter.

Like any economics book *Macroeconomics* is full of charts and tables that illustrate movements in key variables and measures. Sometimes, however, you may want some data that is not provided in a chart or table at that time. There is no need to leaf through the book searching for the appropriate table.

**Acknowledgments**

Writing a textbook is a big job, especially in macroeconomics where viewpoints conflict on a number of topics. No organization of the book, relative emphasis on topics, or balance of opposing points of view will please every macro professor. I hope only that professors with varying standards, needs, and viewpoints can use *Macroeconomics* as the core of their courses and add or subtract information and emphasis where they choose. To the degree that this book is compatible with many professors' courses, I am greatly indebted to the assistance of my editors and the many reviewers who have kindly offered their corrections and advice. However useful *Macroeconomics* is, it is far better than it would have been without their efforts. More specifically, help in the writing and rewriting of the book. I am happy to say that their work has made Macroeconomics a far better book.

I would also like to express my gratitude to the following economics professors who have read portions of or all the manuscript of this book: Robert G. Anderson, Ohio State University; Donald Bellante, Auburn University; George S. Bohler, Florida Junior College; W. Robert Brazelton, University of Missouri at Kansas City; James A. Butkiewicz, University of Delaware; John Z. Drabicki, University of Arizona; Charles C. Fischer, Pittsburg State University; Gary A. Gigliotti, Rutgers University; Otis W. Gilley, University of Texas at Austin; Joseph H. Grant, University of Louisville; Robert R. Keller, Colorado State University; Prem S. Laumas, Northern Illinois University; Thomas S. McCaleb, Florida State University; Allan B. Mandelstamm, Virginia Polytechnic Institute and State University; Michael Melvin, Arizona State University; David M. Nelson, Western Washington University; Dilip Pendse, Indiana University at Kokomo; M. Richard Roseman, California State University, Los Angeles; Curt Scribner, Pittsburg State University; Vladimir Simunek, Kent State University; David E.

Spencer, Washington State University; John M. Trapani, University of Texas at Arlington; Holley Ul-brich, Clemson University; John E. Weiler, University of Dayton; David C. Wong, California State University, Fullerton. Their suggestions and corrections have been invaluable to the improvements Macroeconomics has undergone from one revision to another. The shortcomings or mistakes that remain must be blamed on my inability to take advantage of all of the good suggestions and on my own errors.

In closing, it has been an ambition of mine since graduate school to tie macroeconomics into as neat a package as possible in both my mind and the classroom. This book is simply an extension of the fourteen-year process that began in the classes of the late Professor James Witte at Indiana University. No one could provide a clearer picture of the macro economy than Dr. Witte. He had the uncanny knack of seeing the simple in the midst of the complex, and his philosophy lives within me and many of his students. It is to Professor Witte's memory that this book is dedicated.

# PART ONE GETTING STARTED

## Theme 1. Macroeconomics

1. The Macro Economy
2. The Circular Flow of Income
3. Tools of the Trade

Many years ago, before the modern specialized economist of today evolved, the "political economist" roamed the earth. This ancient form of *homo economicus* – exemplified by Adam Smith or David Ricardo – studied all of economics at once. One set of models and one philosophy covered all economic analyses from the price of beaver pelts to the national rate of unemployment. Eventually, the political economist evolved into simply the economist. But all varieties of economists, short or tall, capitalist or Marxist, educated from 1700 on into the twentieth century belonged to this single species of economist.

Suddenly, possibly as a result of a cataclysmic environmental change like the Great Depression, *homo economicus* split into two separate species: the micro person and the macro person. Micro people study microeconomics, which concentrates on individual markets and their individual supplies and demands. In contrast, macro people (considered by some to be the more evolved of the two) study macroeconomics, wherein they stalk bigger game such as the state of the entire economy, the level of all prices, total output, national unemployment, and the level of interest rates. Although macro and micro people share common theoretical ancestors and tools of analysis, they view the economy from different vantage points.

This is a macro book, written by a macro person about the macro economy. The material covered in the next seventeen chapters essentially presents the world of macroeconomics. We are

going to take a tour through that world, and along the way we will acquire a variety of models for measuring, interpreting, and predicting the state of the macro economy. Before we begin that tour, however, we will, in this first chapter, prepare ourselves for the trip by laying out some of the basic equipment that we will be repeatedly using along the way.

## 1. The Macro Economy

There is something very comfortable yet challenging about studying the macro economy. It is comforting to know that the entire economy can be partitioned into only three giant markets, and as long as you can keep these three markets in view at the same time, you have the whole picture for macroeconomics. Contrariwise, in microeconomics you seldom see the whole picture because there are too many markets to keep track of at once. Macroeconomics is challenging because it sets more lofty sights. Nothing less than the health and well-being of the entire economy is its subject. It requires us to think in terms of aggregates, something most people are not accustomed to doing. We naturally tend to view things from the personal or individual level – the micro level. Everyone suffers from some degree of mental short-sightedness or tunnel vision. In the study of macroeconomics, however, what holds true or seems to hold true for the individual does not always hold true for the aggregate economy.

### Dealing in Aggregates

In macroeconomics, all variables are studied at the aggregate level. We deal in grand sums like national income, gross national product, aggregate demand, aggregate supply, and the general price level. Just about everything is viewed from a national perspective. Total numbers or averages are important, not individual numbers. This perspective makes macro a very cold and analytical study at times, but it also helps offset any personal biases of the economist.

For example, when we speak of national income, we are referring to the sum of all income earned by everyone in the country. We do not

mean just the wages of workers. After all, the IRS is not satisfied with your reporting only your wages if you have also earned interest on bank accounts and securities, rental income on the extra house and property you rent, or dividends on the stocks you own. They want to know about your *total* income, and macroeconomists are interested in the grand sum of your and everybody else's total income – the aggregation of all incomes in the economy.

Since we are interested in aggregate income, we are not interested in who earns the individual incomes or who spends them. Income is income, and spending is spending when the economy is viewed from the aggregate level. Hence we do not care much about the distribution of income. Whether your income or George Stein – brenner's income goes up is not as important to us as whether aggregate income goes up. Whether or not Yankee ticket sales rise, or baseball ticket sales rise, or sports ticket sales rise, or leisure spending rises is not as important to us as whether total spending rises. Unless we can establish that changes in segments of total income or spending have a significant influence on total income or spending, the segments are of no interest to the study of macroeconomics. Many individual differences or changes simply cancel each other out at the aggregate level.

Moreover, inflation, in its usual form, has no impact on a country's standard of living as viewed from the aggregate level. Some people lose ground in their ability to purchase goods and services, but others gain ground. When all of the gains and losses are summed, there is no net change in aggregate purchasing power. To individuals, a lot of changes occur, but in the aggregate, no change occurs. The economy is neither better off nor worse off.

That is the beauty of dealing in aggregates. What matters very much at the individual level becomes irrelevant at the aggregate level, causing the study of macroeconomics to be, in a sense, very even-handed. All individuals are treated equally because no individuals are considered. Should we redistribute income from the

rich to the poor? The macro economy does not care. Should we lower military spending and raise highway spending? The macro economy does not care. The totals are more important than the individual parts. Occasionally individuals are considered, but only to be used as building blocks for the aggregate picture. This point of view is crucial to understanding a number of macro relationships. Do not be surprised when the macroeconomist says that various issues do not matter at the aggregate level.

**The Big Three Markets**

There are literally thousands of markets in our economy, but the entire economy with its many markets can be divided into three market groups, and each of those three groups can be treated as a single aggregate market. These three macro markets are the product, financial (or money), and factor markets. Everything is bought and sold in one of these three markets.

The **product market** is the sum of all markets for goods and services. When we later refer to such measures of aggregate production or sales as national income, gross national product, aggregate demand, and aggregate supply, we will be referring to the grand sum of activity in the product market. Examples of goods in the product market are cars, steel, beer, stereos, highways, machines, buildings, energy, and missiles. Examples of services are the output of doctors, politicians, government workers, soldiers, restaurants, hair dressers, and professors.

The **financial market** is the sum of all markets for financial assets – that is, bonds, stocks, and money. In the financial market, people and institutions borrow and lend money from and to one another. It is common to divide all financial transactions into two subgroups. Those that involve short-term securities are said to occur in the **money market,** and those that involve long-term securities in the **capital market.** The dividing line between short-term and long-term transactions in this case is one year, meaning one year until the securities mature or the loan is paid back. Since the goal of those

borrowing on either a short-term or a long-term basis is to acquire money, however, the financial market in its entirety (money market and capital market) can be called the **money market.** This is not misleading terminology because the overwhelming majority of financial transactions that have any significant impact on the macro economy take place in the market for short-term securities.

The third market group, the **factor market** is the sum of all the factors of production or services of the factors that are purchased by producers of goods and services. The production of any product requires at least a little of each of the three types of factors of production; land, labor, and capital. By **land,** we mean that use of land by farmers, manufacturers, and other renters of property to produce goods and services. We also mean the use of raw materials that are mined or harvested from the land, including such production necessities as wood, coal, iron ore, cotton, and oil. By **labor** we mean the services of all working people, from unskilled laborers to board chair people and entrepreneurs. And finally, by **capital,** we mean production equipment such as buildings, machines, and tools as well as the funds needed to purchase that equipment.

In our study of macroeconomics, we will examine the three markets separately in the order presented here. Our ultimate goal is to build a model of the macro economy composed of these three markets. In this model, all three markets will be self-equilibrating, since the forces of supply and demand bring the product market to equilibrium levels of output and prices, the money market to an equilibrium interest rate, and the factor market to equilibrium levels of factor utilization and factor costs. These five variables – output, price level, interest rates, factor utilization, and factor costs – always move toward levels that equilibrate the three markets. When all three markets are in equilibrium, the economy is said to be in **macro general equilibrium.** Our three-market model is a macro general equilibrium model; and we will use it to study the big three markets (the product, money, and factor markets) all at once.

## 2. The Circular Flow of Income

Most important to understanding macroeconomics is the manner in which income is generated and transferred from one participant in the economy to another. Virtually all income earned by members of society comes from the sale of a good or service. The total dollar value of income earned by all members of the economy in a given time period is essentially equal to the total dollar value of all goods and services produced and sold in the economy during the same time period. A dollar's worth of output produced and sold becomes a dollar's worth of income earned by someone (usually the producer of the output) in the economy. One person's purchases of goods and services become another's income.

Income flows from households to businesses and to the government, from businesses to households and to the government, and from the government to households and to businesses. This **circular flow of income** from one sector to another and back again describes economic activity in our economy. Money changes hands over and over again, with sales becoming the source of income, and vice versa. Understanding the circular flow is crucial to understanding macroeconomics. The fundamental properties of the circular flow offer some explanations for income expansion and decline as well as for inflation and unemployment.

### A Two-Sector Circular Flow Model

In a simple economy with no government, the sales revenues received in the business sector become the income of the members of the household sector, as Figure 1-1 depicts. Dividing the economy into these two sectors may seem arbitrary, but it helps to organize the study of economic activity. The **household sector** refers to just what the word "household" suggests, the conglomeration of all economic activities not directly related to the production and sale of goods and services. Everyone, from corporate magnates to beach bums, belongs to the household sector and spends at least part of the day engaged in such economic activities.

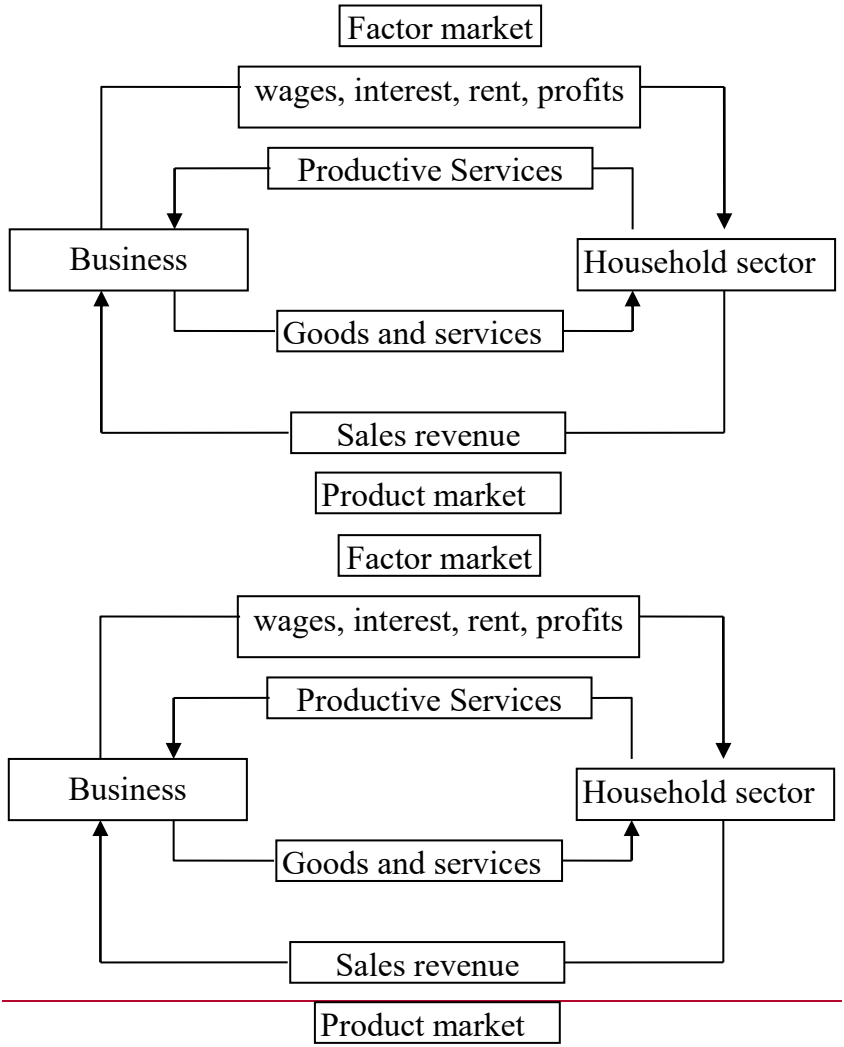



**Figure 1-1. A two-sector circular flow model**

The **business sector** refers to all economic activities associated with the production and sales of goods and services. Over half the population spends part of its day in the business sector helping to

produce goods and services. Together, these two sectors make up the **private sector,** which stands in contrast to the government.

***The Two-Way Flow*** Members of the household sector sell their productive services to the business sector in the factor market. These services are used to produce products that are sold by businesses in the product market either to other businesses or to the household sector. Products sold within the business sector are ultimately used to produce other products that are sold to the household sector. All of the sales revenue earned in the business sector from selling products to the household sector is used to purchase productive services from the household sector. Sales revenue in the business sector becomes the income of the household sector. With that income, members of the household sector have the ability to buy the goods and services they have helped produce in the business sector.

The income that flows from the business sector to the household sector comes in four forms: wages, rent, interest, and profits. These payments reward the three factors of production: land, labor, and capital. As discussed earlier, every product requires at least a little of each factor. (To review, land includes property and raw materials; labor refers to all productive human services; and capital refers to the machines, tools, and buildings that labor uses to turn land into products.) **Wages,** which include salaries, tips, and so forth, are the payments for labor. **Rents** are the payments for the use of land and its imbedded resources. **Interest** and **profits** are the rewards to those people in the household sector who provide financial capital (funds) to the business sector for the purchase of physical capital (machines, tools, and buildings). Interest payments go to those who lend money by buying bonds, and profits go in the form of dividends to those who purchase partial ownership in the form of stocks. What makes a capitalist economy unique is that all three factors of production are primarily owned by the household sector rather than by the state, and the household sector receives the rewards for supplying those

factors to the business sector. The sum of wages, rents, interest, and profits is the **national income *(NI).***

The business sector uses the three factors of production that the household sector supplies in order to produce the economy's goods and services. This relationship between the business and household sectors may not be apparent at first glance, since businesses seem to use such materials as electricity, coal, and lumber to produce their products. But those materials, like all products, come from land through the efforts of labor and capital. The sum of the dollar value of all those goods and services is labeled **gross national product (GNP).** Except for some accounting adjustments (that we will consider in the next chapter), *gross national product theoretically equals national income.* The goods and services flowing in both directions, to and from the household, are equal in dollar terms. A dollar's worth of output always creates a dollar's worth of income headed for the household sector. That this should be the case seems obvious. Amazingly, though, this truism often escapes the attention of economic analysts. Where, for instance, do those billions of dollars of Exxon profits go? Not into a black hole. They go to the household sector. Exxon stockholders (about 700,000 of them) receive dividends. Whoever the owners (stockholders) of Exxon are, all 700,000 of them go home at night – in other words, they are a part of the household sector.

Almost akin to a law of physics is the conservation of income in the circular flow: What is received as payments for goods and services in the business sector must flow through the household sector. After all, where else would the income flow? Even if the Exxon profits are retained and plowed back into Exxon, they will be used to purchase land, labor, and capital, all of which are owned by the household sector.

Here is the first example of how clear the study of macro can be if we remember to aggregate. For example, what happens to aggregate household income if Exxon and all other U.S. sellers of

gasoline raise gasoline prices to $2 a gallon? Nothing at all. Household income may be redistributed, but the grand total national income, or *NI,* is unaffected. All of *NI* flows to the household sector. From the macro vantage point, it does not matter whether Exxon makes more income and leaves less for others, because Exxon is owned by the household sector as is the rest of the economy. The household sector is one big unhappy family. The same reasoning would prevail for a hike in apartment rents by every landlord in the country. One group of households gains, and another group loses. There is no net effect on *NI* going to the household sector. Remember the following principle:

***Wages do not equal NI.***
***NI = wages + rent + interest + profits***

Contrary to what many people believe, the household sector is not made up of just workers carrying lunch pails. Owners of land and capital are included (though most of them are also workers as well).

Since all of *NI* is earned by the household sector, it is possible for the household sector to purchase all of the output in the product market. If the households were to spend exactly all of their *NI,* the dollar value of household spending would equal the dollar value of the output, GNP. Household spending, called **consumption,** would equal GNP. Demand would equal supply in the product market.

***Income, Output, and Prices*** Some distinctions in terminology are necessary to avoid confusion. National Income and Gross National Product measure the dollar value of output *(Q).* They are calculated by multiplying output times the general price level *(P).* When current prices are used in that calcualtion, the result is called **nominal** or **money *NI*** (or **money GNP).**

***money NI (or money GNP) = output x current prices***

Changes in money *NI* result from changes in prices and/or changes in output. A rise in money *NI* or money GNP does not necessarily result from a rise in output. **Inflation,** which is a rise in the general price level, alone can cause money *NI* to rise.

In order to focus on output, *NI* and GNP are often calculated by using constant prices. When the dollar value of output is expressed in terms of constant dollars, it is called **real *NI*** (or **real GNP).** Changes in real *NI* or real GNP occur *only when output changes.* We will discuss more specifically how real *NI* and real GNP are calculated from money *NI* and money GNP in the next chapter. For now, let it be clear that changes in output and changes in real *NI* or real GNP mean the same thing.

***real NI or real GNP = output x constant prices***
***changes in real NI or real GNP = changes in output***
***Δ real NI or Δ real GNP = ΔQ***

As will become progressively more apparent, keeping track of real income is usually more informative than keeping track of money income, although both are involved in macroeconomic study. To eliminate the confusion and inconsistencies that often plague media reports on this subject, we will use the following:

***output = Q = real NI or real GNP***
***GNP = money gross national product***
***NI = money national income***

GNP and *NI* change with both the price level and output. Real GNP or real *NI* change only with changes in output.

The word *real* in economics always means adjusted for the effects of price increases. Thus, in any economics discussion, real

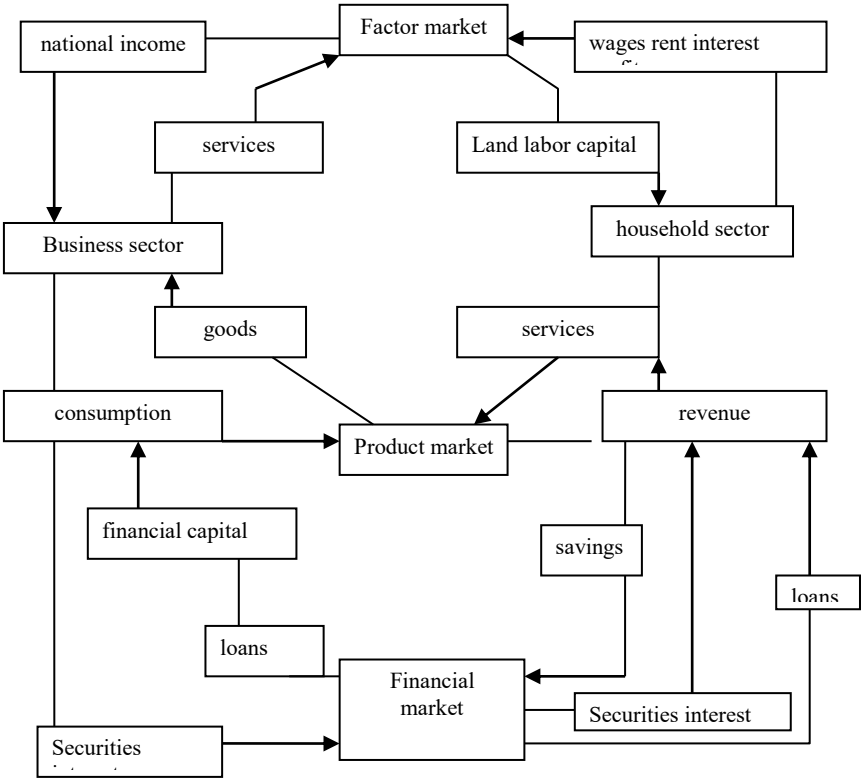
wages, real interest rates, real returns, and so forth signify constant dollars or constant purchasing power.

***Saving and Investment*** Few households ever spend exactly what they earn. Some spend more; but most spend less than their income. The household sector typically saves part of its income. To **save** is to not consume, and **saving** is the portion of income that the household sector does not consume.

The business sector often borrows the household sector's savings in order to finance their purchases of capital. These purchases are called **investment.** In economics it is necessary to distinguish between *investment,* which is the purchase of capital by businesses, and *financial investment,* which is the purchase of financial assets such as stocks and bonds. Financial investment is simply a method of saving. The household sector saves its income by purchasing savings accounts, certificates of deposit, stocks, bonds, and other financial assets. Even though we all colloquially refer to a purchase of stock as an "investment," a stock purchase, just like the purchase of a savings bond, is a form of saving. It just sounds more exciting to call such purchases investments. In economics the terms *investment* and *private investment* refer to business purchases of capital.

The word *investment* should make you think of machines, not stocks. The word *saving* should make you think of "not spending" on goods and services. Savings are the funds with which financial investments (purchases of financial assets) are made. Those funds are borrowed by the business sector in order to make investments, purchases of capital. As Figure 1-2 shows, it is the financial markets, the money and capital markets, that channel households' savings in the form of financial investments to businesses. The income savers of the household sector (sometimes called *surplus savers)* are the ultimate lenders in the financial markets, and businesses (and, as we will discuss later, the federal government)

are the ultimate borrowers (sometimes called *deficit spenders).* Often the household savers lend directly to the business spenders by purchasing stocks and bonds. Most of the time, a financial intermediary, such as a bank or savings and loan institutions, transfers the funds from the surplus savers to the deficit spenders. If the funds saved were to equal exactly the funds borrowed and invested, the total spending of the household and business sectors would equal output. All income paid out by the business sector to the household sector in wages, rent, interest, and profits would return to the business sector in the form of purchases of their output. The circular flow would be intact. As we will learn soon, however, the amount of saving does not always equal the amount of investment, and purchases, as a result, do not always equal output.



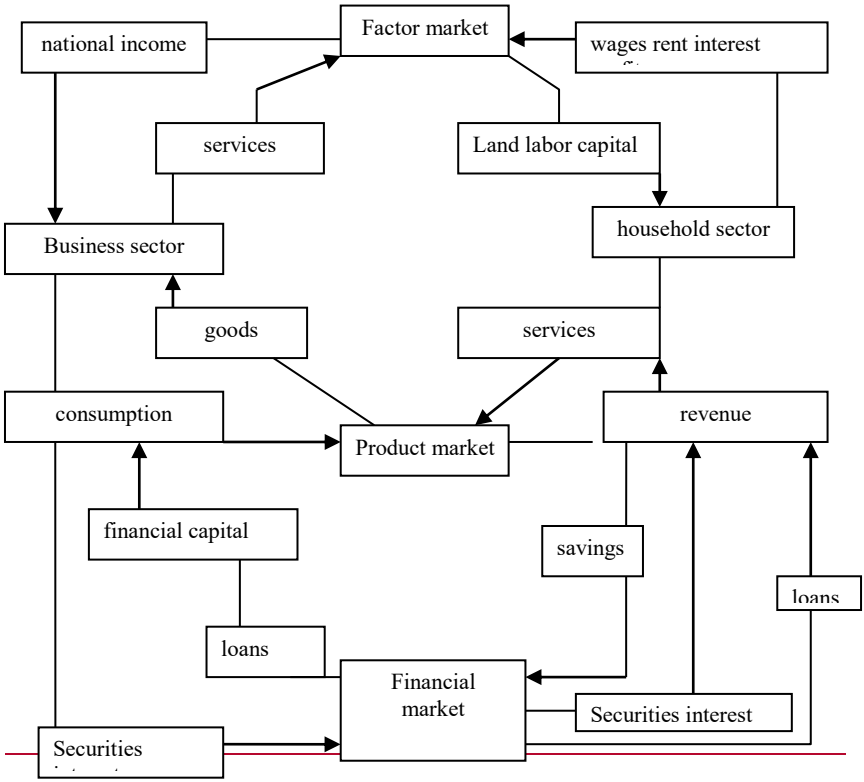



**Figure 1-2 A two-sector circular flow model with financial intermediaries**

Figure 1-2 shows all three macro markets at the same time. Productive services are exchanged for *NI* in the *factor market.* The interaction of factor demand and factor supply determines the level of factor incomes and factor utilization. Goods and service are exchanged in the *product market,* where the interaction of aggregate product demand and aggregate supply determines the level of output, prices, and *NI.* And mixed in with these two markets is the *financial* (or *money) market,* where the demand for and supply of

money or credit determine the level of interest rates. The Federal Reserve (or the Fed), our country's central bank, polices the financial markets, particularly the money market. The Fed's most important job in the money market is to control the money supply. That responsibility is called **monetary policy,** and we will be studying it a lot throughout this book.

### Adding the Government to the Circular Flow Model

As Figure 1-3 shows, adding a third sector, the government, complicates the circular flow picture; but it does not change the fundamental relationships. The dollar value of the goods and services produced in the business and government sectors together is equal to the value of income flows paid to the household sector. The household sector still supplies all the factors of production and ultimately earns all of the *NI.* Some of the income is redirected so that certain individual households receive less income than they earned, while others receive more than they earned. Nevertheless, total *NI* still all flows to the household sector.

Payments flow into the federal government from the other two sectors through taxes on household income and business income and sales as well as purchases by the private sector of government services. The many government agencies pay out income through purchases of goods and services from the business sector, purchases of productive services from the household sector, and income transfers to the household sector. Federal government spending *(G)* comes in two forms, **government purchases *(GP)*** and **government transfers *(GT).*** *GP* refers to purchases of goods and services; *GT* refers to payments (primarily to the household sector) that are not in return for any good or service.

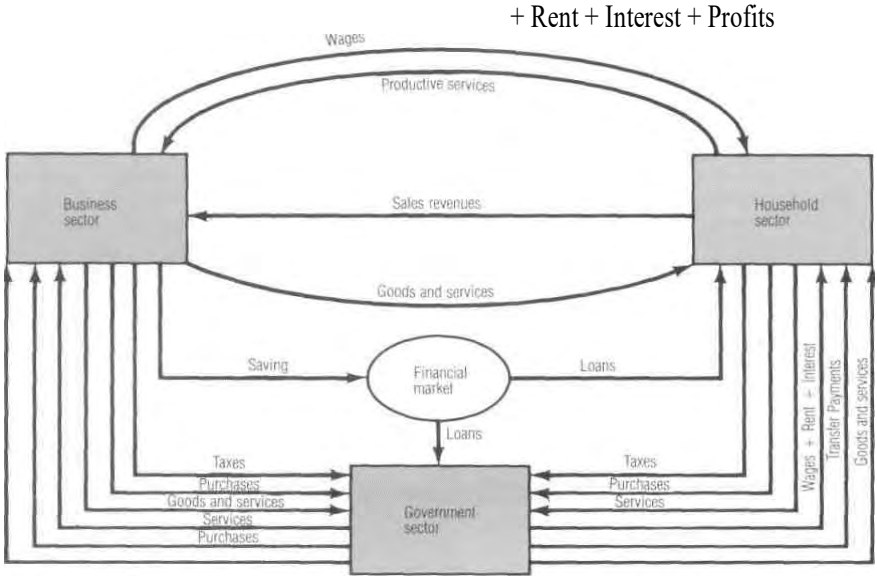



**Figure 1-3 A three-sector circular flow model**

As we will study in great detail in Chapter 8, the government sector spends the private sector's income. It obtains this income either by taxing it away from the private sector or by borrowing it. When the government spends beyond its tax income, it must borrow; and it borrows in the same financial markets used by the borrowers of the private sector. All else being equal, the government sector can spend more only if the private sector spends less. The government's taxing and spending policies are called **fiscal policy,** which we will discuss in later chapters.

**Adding the Foreign Sector to the Circular Flow Model**

We need to add one more sector, the foreign trade sector. Income enters and exits the economy's circular flow by way of trade with the rest of the world's economies. We will study these transactions in some detail in Chapter 14, but we can take a preliminary look here at how they affect the circular flow. Income

exits the circular flow to purchase foreign products, that is, **imports.** But income also flows into the sector disrupts the closed circular flow of income in the domestic economy. Since income goes into and out of the circular flow as a result of foreign transactions, the foreign sector can have a significant impact on how supply and demand compare in the product, money, and factor markets.

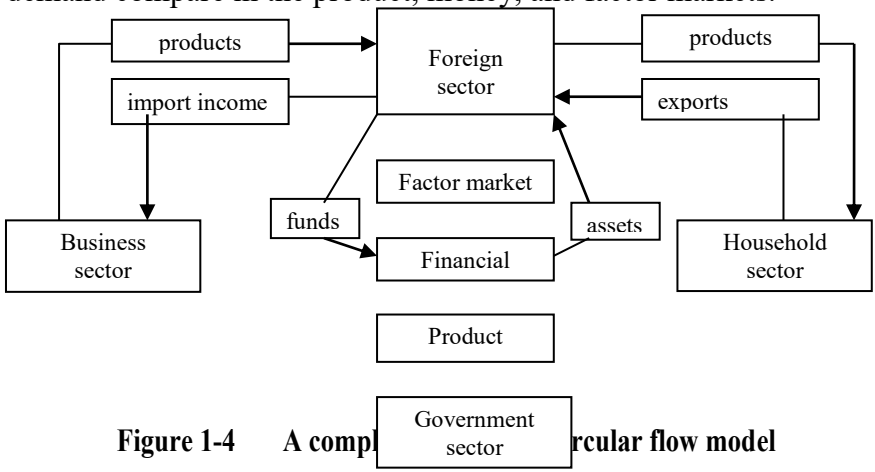



**Figure 1-4 A compl rcular flow model**

Figure 1-4 shows that importing products causes income to leak out of the circular flow. The amount of product demand flowing to the business sector is reduced, and products may remain unsold. On the other hand, exporting products causes income and demand to be injected back into the circular flow. The net effect of these leakages and injections, called **net product exports,** can reduce or augment domestic demand and sales of products and factors. In addition, the net flows of financial assets into and out of the financial markets can have a big impact on the demand for and supply of credit.

The circular flow model is a very important concept, and we will refer back to it often. It is the first of many models that we will use to analyze the macro economy. To build and understand these models, however, certain tools are necessary. Before embarking on our tour of the macro economy, we must discuss the "tools of the trade."

**3. Tools of the Trade**

Most of the tools used to understand macro models are mathematical in nature. Since mathematicians seldom teach their craft with economic applications in mind, we need to examine some basic mathematical principles that are tools of the economist's trade.

**Theoretical Relationships**

The social and physical sciences share the common feature of trying to establish relationships among variables. The goal of the endeavor is to answer lots of "why" questions with cause-and-effect connections. Why are men generally taller than women? Why is the sky blue? Why do we see only one side of the moon? Why do prices rise? The answers to all these questions were arrived at by establishing causal relationships. The idea is to establish relationships between an unknown entity –like height, color, planetary movement, or price levels – and known variables in order to use the known to explain the unknown.

The first step in this process is to list the variables that influence the unknown variable. The mathematical method is to show that the unknown is a function of the listed variables by using functional notation:

**unknown = *f* (list of variables)**
*A = f (B,C,D)*

where *A* is the dependent variable and *B, C,* and *D* are independent variables. If any of the variables in that list are also unknown, it may be necessary to make up sub-lists. For example:

*A = f (B,C,D)*

**where *B = g (E,F)***
***C = h (L,M)***
***D = j (S,T,V)***

The more we know about variables *E, F, L, M, S, T,* and V, the better able we will be to explain the unknown A.

After it is established which variables influence or determine A, it is necessary to pin down exactly what forms the relationships between *A* and its determining variables take. The first step is to establish the type of **qualitative relationship** that exists among the variables. In this case, one is concerned only with the direction in which the dependent variable moves when the independent variable changes. If A and *B* rise and fall at the same time, they are said to have a **positive relationship;** but if they tend to move in the opposite direction, they are said to have a **negative relationship** or an **inverse relationship.**

Beware of leaping to conclusions about causal relationships based upon observation. If change A often follows change *B,* one might be tempted to conclude that change *B* causes change A, with the reasoning: "Afterwards, therefore because." This is a dangerous rule of thumb to follow. Suppose a man notices that every night after dinner the sky turns dark for the night. Should he conclude that his having dinner causes the sun to disappear? It is more likely that he eats dinner when he does because his body's clock is anticipating the arrival of nightfall. That kind of erroneous cause-and-effect supposition is often made in economics. We will take care to avoid such pitfalls in this text.

Once the qualitative nature of the relationship is determined, one must formulate a more exact picture of the relationship. For example, suppose A and *B* rise together. Does *B* rise in any set proportion to the rise in *A?* Or does *B* rise at an accelerating or decelerating rate relative to the rise in *A?* The exact numerical pattern of the relationship between two variables is the **quantitative relationship.** While a qualitative relationship answers "up or down?" questions, a quantitive relationship tells us "by how much?"

It is standard to represent a relationship algebraically in a formula. For example we will develop a relationship between income and consumption whereby we posit that consumption *(C)* is a function of income:

$$\mathbf{C = \mathit{f}\,(income)}$$

We will then establish that it is a positive relationship of the following simple form:

$$\mathbf{C} = \overline{C} + \boldsymbol{b} \cdot \mathbf{income}$$

where $\overline{C}$ is some constant amount of consumption not related to income and b is some constant positive number less than 1. Since $\overline{C}$ and *b* are constants, changes in consumption are caused by changes in income, with the value of *b* determining the proportionality of those changes. If we know the signs of $\overline{C}$ and *b* (+ or –) we can determine the qualitative relationship; and if we know the numerical values of $\overline{C}$ and *b,* we can establish the quantitative relationship between the dependent variable, $\overline{C}$, and the independent variable, income.

Quantitative relationships define the exact form of qualitative relationships, but they require more information than the simpler qualitative statements. Given the numerical values of $\overline{C}$ and *b,* we can find the value for C at all levels of income. To illustrate, if *b* = .5 and $\overline{C}$ = 2,000, we have a positive, qualitative relationship with a quantitative relationship such that C will equal 7,000 when income is 10,000; and C will equal 12,000 when income is 20,000.

$$\mathbf{C = 2{,}000 + .5(10{,}000)}$$
$$\mathbf{C = 2{,}000 + 5{,}000 = 7{,}000}$$
$$\mathbf{and}$$
$$\mathbf{C = 2{,}000 + .5(20{,}000)}$$
$$\mathbf{C = 2{,}000 + 10{,}000 = 12{,}000}$$

With the help of the algebraic formula, we can generate an unlimited number of combinations of C and income. Another way to represent the relationship of consumption and income is to graph all of those combinations. Figure 1-5 shows a graph with consumption values on the vertical axis and income values on the horizontal axis. Since $\overline{C}$ holds at all income levels, C would be 2,000 when

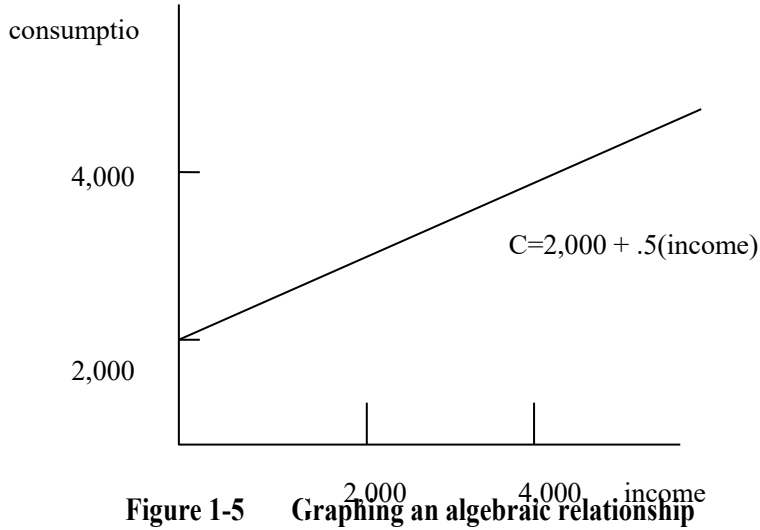



**Figure 1-5 Graphing an algebraic relationship**

income is zero. The value for $\overline{C}$ is the intercept value on the vertical axis. As income rises, consumption rises with it. The ratio of the change in C to the change in income, or $\Delta C/\Delta$ income, is equal to *b,* or .5. This is shown by the line that starts at the $\overline{C}$ value on the vertical axis and slopes up to the right at a rate such that every two units of change in income results in one unit of change in C Were C and income negatively or inversely related, *b* would be negative, and the line would slope down to the right.

The line itself is drawn by connecting the dots that depict all of those combinations of *C* and income that can be generated from the formula. But you probably already knew that.

The fact that there is a $\overline{C}$ in the formula that relates income and consumption indicates that variables other than income must exist that influence consumption. Whenever we set up a functional relationship, we try to include the most important independent variable or variables so that we can explain as much of the movement in the dependent variable as possible. Nevertheless, there will often be variables not included in the formula or model that

influence the dependent variables. Those outside variables are called **exogenous variables.** They influence the related variables included in the formula – called **endogenous variables –** but they are determined by forces existing beyond the consideration of the formula.

An absolutely complete model would include all variables as endogenous variables. But that model would be extremely complicated. The purpose of model-building is to simplify the complex. In doing so, it is often necessary to omit some variables completely or to include them only as exogenous variables. In the consumption formula, the endogenous variables are $C$ and income. $\overline{C}$ is a constant term designed to lump together all of the exogenous variables that influence consumption but are excluded for purposes of simplicity. Exogenous variables are identified by a bar over their letter symbol. For example, $\overline{I}$ and $\overline{C}$ are the exogenously determined components of investment *(I)* and consumption *(C),* respectively. If the exogenous variables included in $\overline{C}$ are found to be more influential than income in determining consumption, the simplified formula has likely lost more in accuracy than it has gained in simplicity.

Another reason for making some variables exogenous is that they are determined by forces that lie completely out of the realm of the model or of economics. Later, when we include government purchases *($\overline{GP}$)* or marginal tax rates *($\overline{MT}$)* in our model, we will treat these variables primarily as exogenous variables. That is because political forces and human decision making determine the values of these variables rather than any economic variables that we might want to include in the model. Thus, the classification of variables as either exogenous or endogenous can be based on both choice and necessity.

An additional way to classify variables is into the two classes, stocks and flows. **Stocks** are variables that are expressed in terms of quantities at a fixed point in time. Our economy has a capital stock, which is the quantity of production equipment that exists at any

given time. Other examples of stock variables are the labor force, the money supply, the level of savings in financial institutions, and the number of acres available to farming. **Flows** are variables that are expressed in terms of quantities per some time period. Wages, for example, are stated in terms of dollars per hour. Additional examples of flow variables are national income, consumption, and saving (all often expressed in terms of dollars per year), output, interest, profits, and government spending. Changes in stocks are stated in terms of flows. For instance, as we will see later, investment (a flow) measures the rate of change in the capital stock; and saving (a flow) measures the rate of change in savings (a stock).

Understanding the differences between stocks and flows can be helpful in understanding macroeconomics. Every economy has a stock of factors of production from which a flow of output comes. Sometimes, speeding up the current flow can reduce the future stock, while increasing the current stock can lead to greater future flows. Remember the difference between measuring quantities at a fixed point in time (my car weighs a ton) and over a period of time (I was driving at fifty miles per hour), and you will be better equipped to tackle the study of macro.

When we put together a group of relationship formulas that explain the variations of several variables all at the same time, we have a **model.** This is a simplified representation of the more complex real world. Many misinterpretations of economic conditions result from people having more information than they can decipher. Models try to pinpoint important relationships and thereby greatly reduce the amount of information needed for analysis, interpretation, and prediction. Models can vary in complexity from one relationship or formula to several hundred. The more formulas there are, the greater can be the accuracy, but also the greater will be the complexity. Simple models that emphasize fundamental and unimpeachable relationships are probably the most useful for studying the macro economy.

**Empirical Testing**

No matter how logical or sensible a theoretical relationship may appear, it can be dead wrong. The earliest economists, such as Adam Smith, David Ricardo, Karl Marx, and others, were brilliant theorists. Every one of them hypothesized economic relationships. Reading them today, you would say that they make perfect sense and that they must be right. Nevertheless, they were often wrong. How do we know? Sometimes theoretical relationships are proven wrong when a reasoning flaw is detected. Often, however, the merit of a theory is determined through **empirical tests** in which observations are made, data are collected, and real world behavior is actually compared to theoretical behavior. Of course, most theoretical relationships are developed from observations of real world behavior, but those observations are usually superficial. After the theoretical relationship is formulated, then the relationship is submitted to empirical testing that entails more systematic observation.

In economics it is standard practice to gather data on the endogenous and exogenous variables. These data are then inserted in the theoretical formula to see how well the formula fits the data. The "goodness of fit" is a measure of the merit of a theoretical relationship. The official term for such statistical testing is **regression analysis.** The actual values of the dependent variable are "regressed against" the actual values of the independent endogenous and exogenous variables. Put all that data in a computer, and it will determine the values for the formula that best fit the data; plus it will give a reading on how well the data fit that particular formula. The better the fit is, the higher the percentage will be of changes in the dependent variable that are explained by changes in the independent variable. A poor fit is a signal that other variables need to be included in order to better explain the changes in the dependent variable.

Through empirical tests like regression analysis as well as others, economists can establish which variables should and should not be included in a model. They can also tell which variables, among those that could be included, can be left out for simplicity

purposes without reducing too much the explanatory power of the model. Throughout this book, we will establish theoretical relationships in our process of building a model of the economy. Along the way, we will occasionally pause to check the validity of these relationships by means of references to empirical studies done by others to test the reliability of the model's relationships. We want our model to have good empirical support.

**Summary**

1. In macro, the economy is viewed in terms of aggregates, so that grand sums and the changes in their levels are more important than individual markets, prices, and quantities.

2. The macro economy can be divided into three giant markets: product, money, and factor.

3. All income earned in the business sector in the production of goods and services is paid to the household sector in return for the use of the factors of production owned by the household sector. A dollar's worth of output generates a dollar's worth of national income *(NI),* which flows to the household sector.

4. The study of macro involves the establishment of relationships, both qualitative and quantitative, among variables.

5. Theoretical relationships must be tested by empirical analysis to determine their accuracy.

**Key Concepts to Know**

1. What is included in the three giant markets.

2. How income and productive services are exchanges between the household and business sectors in the factor market in such a way that all income eventually flows to the household sector.

3. The difference between money and real *NI* (or GNP or wages or anything else); and why changes in real M are more informative than changes in money *NI.*

4. How the government sector, financial markets, and the foreign sector fit into the circular flow model.

5. What investment means in economics.

6. The difference between (a) qualitative and quantitative, (b)

exogenous and endogenous, and (c) stocks and flows.

7. The purpose of building a theoretical model and the purpose of testing it empirically.

**Terms**

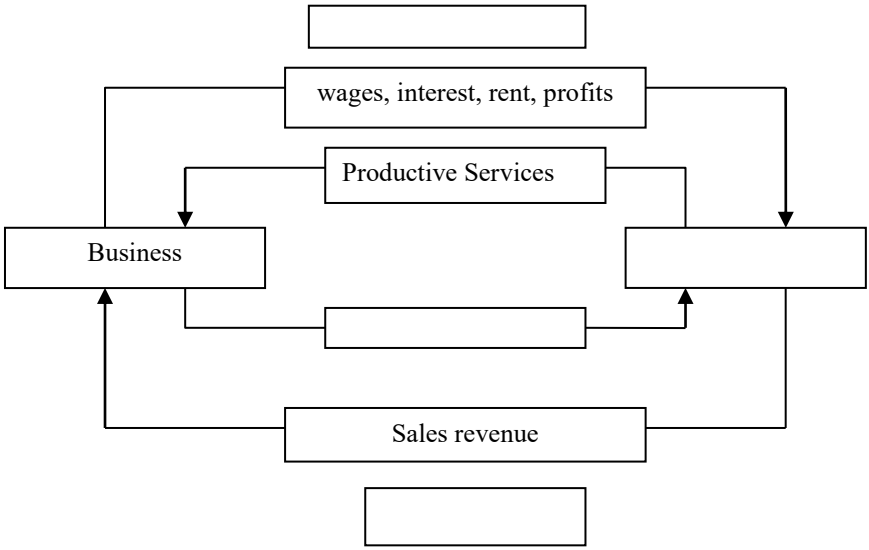
| | |
|---|---|
| product market | private sector |
| financial market | land |
| money market | labor |
| capital market | capital |
| actor market | wages |
| macro general equilibrium | rent |
| circular flow of income | interest |
| household sector | profits |
| business sector | national imcome |
| gross national product | net product exports |
| consumption | qualitative relationship |
| money national income | positive relationship |
| inflation | quantitative relationship |
| | negative relationship (or inverse relationship) |
| | negative relationship (or inverse relationship) |
| real national income | exogenous variables |
| saving | endogenous variables |
| investment | stocks |
| monetary policy | flows |
| government purchases | model |
| government transfers | empirical tests |
| fiscal policy | regression analysis |
| imports | |
| exports | |

**Test**

1. Macroeconomics is _____ because it sets more lofty sights.

2. These three macro markets are the product, _____, and factor markets.

3. The set let pass:




3. The sum of wages, rents, interest, and profits is the _____.

4. The sum of the dollar value of all those goods and services is labeled **gross _____.**

5. NI = wages + rent + interest + _____

6. Federal government spending *(G)* comes in two forms, **government purchases *(GP)*** and _____ ***(GT).*** *GP* refers to purchases of goods and services; *GT* refers to payments (primarily to the household sector) that are not in return for any good or service.

7. Income exits the circular flow to purchase foreign products, that is, _____.

8. The net effect of these leakages and injections, called **net product _____,** can reduce or augment domestic demand and sales of products and factors. In addition, the net flows of financial assets into and out of the financial markets can have a big impact on the demand for and supply of credit.

9. We will then establish that it is a positive relationship of the following simple form:

$\mathbf{C} = \overline{C} + \boldsymbol{b} \cdot$ _____

10. An additional way to classify variables is into the two classes, stocks and _____.

**Goals**

To get used to dealing in aggregates.
To introduce the markets and cast of characters.
To present the circular flow of income model.
To review some of the tools and methodology of model-building.

**New Symbols**

| | |
|---|---|
| NI | money national income |
| GNP | money gross national product |
| P | general price level |
| Q | output (real NI or real GNP) |
| G | government spending |
| GP | government purchases |
| GT | government transfers |

**Suggested Readings**

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## Theme 2. Measures of Economic Activity

1. Measuring National Income
2. Measuring the Price Level
3. Unemployment

As we established in the first chapter, macroeconomic analysis boils down to the study of three markets – product, money, and factor –and the movements of the key variables in those markets – national income, output, prices, interest rates, and factor utilization (particularly the labor unemployment rate). The news media regularly provide us with data on these key variables. Changes in interest rates and government announcements about the levels of output, prices, and unemployment are reported daily. Keeping track of the economy requires up-to-date knowledge of the movements in all these measures of economic activity; and with the help of our knowledge of how the three major markets operate, current information can show us where they are headed in the future.

Since it is so important to monitor the measures of economic activity, we need to take some time to discuss what these measures are and how they are obtained. In this chapter, we will look into the main measures of macro economic activity – the *NI* accounts, the price indices, real *NI,* interest rates, and the unemployment rate. This chapter is heavy with economic jargon and terminology, but our goal is to present only as much terminology as is necessary to equip the reader to understand economic news and to set the stage for later discussions in this book. So if you got a big kick in introductory macro out of memorizing every detail of the national income accounts and you were looking forward to burying yourself in even more minutia, this chapter will be a major disappointment. Otherwise, the combination of this and the previous chapter should make you conversant in current economic events and ready to be transformed into an amateur economist.

**1. Measuring National Income**

Almost every business enterprise employs at least one accountant. Aside from looking for tax dodges, accountants are valuable to firms in that they keep track of the level of business activity conducted by the firm. No manager would want to function without the information provided in an accountant's ledgers.

The accountants for our economy as a whole are employed by the Department of Commerce. This department gauges the level of economic activity – or more specifically, the level of production – through its measurements of gross national product (GNP), national income *(NI),* and all of the subparts of those two measures. Changes in GNP and *NI* are what tell us the economy is experiencing a recession, moderate expansion, or an inflationary expansion. While it is not necessary to learn all of the details of the income accounts in order to be a good analyst of the macro economy, it is crucial to know what GNP and *NI* measure and what they do not measure, and how knowledge of the accounts can help us to better understand the state of the economy.

**GNP and *NI***

As we established somewhat superficially in the previous chapter, GNP is the market value of final goods and services produced in one year, and *NI* is the sum of earnings received by the household sector in payment for the factors of production used in producing those final goods and services. Since, except for a couple accounting adjustments, a dollar's worth of output becomes a dollar's worth of income through the circular flow, GNP and *NI* income may be viewed as two different ways to measure the same thing. However, though GNP and *NI* are the same theoretically, they are not the same numerically on the Department of Commerce's books.

***Some Basic Facts about GNP and* NI** The best way to think of GNP is as the grand sum of the economy's cash register receipts for a one-year period. Production is an activity that takes place over

time – it is *a flow.* Therefore, it must be measured over some time period. GNP figures are always quoted in terms of output per year. Even when GNP is measured over a quarter (three months), it is stated as if the activity that occurred in that quarter had continued for three more quarters (one year). That is exactly what radar does when it estimates your speed in miles per hour after monitoring your car over a very short distance. Just as it is conventional to quote speed in terms of miles per hour, it is a convention to quote GNP in terms of output per year.

That word *convention* is important. No natural law exists as to how GNP should be measured. The people at Commerce have simply established rules, or conventions, to follow. Other countries have their own conventions for measuring GNP. When the conventions differ from country to country, it can be difficult to compare the countries' GNP figures.

In all countries, however, GNP is always expressed in some monetary unit. It may be possible to quote a firm's output or sales in units of their output, like 2 million cars or 50 million tons of steel. But, given the vast multiplicity of an economy's output, it makes sense to express all those many products in dollars or marks or pounds or yen. Country-to-country comparisons then require only currency conversions. Moreover, GNP is not quoted in monetary terms just because it is easier. Since prices are a measure of value, the use of monetary units weights output changes according to the value society places on those changes. That way, when bubble gum output rises from 1,100 billion units to 1,200 billion units, we can fairly compare the increase to an expansion of steel output from 4 million to 5 million units.

Probably the most noteworthy convention followed in the measurement of our economy's output is the counting of only *final* goods and services. This is done to avoid double-counting. If, in the process of measuring GNP, we were to add the sales of U.S. steelmakers onto the sales of U.S. automakers, we would be

counting all of the steel included in the autos twice. This procedure would greatly overstate U.S. production. In order to avoid double-counting, the Department of Commerce tries to exclude *intermediate* goods – goods which physically become part of another product or which are consumed in the production of another product – in its computations. Since steelworkers get paid only once for producing steel, its sale is counted only once – when the automobile is sold.[1]

Another way to avoid double-counting is to sum the **value-added** by each firm, which is the difference between the value of a company's finished product and its payments for intermediate goods. The value-added of an automaker would be the price of the car minus the cost of the intermediate goods (such as steel, rubber, plastic, and glass) included in the car. The value-added for each firm is equal to the amount that firm pays out in wages, rents, interest, and profits. That amount is each firm's contribution to GNP or *NI.* The sum of value-added at each stage in the construction of a car, as well as the materials that make up the car, is equal to the final price tag on the car – which in turn is equal to all of the wages, rents, interest, and profits earned in the production of the car and its materials.

**firm's value-added = product price - intermediate goods costs**
**firm's value-added = wages + rent + interest + profits paid by the firm in production**
**GNP = sum of final product sales**
**GNP = sum of value of all sales - sum of value of all intermediate goods sales**
**GNP = sum of value-added on all goods**
**sum of value-added on all goods = sum of wages + rent + interest + profits = NI**
**Therefore, theoretically at least, GNP = NI**

***Differences between GNP and NI*** GNP and *NI* are different in the *NI* accounts because GNP includes two items of importance that are not part of *NI* – capital depreciation allowances and indirect

business taxes. The preceding discussion of double-counting will help explain these two differences.

As noted, to avoid double-counting, intermediate goods are excluded when summing up GNP. That is easy to do when the intermediate good is one that becomes part of a final good (like steel in a car) or is consumed in the production process (like coal in the production of steel). But what about machines? They could be considered intermediate goods, since they are used to produce other products, but they neither become part of the final product nor are they consumed in the production process. Quite frankly, it is not obvious how to treat machines in the summing of GNP, since they are themselves produced and sold one year and then are used to produce other goods over several years.

The Department of Commerce solves this problem by treating machines both as final goods (when they are produced and sold) and as intermediate goods (in later years as they are used to produce other products). GNP in any year includes the value of all new machines produced in that year. At the same time, however, it is recognized that, due to depreciation, a little bit of every machine is included in the products it produces. Business people account for the gradual loss in value of machines by automatically reckoning the machines to depreciate by some fraction of their total value each year. That fraction is considered as much a cost of production as any other intermediate good. Eventually, when those fractions add up to 100 percent, and the machine is fully depreciated, the total price of the machine will have been included, in many tiny parts, in all of the products that the machine helped to produce. In that way, the cost of the machine is recovered (it is hoped, in its entirety and then some) over the lifetime of the machine.

The fact that a machine is a durable intermediate good makes the measurement of GNP complicated. When the Commerce people add sales receipts, they include sales of newly produced machines as well as the depreciation costs of all of the old ones – these costs

being included in firms' production costs and their product prices. As a result, GNP actually double-counts machines. In order to correct for that double-counting, depreciation allowances made by companies throughout the economy are deducted from GNP to find **net national product** (NNP). Since no wages, rent, interest, or profits are paid out when depreciation costs are assessed by firms, the deduction of depreciation from GNP to obtain NNP brings us much closer to *NI.* NNP measures the production of all new products in one year.

Other costs as well as depreciation costs are included in product prices even though they are not the result of a payment for a factor of production in the current year. Indirect business taxes, such as excise taxes on gasoline, liquor, and cigarettes, and state and local sales taxes are all included in total sales receipts. Those monies go straight to the government. Like depreciation allowances, these taxes are not payments to factors and are not included in *NI.* If we remove them from NNP, we get *NI.*

***GNP - depreciation = NNP***
***NNP - indirect business taxes = NI***

If we remove depreciation costs and indirect business taxes from gross sales receipts for final goods and services, we can again safely say that a dollar's worth of output is a dollar's worth of income.

***More Basic Facts about GNP and* NI** The discussion of how to count machines in GNP and NNP shows that it makes sense to count only those goods that are produced in one year. Accordingly, sales of used items are not included in GNP except for whatever portion of the used good's price is a reward for some effort made this year. For example, most sales of used items are not included, but a portion of used car sales by dealers are. Part of the price of a used car sold by a dealer (we often complain that it is too big a part) is the mark-up he makes to pay for the costs of operating a dealership.

The dealer may or may not have earned that mark-up, but it is a payment for current services, and it is included in GNP.

Another fact about the income accounts is that they do not include purely financial transactions like purchases and sales of stocks and bonds, real estate, and other paper or secondhand assets. GNP is supposed to measure output of goods and services. No production occurs when assets are transferred – except for brokerage services, the payments for which are included in GNP. Thus, when a gold mine in Colorado produces and sells an ounce of its product, gold, that sale is part of GNP; but every transfer of that ounce that occurs in the future will not be included – except for artists' or brokers' fees that are added onto the per-ounce price.

In order for production activity to be measured by the Department of Commerce, the good or service must be sold in the market place – at least in the areas monitored by the IRS. If you pay the young girl down the street to rake your leaves, chances are the income accounts will not catch that transaction unless she reports her income to the tax people. More importantly, an enormous amount of production goes on in the home that is not bought or sold in the market and is therefore not included in GNP. If you paint your house instead of employing a professional painter, that effort will not be included in GNP, even though you worked just as hard or harder than the painters would have. One way we could greatly increase the U.S. GNP without changing the level of production would be for everyone to hire his and her neighbors to do each other's housework. By convention, housework is not counted in *NI.* That angers a lot of unpaid housekeepers. The Department of Commerce tries to make up for part of this necessary exclusion by imputing a value for the work done by farmers in growing their own food and for the housing services homeowners provide themselves.

The illegal marketplace is also excluded from the GNP accounts. That means the production and sale of marijuana, one of the most important cash crops (in terms of dollar value) of some

regions, are not added into GNP. The Mafia may be big business, but their activities (the illegal ones) also do not show up in the income accounts.

As a result of conventions, the GNP figure significantly underestimates the level of production in the United States. Nevertheless, as long as the conventions do not change from year to year, GNP figures should be useful measures of changes in the level of economic activity.

**Gross private investment** includes purchases of plant and equipment by businesses (called *fixed nonresidential investment),* plus purchases of houses by consumers (called *fixed residential investment),* plus net changes of business inventories. The two parts of fixed investment include both purchases of new capital and capital depreciation allowances on old capital. It is gross investment that makes GNP gross, and it is capital depreciation allowances that make gross investment gross. Subtract depreciation allowances from gross investment, and you obtain **net investment.** Add net investment instead of gross investment onto consumption, government purchases, and net exports, and you get **net national product (NNP).** Net fixed investment measures the increase in the capital stock.

| | | |
|---|---|---|
| **gross private investment =** | **$** | **420 billion** |
| **fixed investment** | | **443** |
| **residential** | | **96** |
| **nonresidential** | | **347** |
| **net change in inventories -** | | **23** |
| **gross private investment –** | | **420** |
| **depreciation =** | | **356** |
| **net private investment** | | **64** |
| **net national product =** | **$** | **2,701 billion** |
| **consumption** | | **1,971** |
| **net investment** | | **64** |
| **government purchases** | | **647** |
| **net product exports** | | **19** |

Investment can also be divided into **planned investment,** which includes all fixed investment plus all desired changes in inventories, and **unplanned investment,** which includes any undesired changes in inventories. When goods are produced this year but not sold this year, the Department of Commerce wants them included in their GNP figures somewhere. Since they are not sold, they do not fall under the four sectors' purchases. But factors did earn income producing these unsold products, so they need to be counted somewhere. Lacking any better place to count unsold goods, calculators of GNP stick them into investment as additions to inventories. Some additions to inventories are made on purpose, but others are the result of producers being unable to sell all they produced. These involuntary additions to inventories are the unplanned investment. When unplanned investment is positive, inventories rise; when it is negative, inventories fall.

Government purchases *(GP)* are the third part of GNP, and they refer only to the portion of government spending that makes purchases of goods and services. Government transfers *(GT),* such as social security benefits, welfare, unemployment compensation, and veterans' benefits, are not counted in GNP, since no good or service is produced in return for those payments.

***government purchases (GP) = government spending (G) - government transfers (GT)***

Finally, net product exports, the fourth part of GNP, measure product exports minus product imports.

***net product exports = product exports - product imports***

Very often, particularly since OPEC raised its oil prices, net exports have been negative, indicating a net outflow of income from our economy. Once again, to find *NI* from GNP:

***GNP - depreciation = net national product (NNP)***
***NNP - indirect business taxes = national income (NI)***

***Breaking down* NI** *NI* can be found by way of the expenditure approach (GNP minus depreciation minus excise taxes) or by the flow-of-incomes approach, in which *NI* is the sum of the income flows received by the household sector in payment for use of the factors of production they own. Those incomes are wages and proprietors' income (payments for labor), rent (payment for land), and interest and profits (payment for financial capital). The *NI* figures for M year were:

| | |
|---|---|
| *NI* = | $2,436 billion |
| wages and salaries | 1,856 |
| + proprietors' income | 120 |
| + rent | 34 |
| + interest income | 265 |
| + profits | 161 |

The official term for the first item, wages and salaries, is *compensation of employees,* and it means exactly what it sounds like. **Proprietors' income** is the income earned by people who operate their own businesses or are part of a partnership.

Rental income results from the rental of real property, and it includes an imputed rental payment for every house in the country. Interest income essentially measures the interest paid by the business sector to the household sector for the use of the household sector's funds that are lent through the financial markets. Corporate profits are the pre-tax net earnings of corporations. They are the returns to capital. These earnings can either be paid out in dividends to the household sector or retained and plowed back into the corporation in the form of purchases of more capital.

*NI* is the income *earned* by the household sector, but it is not the same as the income *received* by the household sector. The Commerce people try to estimate income received when they calculate **personal income:**

| | |
|---|---|
| personal income = *NI* | $2,436 billion |
| - social security tax | 138 |
| - corporate profits tax | 57 |
| - retained earnings | 46 |
| + government transfer payments *(GT)* | 375 |
| | $2,570 |

The first three items, which are subtracted from *NI,* represent income earned but not immediately received by the household sector. Most employees do not have the opportunity to even try to evade social security taxes. Employers must take that "contribution" out of labor income before sending that income to the household sector. Before corporate profits can be paid out in dividends or retained for further investment, corporations must pay income tax. The household sector never gets a chance to see that income. Also corporations may choose not to pay all of their profits out in dividends. These retained earnings, or undistributed corporate profits, are earned by the household sector when they buy stock, but they are not received. Thus, wages and profits received by the people in the household sector are significantly below what they earned because of these deductions.

In the other direction, however, the household sector receives income from the government that is not a reward for current factor services. These government transfer payments *(GT)* are the part of government spending other than purchases that is measured and added onto household income. Transfer payments include interest payments on the national debt in addition to such payments as welfare, medicare, and social security benefits.

After these subtractions and additions are made, personal income remains, which is supposed to be household income before income taxes are paid. Personal income figures are often quoted by the media as a measure of household well-being. A rise in real personal income per capita is viewed as a rise in the household sector's standard of living.

Knowing how much income the household sector receives before taxes is often not as informative as knowing after-tax personal income. **Disposable income *(DI)*** is personal income minus personal taxes. The dominant personal tax is the income tax.

***disposable income (DI) = personal income - personal taxes DI = $2,570 - 397 = $2,173 billion***

A more condensed version of the difference between *NI* and *DI* can be achieved by bringing taxes and transfer payments into one equation that calculates **net taxes** *(NT),* which are taxes *(T)* minus government transfers *(GT).*

***net taxes (NT) = T - GT***

We will find later that it makes a lot of sense to think of government transfers as negative taxes. Using net taxes, we can now write:

***NI - NT = DI***

This equation states that the differences between *NI* (what the household sector earns) and DI (what the household sector ends up with to spend or save) is the combination of government taxes (personal, social security, and corporate) minus government transfer payments. There is only one deletion from that equation – corporate retained earnings that are business savings. To be completely accurate, the equation should read:

***DI = NI - NT* - retained earnings.**

Let us assume retained earnings are zero so that we can treat disposable income as *NI-NT.*

Regardless, *Dl* is the income that the household sector has left to spend or save. As a result, disposable income equals personal savings *(S)* plus consumption (C):

***DI* = C + S**

**and**

**S = *Dl* - *C* = $2,173 - $1,971 = $202 billion**

As far as we are concerned, there are only two things that a person can do with disposable income: save it or spend it.

**2. Measuring the Price Level**

No gauge of economic activity or conditions attracts more attention than the **inflation rate,** the rate of increase of *P,* the general price level. Every month we hear reports on the most recent change in the consumer price index and the producer price index. Changes in these indexes are used to estimate the present inflation rate in annual terms. Those estimates are in turn monitored by labor unions, social security recipients, money lenders and borrowers, business people, consumers, investors . . . just about everybody. How rapidly the cost of living and the cost of producing are rising or falling is critical to *individual* households' standards of living and *individual* businesses' profitability. One cannot be an intelligent participator in the economy without understanding what price indexes are and what they measure and do not measure. And to be a successful student of the macro economy, one must know how price indexes are calculated and how to read them.

**Calculating a Price Index**

Indexes are numerical yardsticks that keep track of the level of something compared to its level in a previous time period. It is possible to index anything that is in numerical terms. One could calculate a height index for growing children or a weight index for growing adults. Jerry Lewis could calculate an index of yearly contributions to fight muscular dystrophy, or the Pittsburgh Pirates could measure their changes in annual gate receipts on an index. Index numbers allow for easier year-to-year comparisons and determinations of percentage rates of change. Price indexes are simply a subset of economic indexes, which also include the index of economic indicators, the index of industrial production, and the Dow Jones thirty industrials average, among others. All such indexes have certain characteristics in common.

***Index Numbers*** Regardless of its form, a price index always compares prices in one or more years (current years) with prices in a single, usually previous year called the **base year.** The most fundamental idea of a price index is that prices in the base year are 100 percent, and prices in all other years are compared in terms of that 100 percent standard. If prices double from the base year to some current year, prices in the current year are 200 percent of the base year. Since all indexes are expressed in terms of the base year's value equaling 100 percent, the percentages are dropped off to form **index numbers,** which show relative numerical levels based upon the value of 100 percent. Thus, if prices in Year 2 are twice as high as in Year 1 (the base year), a price index for those two years would read:

Year l 100
Year 2 200

GNP = consumption
+ gross investment
+ government purchases
+ net product exports

Net national product = GNP - depreciation

NNP - indirect business taxes = national income

*NI* = wages and salaries
+ proprietors' income
+ rent
+ profits
+ interest

Personal income = *NI* – social security tax
– corporate profits tax
– retained earnings
+ government transfer payments

Disposable income = personal income - income taxes

*DI* = saving + consumption = *NI* - *NT*

Or, if you prefer that Year 2 be the base year, the price index would read:

Year 1 50
Year 2 100

In both cases, the index number in Year 2 is twice as large as the number for Year 1, meaning that prices were twice as high in Year 2 as in Year 1; or, put another way, that prices were half as high in Year 1 as Year 2. Either way, prices have doubled – that is, they have risen 100 percent.

The simplest formula for calculating a price index is:

***(prices in current year prices in base year / prices in base year) x 100 = index number for current year***

***Two Kinds of Indexes.*** If we had only one price to monitor, or if all prices in the economy rose and fell at the same rate. But such is not the case. To be of any use in an aggregate sense, a price index must keep track of many prices on a wide variety of goods and services. Individual prices rise and fall at widely varying rates. Even during inflationary times, some prices are falling. Anyone who is calculating a price index is faced with the decision of which prices to include and whether all price changes should be treated alike.

For example, suppose that in the next year bubble gum prices double from 20 to 40, while automobile prices rise, on the average, by 5 percent. How should a calculator of a price index treat these two disparate price changes? One option is to treat them equally, but that would yield a totally inaccurate, even silly measure of the cost of living. Unless bubble gum purchases take up as great a portion of total spending as do automobile purchases, a price index that treats these two price increases equally exaggerates the general inflationary bubble to a ridiculous extreme.

Every price index incorporates some system of weighting price changes in accordance with their relative importance. The first step in that weighting process is the choice of which goods or services to include in the so-called *basket of goods* covered by the index. Every

price index has a different basket of goods and, therefore, provides a different picture of the processes of inflation or deflation. For example, when mink coat prices change, you see no change in the consumer price index, because that price index does not include mink coats in its basket of goods.

Once it is decided which goods should be included in the basket of goods for a price index, it is necessary to weight each of those goods by its relative importance. The standard method of weighting a price change is by what fraction it represents of the total amount of money spent on the entire basket of goods. That is, if 25 percent of the value of the basket of goods is spent on housing, changes in housing prices are multiplied by .25. Even though bubble gum prices may double, their impact on a price index will likely be small, because such purchases would likely take up a small percentage of the total money spent on the entire basket of goods – unless one is calculating a candy price index.

When determining these fractional weights, one must decide whether to calculate them from the base year or the current year. If the weights are determined from the quantities purchased during the base year, the price index is called a **Laspeyres index.** If they are determined from the current year, the index is called a **Paasche index.** Both indexes are named after their developers back in the nineteenth century. The simplest formulas for the two indexes are as follows (in which *B* = base, *C* = current, *n* = number of years):

Laspeyres:

$$\frac{P_C Q_B + P_C Q_B + \ldots + P_C Q_B}{P_B Q_B \; PBQB + \ldots + P_B Q_B} \text{ or } \frac{\text{current prices and base quantities}}{\text{base prices and quantities}}$$

Paasche:

$$\frac{PcQc + PcQc + \ldots \mathbf{PcQc}}{P_B Q_C + P_B Q_C + \ldots + P_B Q_C} \text{ or } \frac{\text{current prices and quantities}}{\text{base prices and current quantities}}$$

The Laspeyres index takes a basket of goods as it was purchased in the base year and then tracks the cost of that basket over time. The Paasche index takes a basket of goods as it is purchased in the current year and attaches base year prices to that basket.

The Laspeyres and Paasche methods are equally accurate, but the Laspeyres method is used more often since it is easier to calculate.

**Some Popular Price Indexes**

There are three price indexes over which economists, government officials, and the general public keep a watchful eye: the consumer price index (CPI), the producer price index (PPI), and the GNP implicit price deflator (IPD). All three are calculated monthly, and the figures for the first two are widely reported by the media as indicators of the inflation rate.

***Consumer Price Index (CPI)*** The most widely known price index, the CPI, is calculated by the Bureau of Labor Statistics of the Department of Labor. In response to complaints from labor that their cost of living was rising more rapidly than was suspected. Since then the index has also been called the *cost-of-living index.*

The CPI has traditionally monitored a particular, limited basket of goods purchased by a typical urban wage earner and clerical worker. This basket of goods covers a broad range of goods and services, but it does not come close to including all products covered by GNP. Nevertheless, its cost is measured month after month and compared to the cost of the same basket in the base year. Since the basket of goods comes from the base year, the CPI is an example of a Laspeyres price index.

Another reason why the CPI exaggerates the true rise in the cost of living is that, due to a shortcoming in all Laspeyres indexes, the CPI does not allow for month-to-month or even year-to-year changes in the basket of goods. In actuality, the basket of goods purchased by consumers varies in response to changes in relative

prices. Consumers substitute products that rise relatively slowly in price for those that rise relatively fast. By locking in the basket of goods to be measured, the bureau ensures that its data will be made more obsolete every day.

Even though the people at the Bureau of Labor Statistics would prefer that the CPI not be looked upon as a cost-of-living index, it is the measure of inflation that is most often cited by labor as a basis for their need for higher wages "to keep up with the cost of living." Many union contracts include an *escalator clause* that calls for an automatic upward adjustment of wages at the same rate as the inflation rate as measured by the change in the CPI. In addition, Congress regularly upgrades social security, veterans', and food stamp benefits according to the CPI in an effort to maintain the purchasing power of those benefits.

Thus, regardless of the Department of Labor's warnings to the contrary, the CPI is used as the primary indicator of changes in the cost of living. It is the price index that is most widely quoted. Since most people are not typical, however, and do not purchase the basket of goods identified by the Bureau of Labor Statistics, the CPI is an inaccurate (to some unknown degree) measure of the change in most people's cost of living. Plus, since the CPI covers only a limited number of consumer goods, it is far from a true measure of the economy's inflation rate.

***Producer Price Index (PPI)*** The Bureau of Labor Statistics' work does not end with the CPI; they also calculate the PPI. The PPI measures exactly what its title implies, the prices paid by producers in the intermediate good market. The basket of goods covered by the PPI includes almost 3,000 products priced as they would be for large lot orders. Although the PPI was once called the *wholesale price index,* it does not measure wholesale prices, which is why the bureau officially changed the name of the index not long ago. Since

the PPI monitors the cost of a basket of products determined in the base year, it, like the CPI, is an example of a Laspeyres index.

The monthly figures on the PPI are issued early each month (for the previous month) and are reported almost as widely as those of the CPI. Since most retail price changes come about as a result of changes in production costs, it is correctly presumed that changes in the trend of the PPI portend future changes in the trend of the CPI. The two price indexes follow very similar courses. Producer prices tend to vary, however, much more than retail prices. For example, a restaurant does not change the price of its steak dinner every time beef prices change in either direction. As result, the PPI tends to be more volatile than the CPI. Both indexes zig and z; along the same route; the PPI simply has bigger zigs and zags.

***GNP Implicit Price Deflator (IPD)*** The price index that best measures the aggregate inflation, or deflation, rate is the IPD. What distinguishes this index from the **CPI** and PPI is its basket of products. The IPD covers all of the final goods and services included in the calculation of GNP. In a sense, the CPI and PPI are mere subsets of the IPD. The IPD's comprehensiveness makes it the most reliable indicator for studies or discussions of the entire economy, and it is the index most often co suited by economists.

Another characteristic that sets the IPD apart from the other two indexes is the it is an example of a Paasche index. The Department of Commerce, which calculates the **IPD** in conjunction with their computation of GNP, takes the goods and services produced in the current year and recalculates GNP using the prices of a base year. The GNP figure that uses base year prices is divided in the GNP figure that uses current prices to produce the IPD index number.

***Real GNP*** A discussion of the IPD leads to the calculation of GNP in constant dollars – that is, the calculation of real GNP. When a current year's GNP is recculated using a base year's prices, the result is real GNP in the dollars of the base year. As explained

earlier, GNP rises when either output or prices rise, or both. The is why a distinction must be made between *money GNP* (or just plain GNP) and *re GNP.* Money GNP uses current prices, while real GNP uses the prices of a base year. Real GNP rises only when output rises, since, by definition, real GNP is co stant-price GNP.

The formula for computing real GNP is:

$$\frac{\text{GNP}}{\text{price index number of base year of price index}} \times 100 = \text{real GNP for Year X in prices}$$

**Interest Rates**

There is no set pattern of monthly or quarterly announcements, but the media keep us well-posted on movements in interest rates. Since interest rates measure the cost of acquiring money or the reward for not spending it, they are an important measure of economic activity and are the basis of many economic decisions. Unfortunately, much confusion exists on what interest rates measure and which interest rates are which. In this section, we will do some basic groundwork about interest rates – enough to hold us over until Chapter 5, when we will study the money market and the determination of short-term interest rates in more detail.

**What Are Interest Rates?**

Interest is the income paid to surplus savers (people whose income exceeds their spending) for lending money to deficit spenders (people whose spending exceeds their income). There was a time, back in the Middle Ages, when it was against the church and, therefore, the law to receive a reward for not spending income. Fortunately, those days have passed, and it is perfectly legal in capitalist countries for money borrowers to pay interest to money lenders. Let us examine what determines the level of interest rates.

***The Level of Interest Rates*** Everyone who participates in the circular flow of income is trying to earn a reasonable income from his or her personal wealth. By wealth we are referring to physical

and financial assets as well as *human capital* (the skills and abilities of the individual). Some people are greedier than others, but all are trying in some way to maximize their rates of return on the valuable items and qualities that they possess. A crucial economic reality is the fact that those people who are wealthy with abilities and plans are often – due to bad luck or bad timing or simply youth and inexperience – not the people with easily marketable wealth in the form of real and financial assets. Sometimes ambitions and marketable wealth do not match. Under these common circumstances, it makes sense for the people short on extrinsic wealth to borrow from those who have a surplus in the present.

Financial markets bring the borrowers and the lenders together. The people whose costly marketable plans exceed their wealth need to borrow from the people who, through luck or previous effort, presently possess more wealth than marketable plans. The presently wealthy group can then share in the new wealth generated from the borrower's projects by funding those projects.

The lenders of funds deserve a reward, because they give up the chance to spend their funds in the present in favor of spending them later after the loan is repaid. Since most people prefer spending now to spending later, the borrower must encourage the delay of spending by paying interest. In addition, there are risks involved in lending money. The borrower may fail to repay the loan or the lender may decide, before repayment is due, that he or she needs the funds.[9] Interest is also a reward for taking on those risks. The greater the risks involved, the higher the reward must be.

Borrowers will undertake only projects that promise higher percentage rates of return than the percentage cost of borrowing the funds, the interest rate. We will discuss this decision-making process in greater detail in Chapter 13. Borrowers with prospective rates of return on their projects in excess of the going rate of interest will compete for the funds available until the interest rate on the last

dollar borrowed is approximately equal to the projected rate of return on the last project to be funded.

As a result of this market process, the level of interest rates and of rates of return on capital investment projects are, on the average, very closely related. Sup-ply-and-demand forces and market competition will bring loan rates and capital return rates to the same general level. The lenders of funds cannot expect to receive all of the returns on a business project, but they can expect to share in those earnings in return for taking the risk to lend the money. Since the borrowers are the ones who actually make the effort and take personal risks, they should expect to make a rate of return that covers the interest rate and then some. But competition among lenders and borrowers will push the percentage cost of borrowing into close conjunction with the rates of return on capital. One can rely on this conjunction because those with funds to lend can also be the capital investors. If capital rates of return are high relative to loan rates, funds will flow directly into capital projects, driving down capital returns and driving up loan rates. But if loan rates get too close to capital rates of return, everyone will want to lend, but few will want to borrow and invest.

Historically, in the U.S. economy as well as other market economies, a reasonable real rate of return on capital has been in the range of 6 percent to 10 percent, give or take a couple of percentage points. Rates of return in nineteenth-century industry, transportation, real estate, and farming were in the range of 8 percent to 10 percent. Similar rates may be a bit lower on the average in the present; but if you can find a business with a guaranteed 8 percent real rate of return, buy it. Given that capital rates of return should slightly exceed loan rates, interest rate levels on relatively low-risk business loans have normally been in the range of 4 percent to 6 percent in real terms.

***A Multitude of Interest Rates*** Many times economics books refer to *the* interest rate, singular, as if there is only one rate. That can be confusing, since there are actually so many different interest

rates in the financial markets. Let us clear up why there are so many rates and why, in spite of this multitude of rates, economists speak of the interest rate in the singular.

We established earlier, that the general level of interest rates is closely related to rates of return on capital, and that low-risk commercial loans tend to have a rate of interest of about 4 percent to 6 percent in real terms. Now suppose the rate for short-term, low-risk business loans is 6 percent. Not all business loans will be at 6 percent; one rule to count on is that the greater the risk of a loan is, the greater will be the interest rate charged. Thus, a business that is less likely to be able to repay a loan than another business will pay a higher rate on the loan than the other business in order to compensate the lender for the greater risk. Similarly, long-term loans generally have higher interest rates than short-term loans. This is because the possibility of the lender needing the money back before the loan runs its term increases as the term gets longer.

The wide variations in riskiness of loans, due to the reliability of the borrower and the length of term to maturity of the loans, creates a wide variety of interest rates for business loans. Similar variations also exist among consumer loans and government securities (loans). Every borrower is rated as to credit-worthiness. As a result, there are literally thousands of different interest rates.

What must be understood, however, is that in spite of their multitude, the rates tend to move up and down in a sort of unison arrangement like a marching band. This mutual interdependency among all rates results from the fact that virtually all borrowing comes from one pool of funds. All borrowers are competing for the same money. When that pool of funds shrinks relative to the number of borrowers, all borrowers pay more. In the opposite direction, a relative abundance of funds causes all interest rates to fall.

One rate cannot move very far out of alignment with others for very long. Should one rate rise, funds will head toward those loans. That will increase the supply of funds to those loans and cause that

particular rate to fall back in line with the rest. A drop in one rate will scare funds away. Only a readjustment of the rate upward again will bring the funds back. Consequently, when economists speak of *the* interest rate, they are referring to the general level of the whole group of rates. Since the group travels up and down in a closed, albeit sloppy, formation, it is possible to speak of interest rates in the singular.

***Market versus Real Rates*** The **market rate of interest** *(i)* is the actual interest rate charged in the market. The **real rate of interest** *(r)* is the market rate of interest *(i)* minus the inflation rate:

$$\textit{real rate of interest} = \textit{market rate} - \textit{inflation rate}$$
$$r = i - \%\,\Delta P$$

Thus, if the interest rate a bank wishes to charge you is 15 percent, and the inflation rate over the time period of the loan is 10 percent, the real rate of interest is only 5 percent. The 10 percent inflation reduces the purchasing power of the repayment by 10 percent. Even though the repayment is 115 percent of the loan, the purchasing power of that money is only 105 percent of the purchasing power of the loan when it was made.

During periods of inflation it is common for market rates of interest to be quite high while real rates are very low or even negative. Since inflation reduces the real value of a loan repayment, money lenders try to hedge against a loss by tacking the expected inflation rate onto the real interest rate they would like to charge.

**market rate of interest = desired real rate + b • expected inflation rate**

As a result, market interest rates will rise during periods of inflation to keep real rates from falling. The higher is the expected inflation rate, the higher will be market interest rates.

**Some Popular Interest Rates**

Even though the financial markets are loaded with many different interest rates, only a few receive frequent mention by the media or by economists as indicators of credit conditions. A

description of these rates follows. Their significance will be discussed in later chapters.

***The Prime Rate*** The interest rate at banks that is most closely monitored by the media is the **prime rate.** This is the rate of interest charged by banks to their most credit-worthy commercial customers on short-term loans. Aside from individual exceptions and regional variations, it is safe to think of this rate as the lowest available to businesses with the finest credit ratings. Companies with poorer credit ratings will pay the prime rate plus a premium commensurate with their extra risk.

The prime rate is set by banks but is determined by supply and demand. Banks throughout the economy charge the same prime rate as a result of competition. When changes in the supply and/or demand in the money market produce the need for a change in the prime, major banks are usually the first to announce the change. All other banks tend to follow the lead of the New York banks, either because they agree with the need for the change or because competition dictates that they must fall in line.

The prime rate does not vary from day to day like most money market rates, but its level is closely tied to other market rates. When daily fluctuations in money market rates lead to a trend in either direction, one can expect a change in the prime rate in the near future. Depending on how much other rates are varying, the prime rate may change a couple of times a month or just a couple of times a year. When it does change, you will be sure to hear about it, since the cost of money to business has so much bearing on business activity.

***The Discount Rate*** Even though the Federal Reserve (the Fed) has a great deal of influence on the economy, financial markets, and the level of interest rates, the only rate that it actually sets is the **discount rate.** This is the interest rate charged by the Fed when it lends funds to banks. There is no competitive market here, for reasons we will discuss

in Chapter 9, so the Fed can set the discount rate at any level it wants, and it can change the rate whenever it wants.

There was a time when the discount rate was the only tool available to the Fed for controlling the money supply. That time has long since passed. But since the discount rate is still the only interest rate directly controlled by the Fed, changes in the rate still attract a great deal of attention. In actuality, as we will discuss in Chapter 10, changes in this rate have very little direct impact on the banking system and the financial markets. Nevertheless, every change in the discount rate is accompanied by much publicity and analysis. We will discuss later why most of this publicity and analysis is misdirected.

In practice, the Fed tries to keep the level of the discount rate in the same ballpark as other short-term interest rates, such as the federal funds rate (described in this chapter). In much the same fashion as bankers adjust the prime rate, the Fed responds to trends in other interest rates when it makes its changes of the discount rate. The Fed makes these adjustments even less often than bankers change the prime rate.

**3. Unemployment**

Another economic statistic that is announced monthly and is often anxiously awaited by friends and foes of policy-makers is the **unemployment rate,** which is, the percentage of the labor force that is unemployed. The level of unemployment is a critical indicator of the health of the economy and the factor market. A rising unemployment rate accompanies economic contraction or very slow expansion, while a falling unemployment rate signals a healthy expansion of output. There is probably no statistic that worries politicians more than the unemployment rate, because unemployed workers have lots of free time to vote on election days. Incumbent politicians and unemployed workers do not mix well.

From the unemployment rate, a knowledgeable person can reach many conclusions about the state of the economy.

Knowledgeable in this case means knowing how the unemployment rate is calculated, the kinds of unemployment that can exist, what full employment means, and the relationship between *NI* growth rates and the rate of unemployment. The next section will make you, in this regard, a knowledgeable person. And, if nothing else, it will explain why you may not find a job when you graduate.

**The Unemployment Rate**

Every month, the Bureau of the Census sends a small army of data gatherers to canvas a statistical sample group of over 50,000 U.S. households. Among the many questions these canvassers ask is whether members of the household who are sixteen years of age or older are working or not. A second question follows for those who are not working: Are you actively looking for a job? The purpose of these two questions is to classify each adult into one of three categories: (a) employed, (b) unemployed, and (c) not a member of the labor force. The Bureau of Labor Statistics of the Department of Labor uses the results of this census report to calculate the size of the labor force and the percentage of that labor force that is unemployed. A person must either be employed or actively seeking employment to be considered part of the **labor force.** Convicts, housewives and househusbands, patients in hospitals, and retired people are not a part of the labor force. Unfortunately, this method of calculations omits many potential workers who are not actively looking for work because they have failed so often to find a job.

A. employed

B. unemployed but looking for a job J

**labor force**

C. unemployed but not looking for a job

% unemployed = B / A+B = unemployed but looking/ labor force

**Three Types of Unemployment**

To better interpret the unemployment rate and analyze methods for reducing unemployment, it is constructive to break down

unemployment into three types: frictional unemployment, structural unemployment, and unemployment caused by slow or negative output growth (often called *cyclical* unemployment in the past, but more recently referred to as *demand-deficiency* unemployment). Some modern labor market theorists as well as some monetarists are not particularly fond of this three-way division. For our goal, however, of analyzing the reasons for persistent unemployment, such a division is helpful.

The first two kinds of unemployment, frictional and structural, exist to some extent regardless of the state of the economy. Policy designed to reduce or eliminate the third kind of unemployment (demand-deficiency) may have little or no effect on frictional and structural unemployment. Let us consider those two first ***Frictional Unemployment*** Up to one-fifth of the U.S. labor force changes jobs every year. Each month, the census people find workers who have very recently lost or left their jobs. In many cases, if the canvassers returned a couple of months later, they would find those workers reemployed. At the same time, however, a whole new group would have temporarily joined the unemployment ranks. **Frictional unemployment** refers to workers who have marketable skills but are unemployed for short periods of time due to (1) voluntary job shifting or (2) changes in product demand and supply that result in shifts of jobs from one firm, industry, or geographic region to another.

Many workers are interested in finding a better job than they presently have. "Better" could mean higher pay, preferred location, or improved working conditions. Whatever the goal, it is often difficult to look for the new job while continuing to hold the old one. Personnel offices do not stay open after 5:00 P.M. or on weekends. Your boss may not be pleased if you ask her for a day off to search for a better job. She may just give you the rest of your life off to look. As a result, many people voluntarily leave or lose one job in order to search for another, more desirable one.

Some workers find themselves temporarily without a job because of changes in the market for their employer's product.

These are workers with marketable skills who happen to be employed by a company that is either faring poorly in a healthy industry, or is a part of an industry that is faring poorly in a healthy economy. Either way, jobs for these workers are disappearing in one company (or one industry) but are appearing in others. This event is common in a growing economy, since the nature of economic growth is that some companies and industries prosper while others fall in their wake. The laid-off worker has to find out where other jobs are opening.

It may take weeks or months for frictionally unemployed workers to find the right job. Being without a job gives them the chance to sample the labor market and consider a variety of opportunities. This process takes time – called **search time** by economists. The benefit of taking the time is the potential of finding a much better job tomorrow. The costs are the losses of income during the search period. When those costs start exceeding the benefit, it is time to settle for the best offer available thus far.

Ironically, unemployment compensation, by reducing the costs of search, works to lengthen the optimal search period for frictionally unemployed workers. As a result, the compensation increases the number of frictionally unemployed at any given time – it causes the unemployment rate to be a bit higher than it would be otherwise (though this fact is not necessarily an argument against the merit of such benefits).

A few million workers being frictionally unemployed every month sounds like a source of concern, but it really is not. The existence of frictional unemployment is a sign of labor and social mobility – an auspicious quality in the labor market. Frictional unemployment is truly a low-priority problem, and it can be ameliorated by job information services that help connect workers and jobs, thereby reducing search time.

***Structural Unemployment*** There are many workers who cannot find jobs because they lack marketable skills. These people are often

without a job for a long time and are labeled as hard-core unemployed. This category of unemployment, called **structural unemployment,** includes people who have yet to develop a skill (like teenagers and some adults), people whose skills have been made obsolete by automation, people whose skills have become rusty during a period of inactivity in the labor market (like many women who reenter the market after rearing children), people whose skills are not recognized by employers due to discrimination (like some women and some minorities), and people who for some other reason cannot find a job requiring what they have to offer.

A frustrating characteristic of the U.S. labor market is that, except during recessions, there usually are more job vacancies than job seekers, yet the jobs call for skills that the job seekers do not have. The existence of thousands of job openings for computer programmers does little to comfort a nineteen-year-old person who is a member of an often discriminated-against minority group and who has never held anything but a part-time job. In contrast to frictionally unemployed workers, who are looking for jobs that best match their skills, structurally unemployed workers have no skills that the market desires. And a painful extension of that contrast is the fact that most structurally unemployed workers receive no unemployment compensation, because they have worked too little to qualify, or because they have been without a job for a time that exceeds the coverage period.

Many believe that the U.S. minimum wage law contributes to structural unemployment. Unskilled workers, no matter how hard they work, may be worth only $2 or $3 per hour to their employers. In a competitive labor market, wages are based upon the workers' value to their employers. If the law dictates that at least $3.50 per hour must be paid by employers, they will lose money every time they pay an unskilled worker who can generate only $3 worth of value. The law of demand overrules the minimum wage law and causes employers to hire fewer unskilled workers. While it is not

clear how many people are not hired because of the minimum wage law, there can be no doubt that the law adds to structural unemployment, particularly among teenagers who would settle for $3 an hour just to get the money and the experience. Here is a law, designed to help the poor, which also helps create unemployment.

What structurally unemployed workers need above all else are marketable skills. The best way to reduce structural unemployment is to provide training programs for these workers. Since they cannot all join the army, navy, air force, or marines, incentives must be provided to encourage employers to take on the extra cost of training.

As pointed out earlier, automation creates some unemployment by making some workers' skills obsolete. One should not surmise, however, (though many a worker who has lost a job to automation has thus surmised) that automation or technological change is the enemy of the labor force. Automation usually creates more jobs than it destroys.[10] If it did not, the most automated economies, such as Japan, the United

States, or Germany, would have the biggest perennial surplus of labor. Quite the contrary, the least automated economies have the highest unemployment rates and the lowest levels of wages. Individuals may have good reasons to fear automation, but the labor force in the aggregate should recognize that automation is its ally.

***Demand-Deficiency Unemployment*** Fractional and structural unemployment are often concentrated in certain subgroups of the labor force or subsectors of the economy. When skilled workers are being laid off throughout the economy in a wide variety of industries, the culprit is usually slow sales and consequent production cutbacks. **Demand-deficiency unemployment** refers to the unemployment above and beyond frictional and structural unemployment. It is caused by a shortfall in the quantity of demand in the product market relative to output. The shortfall in demand and the resulting layoffs may be localized in one or two major industries

to begin with (housing and automobiles for example), but the circular flow process causes the drop in sales to spread throughout the economy. When sales lag behind production, and inventories climb too rapidly, U.S. producers tend to respond by cutting back production and laying off workers.

Workers laid off due to deficient demand may think, or hope, at first that they are an example of frictional unemployment. The market, they presume, still values their skills, but maybe sales have just dropped off at this one firm or in this one industry. The job search process will tell such workers whether or not they are frictionally unemployed. If they find that other workers of similar skills are being laid off simultaneously at all of the places they would hope to find a job, that is a strong indication that the shortfall in demand and sales is widespread. If so, the job loss is part of a macro problem, not a micro one. As the search time extends well beyond the optimal period, it will become clear that the unemployment is due to insufficient demand.

Demand-deficiency unemployment is associated with declines or slow growth in output. We learned earlier in this chapter that if output grows more slowly than the rate of growth of capacity, unemployment will rise. This type of unemployment is demand-deficiency unemployment. A recession brings a rise in unemployment, and recovery brings a fall. It is the appearance or increase in demand-deficiency unemployment and its decline or disappearance that causes the unemployment rate to rise and fall through the business cycle."

**Full Employment**

Ever since the Employment Act, if not before, macro policy has been directed toward maintaining high employment and stable prices. It is not clear what the authors of the legislation had in mind when they spoke of high employment, but we certainly need to establish what is generally meant today by *full employment.*

***The Full Employment Rate*** Full employment does not mean zero percent unemployment. Even most politicians know that zero percent unemployment is impossible. We can always expect to suffer from some measures of frictional unemployment and structural unemployment. A variety of policies (such as job information services and training programs) can reduce these two forms of unemployment but cannot eliminate either of them. Whereas increases in demand have been successful in reducing demand-deficiency unemployment, such increases are relatively ineffective in decreasing either frictional or structural unemployment, because these two groups of unemployed workers have not lost their jobs due to a shortfall in demand. Increases in demand will not improve job search information or job training. Policy-makers who try to manipulate demand may hope to eliminate demand-deficiency unemployment, but their impact on the other two forms of unemployment will be limited.

Because of this dichotomy between frictional and structural unemployment on one hand and demand-deficiency unemployment on the other, the simplest and most practical definition of **full employment** is the level of unemployment at which only structural and frictional unemployment exist. Whenever demand-deficiency unemployment exists, the labor market is not at full employment. Therefore,

**% of labor force frictionally unemployed**
**+ % of labor force structurally unemployed**
**= full employment rate of unemployment**

In recent years, the sum of frictional and structural unemployment has been estimated to be close to 6 percent of the labor force. That is, if the unemployment rate were to drop to about 6 percent, the labor market and the economy would be said to be at full employment.

Associated with the full employment rate of unemployment is **full employment output** *(FE),* the level of real GNP that would be

produced if unemployment were at the full employment rate. Any time demand-deficiency unemployment exists, *Q* is below the level of full employment. The gap between *Q* and *FE* is a possible measure of the output lost as a result of the deficiency in demand. Figure 2-6 shows actual real GNP and *FE* output and the gap between the two. When unemployment is pushed below the full employment rate, the gap is negative. The goal of fiscal and monetary policy is to make that gap equal to zero. Because of that goal, full employment output is often also called **potential GNP** (or **potential output).**

***Full Employment and Inflation*** Why should our society be satisfied with an unemployment rate as high as 6 percent, meaning approximately 6 million people are unemployed? The problem is that if we were to push the unemployment rate below the full employment figure through increases in demand, demand would outrace output, and inflation would result.

Because of this, another useful definition for *full employment* is the maximum level of employment (or the minimum level of unemployment) that can be attained without setting off major increases in production costs and prices. Again, that level of employment or unemployment is reached when only structural and frictional unemployment remain.

Some economists call the minimum rate of unemployment that is attainable without causing inflation the **natural rate** of unemployment instead of the full employment rate. This is because they argue that it is virtually impossible to sustain unemployment rates below the full employment rate without asking for ever-increasing inflation. We will save a more thorough discussion of this topic for Chapter 17.

Whether we use the terminology of full employment or the natural rate of unemployment, the picture is the same. When demand-deficiency unemployment ha been eliminated, efforts to

lower unemployment will be likely to set off an acceleration in inflation, because of a scarcity both of skilled labor and of all of the other factors of production that are combined with labor. When utilization of the labor force reaches the range of 94 percent or 95 percent, the utilization rates of all other factors are also closing in on 100 percent. Quality labor is not the only quality factor that becomes hard to find. As a result, production costs and product prices rise much more rapidly when the full employment level of income and production is reached Without making major structural changes, policy-makers cannot hope to push unemployment below the full employment (or natural) rate or output beyond the fu employment level without setting off inflation or accelerating existing inflation. It i all a matter of the ability of output to keep up with demand in the product market. We have now covered the main measures of economic activity. As a kind c summary and a handy reference, Tables 2-8 through 2-11 provide data on all of the measures of economic activity that we have studied. You may find it useful to refer to these tables from time to time while you read the rest of the book. It is time w set off on our tour of the big three markets, starting with the product market.

**Summary**

1. GNP measures the level of economic activity by calculating the total of final sales of goods and services for one year, and *NI* measures the same thing by calculating income earned by the household sector in one year.

2. The only differences between GNP and *NI* are depreciation allowances and indirect business taxes, both of which are included in final sales receipts but are not sent to the household sector as income.

3. Output grows at an average rate of about $3^{1}/2$ percent a year while output per capita rises at a rate of $1\ ^{1}/_{2}$ percent to 2 percent

per year.

4. The rate of inflation can be measured with price indexes – such as the consumer price index, the producer price index, and the GNP implicit price deflator – which compare the cost of a basket of goods in any given year to a selected base year. Real GNP can be calculated by dividing money GNP by a price index.

5. Interest is the reward paid to lenders for delaying consumption and taking on risk; the greater the risk, the higher is the interest rate.

6. Interest rates charged in the market are arrived at by adding the expected inflation rate onto a desired real interest rate.

7. The unemployment rate measures the percentage of the labor force that are actively seeking jobs.

8. Unemployment can be divided into three groups: frictional (short-term with marketable skills), structural (long-term with a low level of marketable skills), and demand-deficiency (due to a drop in the level of demand).

9. The economy is said to be at full employment when only frictional and structural unemployment remain.

10. Efforts to push unemployment below the natural (or full employment) rate cause rapidly rising costs and inflation.

**Key Concepts to Know**

1. Why GNP and NI measure the same thing conceptually but, due to accounting and measurement conventions, are not equal when measured by the Department of Commerce.

2. Why output growth averages around $3^{1}A>$ percent a year.

3. The relationships among GNP, NNP, A7, personal income, DI, and saving.

4. How a price index measures inflation and how to interpret index numbers.

5. How uninterrupted inflation is a phenomenon of only the last twenty-five years.

6. Why real interest rates tend to gravitate toward rates of return

on capital, and what risk and expected inflation do to the level of market interest rates.

7. The difference between real and market interest rates.

8. Which interest rate is the best indicator of credit market conditions.

9. The differences in the causes of the three types of unemployment and why policy that reduces demand-deficiency unemployment is relatively unsuccessful at reducing frictional or structural unemployment.

10. Why efforts to reduce unemployment below the natural rate tend to be inflationary.

**Terms**

| | |
|---|---|
| value-added | natural rate |
| index numbers | net national product |
| Laspeyres index | capacity |
| Paasche index | productivity |
| market rate of interest | recession |
| real rate of interest | depression |
| prime rate | unemployment |
| discount rate | gross private investment |
| federal funds rate | net investment |
| unemployment rate | planned investment |
| labor force | net national product |
| frictional unemployment | unplanned investment |
| search time | proprietors' income |
| structural unemployment | personal income |
| demand-deficiency unemployment | disposable income |
| full employment | net taxes |
| full employment output | inflation rate |
| potential GNP (or potential output) | base |

**Test**

1. This department gauges the level of economic activity – or more specifically, the level of production – through its measurements of _____ (GNP), _____ *(NI),* and all of the subparts of those two_____.

2. Changes in GNP and *NI* are what tell us the economy is _____ a recession, _____ expansion, or an _____ expansion.

3. In order to correct for that double-counting, depreciation allowances made by companies throughout the economy are deducted from GNP to find _____..

4. GNP - depreciation = _____

5. NNP - _____ = NI

6. Add net investment instead of gross investment onto consumption, government purchases, and net exports, and you get _____.

7. Government purchases (GP) = _____ - government transfers (GT)

8. Net product exports = product exports - _____-

*9*. GNP - = net national product (NNP)

10. _____ - indirect business taxes = _____

11**.** _____ is personal income minus personal taxes. The dominant personal tax is the income tax.

12. The set attitude:

| | | | |
|---|---|---|---|
| 1 | ***NT*** | A | ***NI - NT*** |
| 2 | ***DI*** | B | ***NI - NT* - retained earnings** |
| 3 | ***r*** | C | **C + S** |
| | | D | ***T - GT*** |
| | | E | ***i – % ΔP*** |

13. Real rate of interest = market rate - _____

14. Market rate of interest = desired real rate + b · expected inflation rate

**Goals**

To learn how NI and GNP are measured and what they tell us.

To see how price indexes are calculated and what they measure.

To present the well-known price indexes and to show how real GNP is calculated.

To learn what interest is and what determines the levels of interest rates.

To present some of the more famous interest rates.

To learn how the unemployment rate is calculated and how unemployment can be divided into three classes.

To look into the relationship among unemployment, output, and inflation.

**New Symbols**

| | |
|---|---|
| NNP | net national product |
| Dl | disposable income |
| NT | net taxes |
| T | taxes |
| S | personal saving |
| C | consumption |
| CPI | consumer price index |
| PPI | producer price index |
| IPD | GNP implicit price deflator |
| r | real interest rate |
| I | market interest rate |
| FE | full employment output or factor utilization |

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# PART TWO MODEL BUILDING

## Theme 3. Fundamental aggregate demand and supply theory

1. Demand and Supply in the Aggregate
2. Unemployment and Inflation
3. The Neoclassical Interpretation
4. The Keynesian Interpretation
5. A Modern Synthesis

Understanding the macro economy means first and foremost grasping the concepts of aggregate demand *(AD)* and aggregate supply *(AS)* and knowing what their determinants are. All changes in the state of the economy are a product of or can be explained in terms of changes in the levels of either *AD* or *AS* or both. The comprehension of this fundamental truth requires a bit of effort, but it also eliminates most of the confusion and mystery that is often attached to changes in the economy. What would macroeconomics be without that confusion? Easy, that's what.

The purpose of this chapter is to build some models of *AD* and *AS* that are well-founded in the simple and orderly laws of basic supply-and-demand theory. *AD* and *AS* are simply the grand sums of all the many individual demands and supplies throughout the economy. The same laws that govern the demand for pizza and beer influence the level of *AD.* Key variables in basic supply-and-demand theory are prices, output, and income. Those are the same variables that are of primary concern in macroeconomics. The difference, as we discussed in Chapter 1, is the level of aggregation.

Our goal is to build a model that shows us how the levels of output, prices, and national income are determined in the product market. The model will also help us to explain the causes of inflation and unemployment. We will then consider two older versions of the *AD-AS* model – that is, the neoclassical and Keynesian versions. These two versions led to some very different

policy prescriptions in the past, particularly during the Great Depression, when the Keynesian version was devised.

**1. Demand and Supply in the Aggregate**

Since aggregate demand and aggregate supply are simply the grand sums of all finished product demands and supplies, respectively, we would expect that the rules that govern the many individual micro product markets would apply as well to the aggregate product market. Fortunately, they do. The laws of demand and supply hold true for any market, regardless of its level of aggregation.

At the micro level, demand and supply interact in each individual market to determine the equilibrium levels of individual prices and outputs. At the aggregate level, aggregate demand *(AD)* and aggregate supply *(AS)* interact to determine the equilibrium general price level and the equilibrium level of output for the entire economy. Money *NI* (or money GNP) is simply the product of the price level times output. Equilibrium changes when, and only when, the level of aggregate demand or aggregate supply change, leading to a change in output and the level of prices.

Are the workings of demand and supply at the macro level similar enough to the workings of aggregate demand and aggregate supply that we can take a typical supply-and-demand graph for an individual market such as in Figure 3-1 A, and convert it into a graph for an aggregate product market? The answer is, basically, yes. Actually, the exact shape that the aggregate demand and aggregate supply curves will take is shown in Figure 3-1B, and we will discover the reasons behind those shapes shortly. It should be noted at this juncture, however, that the laws of demand and supply hold true in the aggregate; that is, higher prices discourage *AD* while they encourage *AS.*

Let us more precisely define these terms. **Aggregate demand** *(AD)* is the grand sum of all of the demands for finished goods and services in the product market. It is possible, although not necessary, to divide aggregate demand according to the demands emanating

from the four sectors shown in the complete circular flow model in Chapter 1. Thus, *AD* can be expressed as the sum of consumption *(C),* which is the demand for products by the household sector; investment *(I),* which is the demand for products such as manufacturing plants and equipment by the business sector; government purchases *(GP),* which, as explained earlier, are the demand for products by the government; and net product exports *(X),* also explained earlier, which is the difference between foreign demand for domestic products and domestic demand for foreign products.

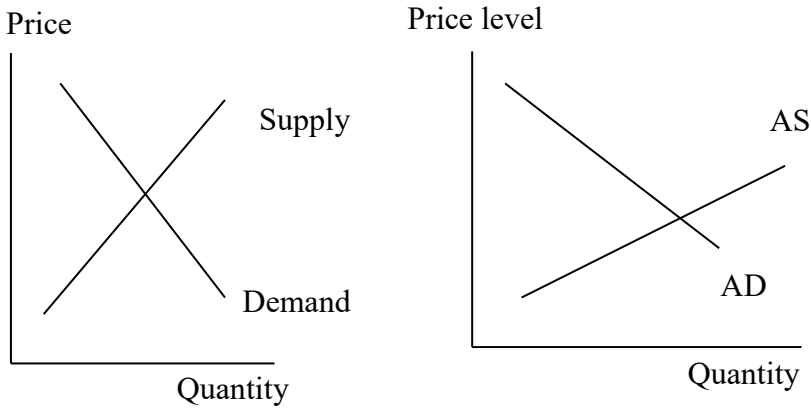


**Figure 3-1 Micro to macro**

**AD = grand sum of finished product demands**

**or**

**AD = consumption + investment + government purchases +**

**AD = C + I + GP +**

**or, if we omit foreign trade, as is often done: AD = C + I + GP**

On the other side, the total of all outputs of final goods and services produced in the business and government sectors is the dollar value of **aggregate supply** *(AS).* One measure of *AS* is GNP, which in turn is conceptually equal to *NI,* or the sum of wages, rent, interest, and profits.

***aggregate supply = GNP = NI = output x price level***
***and AS = wages + rent + interest + profits***

**Determinants of Aggregate Demand**

The determinants of a single consumer's demand for an individual product can be applied to aggregate demand as well. Let us consider how each of the following determinants – buyer's income, buyer's preference for that particular product rather than another, the price of that product, and prices of other, similar products – can be adapted to aggregate demand.

*Money* ***Income*** If a consumer's individual money income rises, his or her level of demand for products will probably rise. Likewise, if *NI* rises, so, too, should the level of AD. But before establishing a relationship between *NI* and AD, we must first establish how any change in *NI* occurs.

A fundamental axiom in macroeconomics is that the dollar value of total sales (or total final sales) must equal the amount of the **money supply** *(MS)* – usually defined as currency plus checking account deposits – multiplied by the rate of turnover, or circulation, of that money through the circular flow. All goods and services must be bought with money. At every sale, money changes hands; it is used over and over. If we add up all of the money in circulation and measure how often each dollar, on the average, makes a complete trip through the circular flow, all we need to do is multiply the money supply times the average number of trips in order to get the dollar value of total final sales. Economists call the rate of turnover of money its **velocity** *(V).* Thus:

**money supply x final sales velocity = total final sales**
***MS*** **x V** $_{\textbf{final sales}}$ **= total final sales**
***MS*** **x** $V_{FS}$ **= money *NI* = output x prices**
***MS*** **x** $V_{FS}$ **= *NI* = Q x *P***

The preceding equations are examples of the *quantity of money equation of exchange,* which applies to every economy. It is too simple to be violated. The equation of exchange is a truth. From the equation we can see what could cause *NI* to rise: either the money

supply *(MS)* or the velocity of money *(V).* When *NI* rises, the level of *AD* at all prices rises and shifts the *AD* curve to the right as in Figure 3-2.

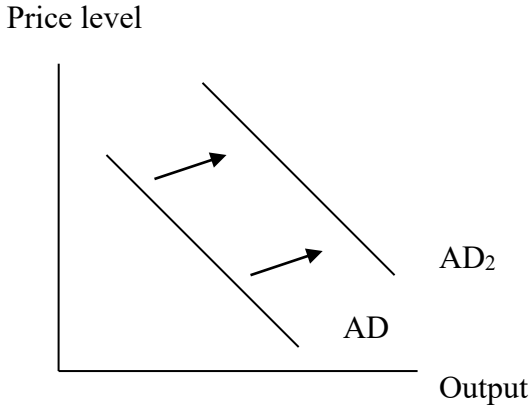


**Figure 3-2 Increase in level of AD**

Likewise, a drop in either *MS* or *V* will cause the level of *AD* to fall and shift the *AD* curve to the left. Thus, we can say that the level of *AD* is fundamentally a function of two variables, *MS* and *V:*

$$\text{level of } AD = d\,(MS^{+},\ V^{+})$$

Anything that changes the level of *AD* must either change the quantity of money or the rate at which money circulates, and there are no exceptions to that rule.

This rule is valid for changes in other variables that are said to affect the level of *AD.* These other variables must have their impact on the level of *AD* by way of one or the other two fundamental determinants, *MS* or *V.* For example, changes in any of the three main components of aggregate demand, consumption, investment, and government purchases, must be explained by changes in either the money supply or velocity. As straightforward as this sounds, debates still teem about where changes in the level of *AD* come

from and to what degree these changes can be predicted and controlled.

***Spending Now or Later*** At the micro level, utility and marginal utility concepts are applied to show why one product is preferred over another. The marginal utility per dollar of one good compared to another is not relevant at the aggregate level. We are interested not in *which* products are demanded, but in the total amount demanded of all products. Thus, it is a matter of whether to spend or not to spend. And since all demanders spend at one time or another, it really is a matter of whether to spend now or later. Demanders in all three sectors have the ability to spend either less than or more than their present incomes in any given time period. That is, demanders can save or dissave. It is important to the level *of AD* whether spenders have decided to speed up or slow down their spending rates. In macroeconomics, product preferences do not matter, but time preferences definitely do.

A variety of variables can influence demanders' spending time frames, the most obvious being the interest rate. Interest income is a reward to savers or lenders for not spending part of their incomes now and spending it later instead. Interest is also the cost to borrowers of spending beyond their incomes now. All else being equal, low rates of real interest encourage spending in the present by discouraging savers and encouraging borrowers. High interest rates are an incentive to spend in the future for both savers and borrowers. A decline in interest rates can generate an increase in the level of *AD* as demanders in the household and business sectors choose to spend more in the present. A rise in the interest rates can cause the level of *AD* to fall. We will learn in Chapter 5 how the interest rate falls as the result of either an increase in the money supply or a decrease in the level of money demand. We have already established that an increase in the money supply causes the level of *AD* to rise. What about a drop in money demand? As we will discuss later, a drop in money demand causes an increase in the velocity of money. Thus, a drop in the interest rate is really just an example of a change

in one of the two fundamental determinants of aggregate demand. It is not so much a drop of the interest rate as the increase in the money supply or velocity that causes the level of *AD* to rise.

Another example of a variable that can influence the timing of spending is **inflationary expectations –** the anticipation of future increases in the price level. This variable has been particularly influential in recent years. Since inflation reduces the purchasing power of any money income flow, expectations of future inflation cause many spenders to accelerate their spending. An increase in inflationary expectations can, therefore, cause the level of *AD* to rise. Since inflationary expectations cause buyers to spend money faster and hold onto it less, we are really talking about an increase in the velocity of money. Inflationary expectations cause velocity to rise. An increased desire to spend now means an at least temporary rise in the level of *AD,* but that increase still requires a rise in velocity.

In addition to changes of the interest rate and inflationary expectations, other variables could lead to an acceleration of spending and generate a shift in the *AD* curve. Whatever the variable, the level of *AD* rises whenever more spending is scheduled for the present, and the level of *AD* falls when more spending is scheduled for another time period. Those changes can come about only if there has been a change in *MS* or *V*.

***The Price Level*** Once the level of aggregate demand is established, the final variable needed to determine the exact quantity of output that will be demanded is the general price level *(P).* At the aggregate level, individual prices are not important the way they are at the micro level. The aggregation of all prices into the general price level allows us to find the real purchasing power of money national income – and, therefore, money balances – ready to be spent by all sectors. That in turn lets us determine the quantity of output demanded.

Changes in the general price level lead to modifications in the quantity of AD. Aggregate demand follows the same law of demand as does individual product demand. The aggregate quantity of products demanded by all sectors of the economy rises as the general price level falls, and vice versa. Given a particular level of money national income, the lower the general price level is, the higher the purchasing power of that money income will be. More goods and services will be demanded when prices are low than when they are high.

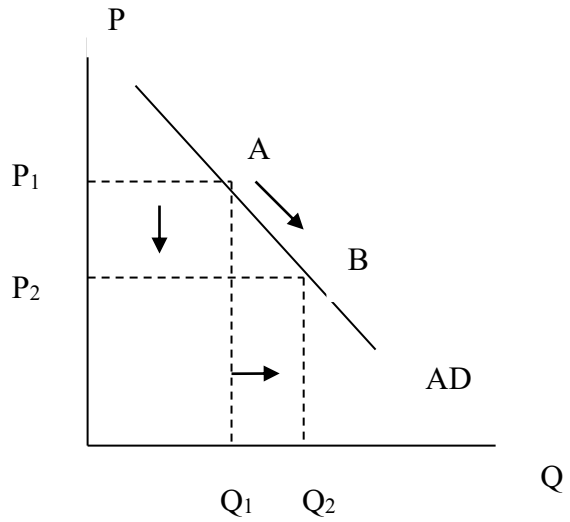


**Figure 3-3 An increase in the quantity of AD**

This relationship between the general price level and the quantity of *AD* is depicted in Figure 3-3. The *AD* curve shows that as the price level falls from *Pi* to $P_2$, the purchasing power of a trillion dollars of money income rises, and the quantity of products demanded rises from $Q_1$ to $Q_2$. A trillion dollar's worth of money income will obviously buy more goods and services at a lower price. Output and prices are just the opposite sides of the same seesaw. As long as *NI* is unchanged, a rise in output means a fall in the price

level, and a rise in *P* means a fall in output demanded. Output and the price level both are the result of interactions between the levels of *AS* and *AD.* Variations in output and the general price level occur only as a result of shifts in the levels of *AD* and *AS.* Changes in the price level and output follow changes in the levels of *AD* and *AS* – not the reverse. But, when a change in *P* does occur, it will lead to an adjustment in the quantity of *AD* or, as we shall see, the quantity of *AS.*

Since the quantity of output cannot be determined without knowing the level of *P,* and since *P* results from interactions of the levels of *AD* and *AS,* we should move on to discuss the determinants of the level of *AS* so that we can complete our picture. All of the variables we have discussed in this section will be included in our model-building in later chapters.

**Determinants of Aggregate Supply**

The conversion from micro to macro on the supply side is fairly straightforward; the aggregation of individual supply determinants changes them very little. The result is an upward sloping *AS* curve. Nevertheless, the exact shape of the *AS* curve is a topic of heated debate. Let us see how supply determinants at the micro level – that is, goals of the firm, costs of production, productivity of inputs, and product prices – are translated into macro.

***An Aggregate Production Function*** The economy's ability to produce goods and services at any given time is determined by the quantity and quality of its factors of production (land, labor, and capital). The maximum level of production that can be achieved with those factors at any given time is called the economy's capacity to produce.

***capacity = f (land, labor, capital, productivity)***
***capacity = f (RM, L, K, PROD)***

Land includes raw materials *(RM)* of all kinds, and productivity *(PROD)* incorporates all quality aspects of the factors of production

such as labor skills and technology. As mentioned earlier, the production of anything requires a little of all three factors. An increase in the quantity or quality of any of the three factors causes capacity to rise. This is **economic growth,** a rise in capacity to produce.

The level of output produced at any given time is a function of the quantity of factors employed *(F)* and their quality.

**output =** ***q (F, PROD)***

In the short run, however, the factors of production are fixed in quantity and quality. Certainly, the quantity of land or resources is fixed. It is likely that this factor is fixed even in the long run. On the other hand, it could also be said that some resources exist in such vast supply that what determines an economy's output is not the quantity available but the quantity employed. It can also be argued that the quantity of capital and labor are fixed in the short run. The **short run** is often defined in micro as a period during which capital is fixed in quantity and labor is variable. At the micro level such a distinction is appropriate, since an individual firm must produce at the present time, with the plant and equipment it has at the present time. The multiplicity of firms at the aggregate level makes it harder to designate a time period during which all plants at the same time must produce with the capital they have at hand. At the aggregate level, something always seems to be changing.

Nevertheless, in spite of the uninterrupted flux at the aggregate level, the ability of the economy to produce in any given limited period of time – this year, for example – has a finite limit because all of the quantities and qualities of factors of production are limited. Only this year's technology (even though technological change is a continuous flow), this year's capital stock, this year's readily available raw materials, and this year's labor force can be used. Assume for the present discussion that we can make economic growth stand still and that we can look at any economy in the short

run, during which all factors of production have a fixed quantity and quality. In Chapter 15, we will relax this restriction and view the economy in dynamic flux. In the short run, the level of *Q* is a function of how much of these factors are actually employed, which is determined by the levels of *AS* and *AD*.

In addition to a myriad of goals among the many producers in our economy, all share a desire to make profits. Consequently, all firms try to economize to some extent. Economizing also goes on at the macro level. Every economic system is the result of the battle against scarcity, a battle that is fought, in part, by economizing. The general philosophy of almost all of those involved in the production of *AS* is to get the most output from as little input as possible. Plus, the majority of firms in our economy function in industries in which the maximization of market shares is a common goal. With that generalized goal as a guide, we will have no problem determining how the level of output, or *AS,* responds to changes in aggregate variables.

***The Price Level*** If all units of the available factors of production were of equal quality and availability, output would increase steadily until the economy's productive capacity would be reached, and then it would stop dead, as if it had hit a wall. We might envision a giant factor warehouse where the first unit employed is as easy to find as the last. In such an economy, average costs of production would vary only because machines are much less divisible than labor and raw materials. Even so, if each machine could be bought with the optimal quantities of labor and raw materials, average costs would be constant throughout the economy until the warehouse ran out of factors. Firms would not necessarily have to experience increasing or decreasing returns; they could simply pick the best output level and buy the appropriate factors. In such an imaginary economy, the aggregate supply curve, as shown in Figure 3-4, would be horizontal until capacity is reached. At that point, it would become vertical.

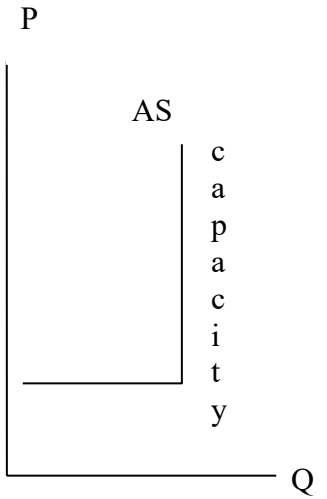


**Figure 3-4 Hypothetical AS curve**

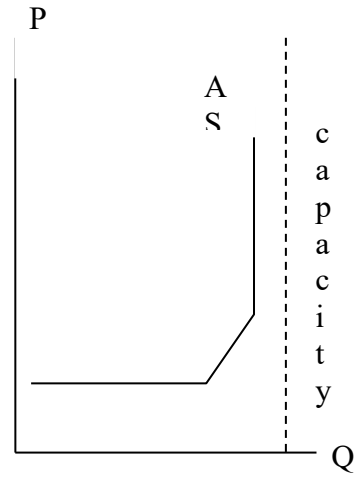


**Figure 3-5 The AS curve**

In reality, factors of production are distributed through very imperfect markets rather than our imaginary, efficient warehouse. The most readily available and highest quality factors are employed first. As the less available and lower quality factors are employed, the productivity of all inputs declines, and average production costs rise. In such a world the *AS* curve slopes upward – gently at first, then increasingly more steeply. As the employment of all factors of production approaches the limit for the given short-run time period, the increasing scarcity of factors weighs heavily on the imperfections of the market allocation system, and the rise in costs accelerates. Competition for increasingly scarce factors drives up factor prices and production costs. The acceleration of rising factor costs is particularly abrupt when output passes full employment *(FE).* Beyond that output level, the scarcity of skilled workers sends production costs up at a very rapid rate. The relationship between factor costs and full employment will be examined closely; for now, observe that the result is an *AS* curve like that in Figure 3-5, which slopes gradually upward until full employment is reached. Beyond *FE,* the *AS* curve is very steep and approaches a vertical position at

capacity, but never quite reaches it. The *AS* curve definitely obeys the law of supply; higher prices are necessary to bring forth greater output. Those price increases must rise progressively as output nears capacity in order to cover the rising costs.

***Input Costs and Productivity*** Based on our discussion of the aggregate production function, it is a short step to understanding what determines the level of *AS.* Factor costs and productivity determine the level of *AS* and the location of the *AS* curve. The level of *AS* will move in the opposite direction of changes in production costs. An exogenous decrease in production costs will cause the level of *AS* to increase, and an exogenous rise in costs will cause it to drop. Such changes in production costs can come in two forms: changes in factor prices and changes in the productivity of factors. By exogenous, we mean changes not related to output or to the degree of factor utilization. These variations will result in shifts of the *AS* curve, but the nature of those shifts may differ, depending on whether or not capacity changes.

Suppose a change in an important factor's price comes without any accompanying change in the availability of the factor. An example of such a modification would be a hike in OPEC oil prices with no change in production rates or a union wage settlement that results in higher wages. In these two cases, there is no change in the quantity or quality of factors, which means capacity is unchanged. Production costs, however, are higher at every level of output. The price level necessary to bring forth any level of *AS* is now higher, and *AS* at any price level is now lower. Thus, the level of *AS* has gone down. We illustrate this with a leftward shift of the *AS* curve in Figure 3-6 from $AS_1$ to $AS_2$ – A drop in factor costs would result in a rightward shift to $AS_3$. Since capacity does not change, the shifts in the *AS* curve are more easily oriented to the vertical axis. That is, the *AS* curve does shift left or right; but output. Those price increases must rise progressively as output nears capacity in order to cover the rising costs.

***Input Costs and Productivity*** Based on our discussion of the aggregate production function, it is a short step to understanding what determines the level of *AS.* Factor costs and productivity determine the level of *AS* and the location of the *AS* curve. The level of *AS* will move in the opposite direction of changes in production costs. An exogenous decrease in production costs will cause the level of *AS* to increase, and an exogenous rise in costs will cause it to drop. Such changes in production costs can come in two forms: changes in factor prices and changes in the productivity of factors. By exogenous, we mean changes not related to output or to the degree of factor utilization. These variations will result in shifts of the *AS* curve, but the nature of those shifts may differ, depending on whether or not capacity changes.

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The *AS* curve responds very differently to changes in production costs that result from changes in factor quantity or quality. Any change in the availability or productivity of factors will cause capacity to change. For example, suppose a technological improvement occurs. Capacity will increase, and the capacity line on the *AS* graph will shift to the right as in Figure 3-7. Whenever

capacity rises, production capabilities do also. Thus, the level of *AS* rises, and the *AS* curve shifts to the right from $AS_3$ to $AS_4$. *A* loss of factor quantities or qualities would shift both the capacity line and the *AS* curve to the left. Since capacity *does* change in these instances, the shifts in the *AS* curve are better oriented to the horizontal axis.

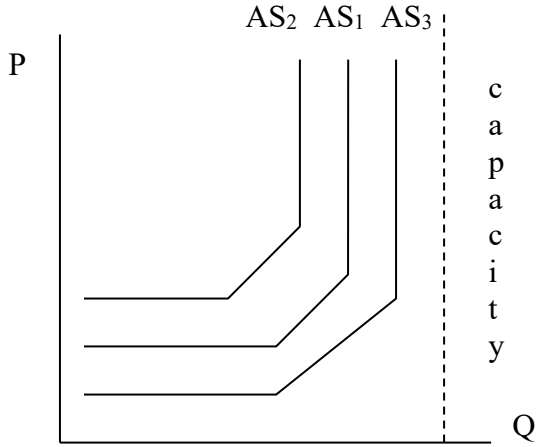



**Figure 3-6 Changer in factor costs**

As proposed earlier, we will concentrate in this chapter on short-run situations during which capacity is essentially fixed. Thus, our short-run changes in the level of *AS* leave the capacity line unmoved. That means the leftward shift of the *AS* curve due to increases in production costs will best be described as upward shifts. And rightward shifts will be easier to see and to graph as downward shifts. Simply remember, that like all supply curves, the *AS* curve shifts up to the left to higher prices and lower output, or down to the right to lower prices and higher output. When capacity is left unchanged, the ups and downs are emphasized more than the lefts and rights.

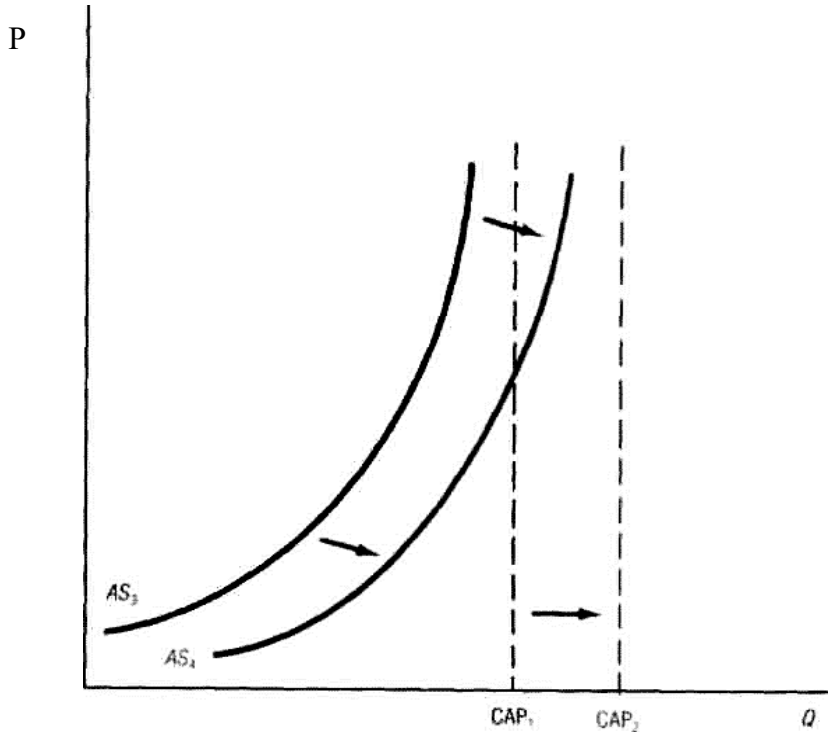



**Figure 3-7 Changer in capacity**

**Product Market Adjustments**

Since output *(Q)* and the price level *(P)* are determined by the interactions of *AD* and *AS,* changes in *Q* or *P* can come about only from changes in the level of *AD* and *AS.* The product market naturally tends toward an equilibrium. **Equilibrium *(EQ)*** exists when the quantity of *AD* equals the quantity of *AS.* When changes in the level of *AD* or *AS* occur, *Q* and *P* adjust until *AD* and *AS* are equal and the product market is in equilibrium. Changes in *Q* and *P* are always in the direction of equilibrium levels. Let us outline how these changes occur.

***Changes in* AD** Starting from equilibrium, suppose the level of AD rises, leaving *AD* greater than *AS* at the current levels of *Q* and

*P.* Producers in general would find that their sales orders would exceed their production rates. That is, they would have more customers than goods and services. What would producers do? Most people who have not studied economics would guess that producers would automatically raise prices to increase profits. In actuality, most U.S. producers would try to increase production in order to expand their markets and, in this way, increase their profits. An increase in output, however, seldom comes without increased costs of production because of limited supplies of factors of production. These cost increases necessitate some degree of price increases. The greater the difficulty that producers encounter in finding factors of production and increasing output, the greater will be the cost increases and the commensurate price increases.

In any case, we can safely conclude that an increase in the level of *AD* relative to *AS* will result in an increase in GNP and *NI* (in money terms). To what extent output increases outweigh price increases, or vice versa, is a matter of the relative size of the increase in *AD* and the level of output relative to *FE.* An increase in output is preferable, but both price increases and output increases result in increases in money *NI* that is in the circular flow. The rise in output is called an **expansion;** it occurs whenever the level of *AD* rises. The effects of an increase in the level of AD are shown in Figure 3–8 by the shift in the *AD* curve to the right from AD, to $AD_2$. *P* and *Q* both rise as the product market moves from equilibrium at Point *A* to Point *B.* Therefore:

**When *AD*↑, output ↑ (expansion) and prices ↑**
**Since O ↑ and *P*↑, *NI* ↑.**

If the level of *AD* falls relative to *AS,* producers will find that their sales run behind their production rates; in other words, they will have more goods and services than they have customers. Again, producers have two choices. In this case, they could either cut back production, or they could lower prices in an effort to bring their quantity of supply in line with demand. Which will they do? A price

cut would help eliminate inventories, but it would also lower profits and easily lead to losses. Because of this consideration, producers often reduce output first, hoping to sell off the inventories at a still profitable price. If the inventories fail to move rapidly enough to produce a sufficient cash flow, a price cut is the next resort. A good example of this process occurred in the auto industry during the most recent recession. Sluggish auto demand caused low sales; producers laid off workers and cut back production. When inventories continued to build, rebates were offered.

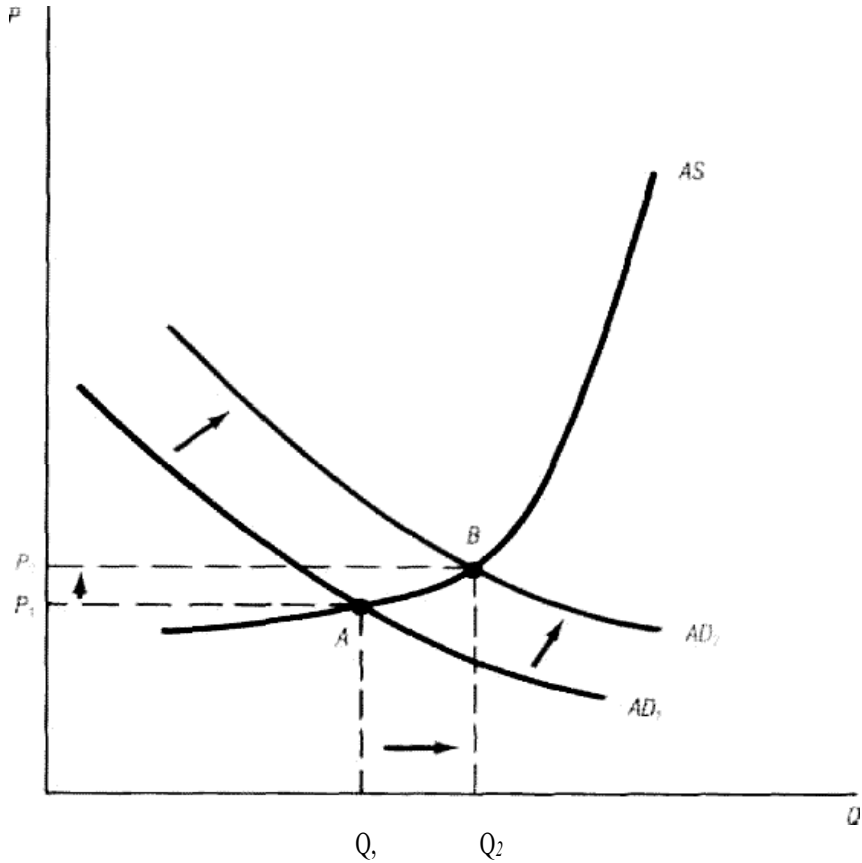



**Figure 3-8 Changes in the level of *AD***

Much as in the opposite situation, a drop in the level of aggregate demand leads to a combination of output and price changes. Both go down.[2] In this case, a price decline would be preferable since workers would not need to be laid off. Whether output or prices change by the greater relative magnitude is a matter of price flexibility. What is certain, however, is that if output and/or prices are falling, GNP and *NI* are falling. A decline in output is called a **contraction.** A drop in *AD* relative to *AS* results in a contraction in output and a fall in prices. This change is depicted by a shift of the *AD* curve in Figure 3-8 from $AD_2$ to AD, and a movement of equilibrium from Point B to Point A.

**When *AD*↓, *Q* ↓ (contraction) and *P*↓.**
**Since Q and *P*↓, *NI* ↓.**

***Changes in* AS** While changes in the level of *AD* result in changes in output and prices in the same direction, changes in the level of *AS* lead to mixed results. Suppose, starting from an equilibrium situation, the level of AS rises. An increase in the level of *AS* sets off changes that leave the economy better off than before. When the level of *AS* rises, producers are willing to produce more than buyers want at current prices. The result is that the price level falls, and sales and output rise. That means that an increase in the level of *AS* causes an expansion and a drop in the price level at the same time. We can see the impact on *P* and *Q* in Figure 3-9 where the *AS* curve shifts to the right from $AS_1$ to $AS_2$ and equilibrium moves from Point A to Point B. Since *Q* is up and *P* is down, we cannot be certain which way *NI* has gone, but we can be sure the economy is better off.

**When *AS*↑, Q↑ (expansion) and P↓.**
**Since Q↑ and *P*↓, *ΔNI* uncertain.**

More output and lower prices mean a higher standard of living. A rise in **labor productivity,** which is the output per worker, could initiate such a change for the better.

Now, beginning again at equilibrium, suppose the level of *AS* falls. As a result, producers wish to produce less output than buyers want to purchase at the current price level. Prices will rise and sales will fall. Thus, a decline in the level of *AS* results in a contraction and a rise in prices at the same time. Since *Q* is down and *P* is up, we cannot be sure whether money *NI* has risen, fallen, or stayed the same. This result is illustrated in Figure 3-9 with a shift of the *AS* curve from $AS_2$ to $AS_1$ and a movement of the equilibrium from Point B to Point A.

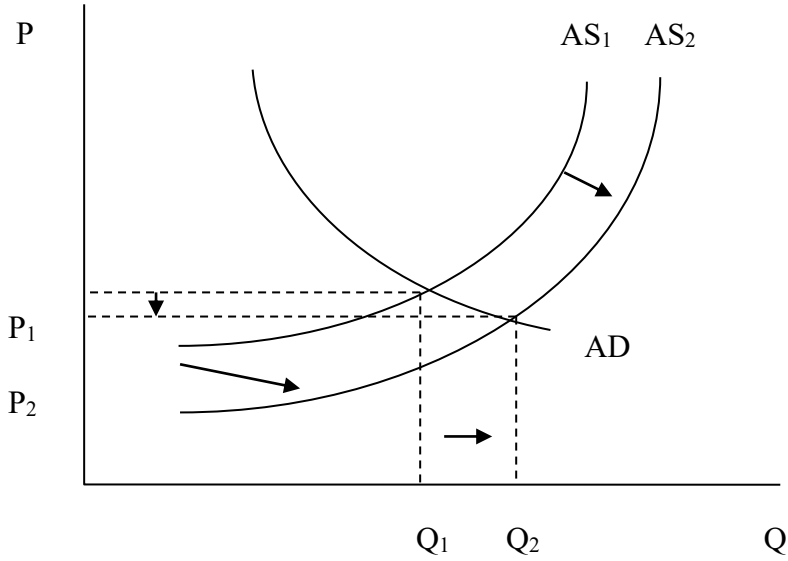



**Figure 3-9 Changes in the level of *AS***

**When *AS*↓, Q↓ (contraction) and *P*↑.**
**Since *Q* ↓ and *P*↑ , *ΔNI* uncertain.**

Whether *NI* has risen or fallen is of little importance compared to the fact that with output down and prices up, the economy is definitely worse off in terms of its standard of living. This is exactly what happened when OPEC oil prices were increased.

The impact of inflationary expectations is not limited to demand-side effects. In fact, such expectations have an even more significant impact on the level of *AS* than of *AD.* When the price level rises, some factor prices rise faster than others. All factor suppliers try to maintain the purchasing power of their money earnings – that is, they try to protect *real* earnings. They do this by raising factor prices in proportion to the expected inflation rate. When factor prices are increased, the level of *AS* falls, and the *AS* curve shifts upward (and to the left). This results in higher prices and lower output. As with demand-side inflationary expectations, the expectation of future price increases causes people to act in ways that contribute to a higher price level. We will be giving supply-side inflationary expectations a lot of attention in later chapters because it explains much of the high inflation and unemployment rates over the last twenty years.

***Equilibrium*** The natural forces at work in the product market tend to make *Q* and *P* adjust until the quantities of *AD* and *AS* are equal – that is, until equilibrium is established. At that time, sales and production are equal, and producers have no incentives to change output or prices in either direction.

**When *AD* = *AS, Q* and *P* stay the same.**

**Table 3-1 Changes in AD and AS**

| Initial Change in the Level of: | Resulting Change in Price | Resulting Change in Output |
|---|---|---|
| ***AD* up** | **up** | **up** |
| ***AD* down** | **down** | **down** |
| ***AS* up** | **down** | **up** |
| ***AS* down** | **up** | **down** |

Equilibrium in the product market is rare. Since the levels of *AD* and *AS* change so often, *Q* and *P* are almost constantly moving in search of their ever-changing equilibrium levels. Changes that start with the level of *AD* are called **demand-side,** and changes that start with the level of *AS* are called **supply-side.** Most government policy in the last twenty-five years has been demand-side oriented, but the supply-side impacts have become increasingly more a matter of interest and debate. We will consider this debate later.

Remember that the words *expansion* and *contraction* refer to the direction in which output moves.

***output up : expansion***
***output down : contraction***

Table 3-1 sums up the four possible changes in the levels of *AD* and *AS,* and it gives the resulting impacts on output and prices.

**2. Unemployment and Inflation**

The *AD-AS* model shows what causes output and prices to move and provides a way to investigate the causes of unemployment and inflation. Whenever output is falling, it is certain that unemployment will be rising. Accordingly, contraction brings unemployment. But unemployment can also rise if output rises too slowly, as we discussed. In general, unemployment arises from a relative shortfall in *AD.* On the other hand, inflation results from a relative excess of AD compared to output. What makes the explanation of unemployment and inflation tricky is that sometimes inflation and unemployment occur at the same time. All is determined by *AD* and *AS.* Proper application of the *AD-AS* model easily explains how either or both of the macro maladies of unemployment and inflation occur.

**Unemployment**

Unemployment, the inability of workers to find or retain a job, comes in all shapes and sizes; and as we will discover in later chapters, one can classify and label unemployment in many

different ways. Many ingredients contribute to secular (long-term) movements in the unemployment rate. In this chapter, however, we will concern ourselves only with significant, fairly rapid rises in the rate. Why, for instance, did the unemployment rate climb from 5.2 percent in 1974 to 8.9 percent in 1975, or from 5.7 percent in 1980 to 10.8 percent in 1982? Or, more incredibly, why did it rise from 3.2 percent to 25 percent during the Great Depression of 1929 to 1933? In order to better understand employment and unemployment, we should recall the relationship between output and the utilization of factors of production established earlier in this chapter. In the short run, the level of output is primarily determined by the quantity of factors employed;

**in the short run:**
**$\Delta Q = q$ ($\Delta$ quantity of factors employed) = $\Delta q(F)$**

Since all output needs at least a little of each factor, most changes in output can be associated with changes in factors employed. Furthermore, changes in labor employment are closely related to changes in output. When output rises, labor employment usually rises, and vice versa. Unemployment always rises when production falls.

When a large number of workers is being laid off throughout the country, producers must be cutting back production by a sizable amount. If production is falling in many industries at once, producers must be responding to a widespread problem. In the case of the periods just mentioned, and in virtually every instance of major increases in unemployment in our economic history, producers cut back production because there was insufficient demand for their products. This kind of unemployment phenomenon is caused by a drop in the level of *AD* relative to *AS.* When sales start lagging and inventories begin building, producers tend to respond with production reductions that require worker layoffs – the classic symptoms of a recession. The actual official government definition of a recession has been two quarters (six months) of declining output. But realistically, the moment workers start losing

their jobs due to widespread production cutbacks a recession has begun. A recession means declining output, which in turn means rising unemployment. Unemployment is born out of a failure of AD to attain the same level as output, most often because the level of *AD* is falling or it is not rising as fast as capacity.

One might ask if there are other reasons for producers cutting back production – to limit supply and increase profits, for one. The answer is yes. But, given the motivation of most firms in our economy to increase their market share, most producers cut back production only when they must. And they must cut back only when they are not able to sell their products as fast as they produce them. To a certain extent, most producers are captives of their markets. They do all they can to expand them, but they cannot ignore falling demand. Profitability constraints often dictate production cutbacks to reduce costs when demand falters. There definitely are exceptions to this practice, particularly in markets with a low degree of competition. When layoffs are widespread, however, *AD* is usually the culprit.

But "usually" does not mean "always." The causes of a rise in the unemployment rate do not have to be rooted in monopolistic market power to be supply-side in their origin. Any exogenous increase in factor costs will cause a decline in the level of *AS* and result in a contraction, with the accompanying rise in unemployment. When production costs increases push up prices and shift the *AS* curve upward, the quantity of *AD* is insufficient to purchase the old equilibrium quantity of output. As the quantity of output sold falls, production falls, and unemployment rises. In this way, OPEC oil price increases in the 1970s contributed to lower U.S. output and higher U.S. unemployment.

Inflationary expectations in the factor market set off a similar reduction in the level of *AS* and push unemployment upward. Regardless of which way the *AD* curve is moving, efforts by factor suppliers to maintain real earnings by raising factor prices will shift the *AS* curve upward and to the left and, thereby, contribute to a higher rate of unemployment. As pointed out earlier, much of the

United State's high unemployment rates in recent years can be attributed to the supply-side effects of inflationary expectations.

Thus, unemployment can be caused by reductions in the level of *AD* or *AS.* Significant upward surges in the unemployment rate probably signal drops in the level of *AD.* But during and in-between such surges, relative drops in the level of *AS* can make output lower and unemployment higher than it would have been otherwise.

Separating the impacts of declines in the level of AD and *AS* is not always easy; hence, neither is pinpointing the exact source of unemployment increases. Clearly, however, increases in the level of either *AD* or *AS* can be used to reduce unemployment. That is where fiscal and monetary policies fit in. Both can be used to set off increases in the level of AD that will cause output to rise and (as long as output rises by at least 3′/2 percent) unemployment to fall. Although fiscal and monetary policies have tended to be demand-side oriented, other government policies could also be enacted that would stimulate production and set off a rise in the level of *AS.* The key to reducing unemployment is increased output, and increases in the level of *AD* have been used more often to combat unemployment. The danger of fighting unemployment with increases in the level of *AD* is that solving one problem may cause another – inflation.

**Inflation**

No word in macroeconomics has associated with it more emotion, confusion, and just plain incorrect diction than *inflation.* First, let us emphasize that inflation is a continuous rise in the general price level. It is not caused by rising prices. Nor does inflation accompany rising prices. Inflation *is* rising prices. Also, inflation is not high prices. If inflation stopped tomorrow, prices would still be high – but they would no longer be climbing. How often have you heard a news commentator say: "Well, inflation went up again last month?" What was most likely meant was "prices went up again last month" or "inflation continued." To say "Inflation went up" is to say "Prices went *up up.″*

The word "continuous" is important to the definition of inflation. Prices vary a great deal in a market economy. That is what microeconomics is all about. One-time price increases are not the stuff of which inflation is made; repetitive increases are. The word "general" emphasizes that inflation is an economy-wide phenomenon. Prices rise at different rates in different industries, and some may even fall. But so many prices are rising during inflation that an economy-wide average price level is rising.

In order to understand the roots of inflation, it does help, however, to look at the reasons for one price rising. An individual price rises when demand for the product exceeds supply. The excess demand can be the result of demand alone increasing, supply alone decreasing, or demand increasing more rapidly than supply.

Since inflation is simply a large number of prices rising, it must occur when the demand for a large number of products exceeds their supply. That is the same as saying *AD* exceeds *AS.* Analogous to the single market example, an excess of *AD* can occur when the level of *AD* alone rises, the level of *AS* alone falls, or the level of *AD* rises faster than output. When inflation is caused by *AD* rising too far or too fast relative to output, it is called **demand-pull inflation.** And when the inflation is due to the level of *AS* falling, it is called **cost-push inflation.** Demand-pull inflation is usually easy to distinguish from cost-push inflation, because output rises in the former case and falls in the latter.

***Demand-Pull Inflation*** One sure-fire way to produce inflation is to allow the level of *AD* to rise faster than output can expand. Since *AD* and *AS* always catch up to one another, increases in *AD* that out-race output will result in increases in the general price level. If one part of *AS,* output, cannot keep up with *AD,* the other part, the price level, will make up the difference. The quantity of money equation of exchange sums up the relationship between *AD* and inflation.

$$MS \cdot V = P \cdot Q$$

The left side of the equation defines the level of AD, while the right side defines the dollar values of *AS.* The two sides rise or fall at the same rate. Increases in the *AD* side that exceed increases in output automatically convert into inflation. If the level of *AD* rises too far or too fast, *P* will rise.

What is too far or too fast? In the previous chapter, we established some basic factual relationships between output expansion rates, full employment, and inflation. Let us recall some of them.

1. Capacity grows at about $3^1/_2$ percent a year.
2. On the average, output expands at the same rate as capacity.
3. In an economy at full employment, output is limited in its ability to expand by the rate of growth of capacity.
4. In an economy at full employment, output can expand little more than $3^1/_2$ percent per year.
5. When output is below full employment, it can expand by more than $3^1/_2$ percent per year. However, since the Korean War, output has not expanded by more than 7 percent in one year.

From these pieces of information, we can conclude that any time the level of *AD* rises faster than 7 percent a year, demand-pull inflation is likely to occur. This is because output is not able to keep up with demand. Since the ability of output to expand shrinks to only about $3^1/_2$ percent a year when the economy nears full employment, the probability of demand-pull inflation being set off is greater as output nears full employment. Also, the closer output is to full employment, the greater will be any demand-pull inflation that does occur.

Note that inflation does not result just because *AD* exceeds *AS.* An increase in the level of *AD* does not automatically translate into inflation. If the excess of *AD* over output is below the range of $3^1/_2$ percent to 7 percent, output can handle most of the excess. Prices will likely rise slightly, but most of the change in *AS* will come in the form of increased output. But if the excess of *AD* over output

exceeds $3^1/_2$ percent at full employment, or 6 percent to 7 percent at output levels below full employment, output increases will be accompanied by significant price increases.

That is where demand-pull inflation comes from, and any country is perfectly capable of setting it off. Nothing exists to limit the rate of increase in *AD.* Countries have accomplished double-digit or triple-digit or even higher rates of *AD* increase simply by allowing the money supply to expand rapidly. That is how hyperinflation has hit such countries as Germany in the 1920s, Japan and Hungary in the 1940s, and Israel and Latin American countries in the last decade. Even the United States had some double-digit inflation in the early 1980s. In every case, the level of AD raced ahead of output.

***Cost-Push Inflation*** We cannot ascribe all of the blame for inflation to *AD.* Sometimes reductions in the level of *AS* also push prices upward. Unfortunately, declines in the level of *AS* send unemployment upward as well. The drop in the level of *AS* creates an excess-demand situation; and as the price level rises, the *quantity* of *AD* falls until equilibrium is reestablished at a higher price level and lower output level. Since we have already discussed the effects of reductions in the level of *AS* in the earlier section on unemployment, we do not need to add much more here. Again, causes in such leftward shifts of the *AS* curve include exogenous increases in factor costs like foreign imports or agricultural goods and factor market (supply-side) inflationary expectations. Whatever sets off inflation – whether it be demand-side or supply-side shifts – the rising prices generate inflationary expectations in the minds of factor suppliers. As they raise factor prices to protect real factor earnings, the level of *AS* falls. As we will discuss at length in later chapters, this process (which we will call *adaptive expectations)* is a gradual, dynamic process that can send prices upward regardless of whether the level of *AD* is rising or falling. It is these expectations that make fighting inflation such a frustrating and patience-testing process.

Now that we have laid out the basic mechanics of the *AD-AS* model that best describes the modern view of the product market, it is time to look back at two historical antecedents to this modern view: the neoclassical and Keynesian models of the product market. The modern view is in many ways a synthesis of the neoclassical thesis and its antithesis, the Keynesian model. Knowledge of both is instrumental in understanding the macro economy.

### 3. The Neoclassical Interpretation

If you were to take a macroeconomics course back in the 1920s, it might have lasted only a few weeks, and your textbook would have been much narrower (and cheaper) than this one. The classical or neoclassical economists – that is, most economists before John Maynard Keynes – believed that the economy was depression-proof. They felt that automatic adjustment processes exist within a market economy to bring output back to full employment whenever it strays away. Although a recession or depression could occur as a result of exogenous disturbances such as war or a bad harvest, it would not last long. Flexible wages, prices, and interest rates would guarantee that output would head back to the appropriate level where the labor force was **fully** employed and all that was produced was sold. Patient policy-makers would simply do nothing and allow the automatic adjustments to run their course uninterrupted. Government policy would be unnecessary or actually harmful. *Laissez-faire* economics ruled. How such a view arose from their version of markets is the topic of this section.

#### Wage and Price Flexibility

All economists labeled classical or neoclassical have had in common an unshakable belief in the efficiency of the market and its ability, through competition, to equate supply and demand. Only government intervention could prevent a market from clearing, they believed; movements in prices would guarantee that all markets would clear, that is, reach equilibrium. The existence of equilibrium in the product market and in the labor market at the same time

means the economy is in equilibrium at full employment output. This is exactly where one would like equilibrium to be. Changes in *AD* or *AS* could disrupt this ideal combination, but only temporarily. Any excesses of demand or supply would be eliminated by movements in prices (which would produce adjustments in the quantities of *AS* and *AD)* and wages (which would result in changes in the level of *AS).*

***The Labor Market*** **In** the neoclassical model, the short-run supply of labor is assumed to be fixed and equal to the labor force. Workers are presumed to be wage takers as opposed to wage setters, and it is assumed that all workers will accept the going market wage. Figure 3-10 depicts the neoclassical labor market model. Labor supply is fixed at *LF,* the size of the labor force. The level of labor demand is a function of the value of marginal product of the labor employed (marginal product times product prices). The market wage in the short run, is determined by the level of labor demanded and its intersection, or equality, with the fixed labor supply. When labor demand equals labor supply at $w_1$ the labor force is fully employed, and the economy is producing at full employment output.

Let us consider a recession scenario. Suppose the level of *AD* falls for some reason so that *AD* is less than *AS* at full employment. With *AD* down, the level of labor demand will also be down. This is because inventories are rising and product prices are falling due to the slowdown in sales. Labor demand shifts from $LD_1$ to $LD_2$. At the wage $w_1$, the quantity of labor demanded is now $L_1$ compared to a quantity supplied of *LF.* Unemployment *(LF* minus $L_1$) exists in the labor market. In a perfectly competitive labor market, unemployment causes wages to fall. Unemployed workers would rather work at a lower money wage than receive no wage at all. Employers would rather hire such workers than pay $w_1$. As wages fall, the quantity demanded of labor rises until it reaches *LF* at $w_2$, where supply again equals
demand. The economy is back to full employment. Workers would supposedly be willing to accept such money wage cuts because

product prices, and therefore the cost of living, would be falling. At the end of the adjustment process, real wages are the same, but prices and money wages are lower. Most importantly, exactly *LF* workers are again employed. Output automatically adjusts back to full employment *(FE)* – that is, whatever output *LF* workers produce.

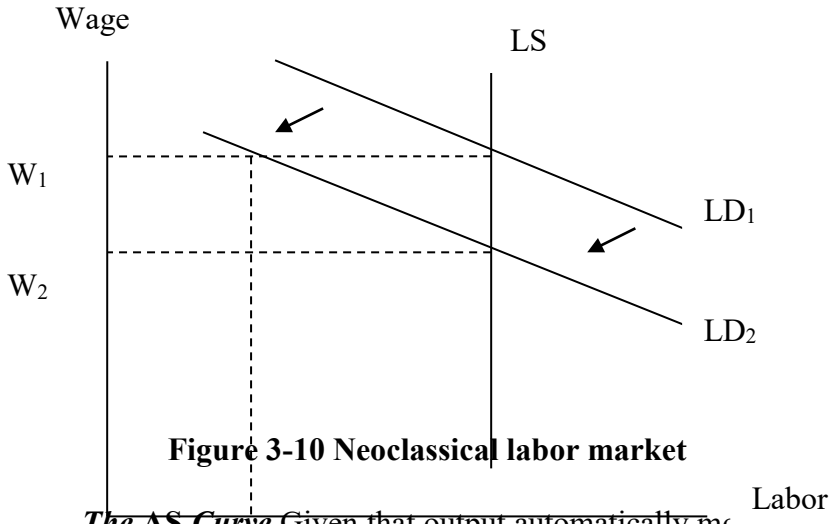



**Figure 3-10 Neoclassical labor market**

***The* AS *Curve*** Given that output automatically mo
employment, the
11. At all positi
drop in the level of *AD*, such as from $AD_X$ to $AD_2$, will create an excess of *AS over AD* and cause prices to fall. The deflation continues until the quantity of *AD* rises to meet *AS* at *FE.* The recession is over. Equilibrium output always lands back at full employment. Perfectly functioning product and labor markets eliminate excess supplies through price and wage declines. A *deflation* (a decline in *P)* is possible, but not a *depression.*

**Say's Law and the Interest Rate**

Wage and price flexibility was the ingredient that allowed the neoclassical economists to guarantee that the quantity of *AS* would always linger around the full employment level. In order to

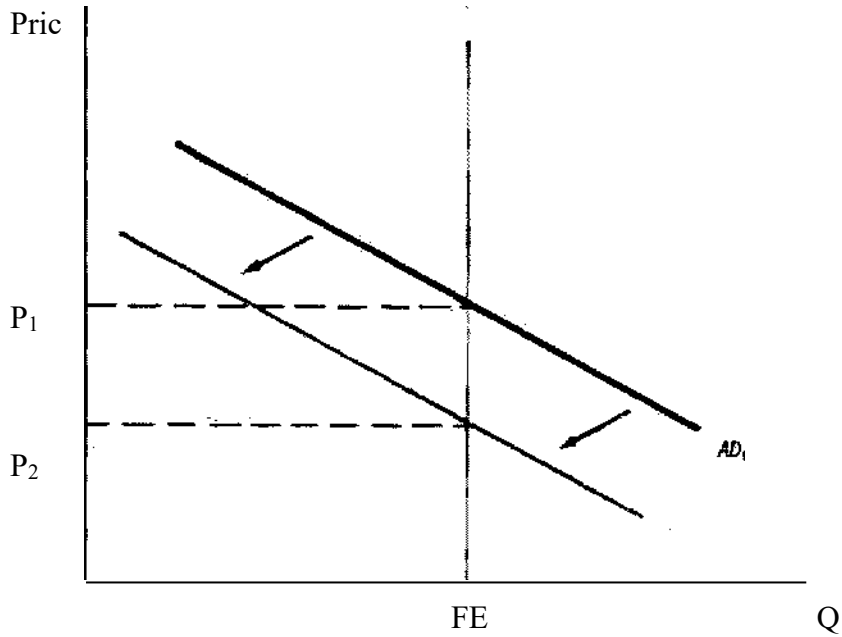



**Figure 3-11 Neoclassical deflation**

prove that *AD* would always be in the same neighborhood, they relied upon Say's Law and the flexibility of interest rates. The combination of the two guaranteed that *AD* would always match *AS*. With *AS* already shown to be at the full employment level, this meant that *AD* would always be sufficient to support the full employment level of output. That is, there could never be a lengthy excess of *AS* over *AD* or a lengthy depression.

***Say's Law*** Authored in its original form by Jean Baptiste Say at the beginning of the nineteenth century, Say's Law states, in its most simple form, that supply creates its own demand. Say was an intellectual descendent of a group of French political economists, the physiocrats, who are credited with the recognition and

development of the circular flow model of an economy. As we saw in Chapter 2, a dollar's worth of output generates a dollar's worth of income, which flows to the household sector. In this simplified model with no government, the household sector has the *ability* to purchase all that is produced. Thus, supply does create its own *potential* demand. Say stated that no one produces except to consume. Therefore, in the aggregate, demand would have to equal supply. Essentially, Say said: C = output *(Q).*

Say was describing a barter economy – that is, one without money. In such an economy saving is unlikely. But in an economy that has currency, saving is not only easier but very likely. When saving exists, it brings with it the likelihood of consumption falling short of *Q,* which would leave an excess supply of goods, a *glut* in the language of Say's era. But every economist from Say through Pigou felt that investment would automatically match saving, leaving *AD* equal to *Q.* The mechanism by which investment and saving are equated was felt to be the loanable funds market, where movements in the interest rate guarantee that all that is produced is demanded and sold.

***A Flexible Interest Rate*** Figure 3-12 pictures the loanable funds market wherein household savings are channeled to investors as if the market were one big savings-and-loan company. The suppliers of loanable funds are savers, while the demanders of loanable funds are the investors who borrow these funds. The higher the interest rate, the more savers will save and the less investors will borrow. At some interest rate, $r_e$ in Figure 3-12, saving equals investment, the loanable funds market is in equilibrium, and so is the product market. What is crucial to the neoclassical model is that the interest rate automatically moves to $r_e$. If the interest rate is higher than $r_e$, saving exceeds investment. In order to attract more borrowers and fewer depositors, our giant savings-and-loan company would be forced by profitability constraints to lower the interest rate toward $r_e$. Should the interest fall below $r_e$, the excess

of borrowers over savers would drive the interest rate back up to $r_e$. Saving always equals investment.

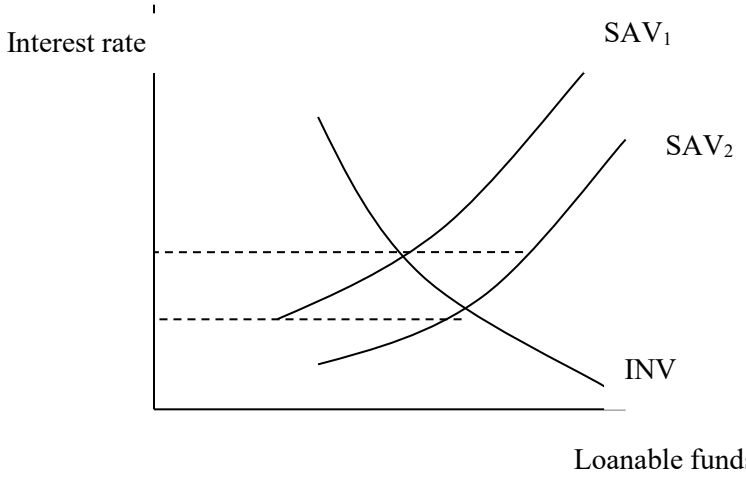



**Figure3-12 Loanable funds market**

The flexibility of the interest rate brings a quick end to any depression or recession. Suppose consumers decide to greatly reduce their level of spending. This means the level of saving must rise as the shift in the saving curve from $SAV_1$ to $SAV_2$ depicts in Figure 3-12. This results in saving being greater than investment at $r_e$. Since $S$ is greater than $I$, $AS$ is greater than $AD$, and a glut of goods exists. Unsold goods should force producers to lay off workers and lower prices. But that will not be necessary. The excess of saving over investment causes the interest rate to automatically fall, and as the rate falls, investment rises and saving falls. Since saving falls, consumption rises. With both $I$ and $C$ rising, $AD$ is clearly rising. When the interest rate reaches $r_f$, $I$ equals $S$ and, therefore, $AD$ equals $AS$. The recession is over, brought to an end by the flexibility of the interest rate. Whatever output is produced, it will be sold as long as interest rates are allowed to vary and automatically seek an equilibrium level.

***Government's Role*** Given that the labor, product, and loanable funds markets automatically adjust to a full employment general equilibrium, what is the government's role in ending a recession? None at all. The economy can cure itself. Any effort by government officials to help the economy might only slow the process by which wages, prices, and interest rates fall. The correct policy for the government is a hands-off policy. Stabilization policy is unnecessary and unwanted. Since the economy automatically maintains full employment, the government has no control over real variables such as output at full employment, employment, real wages, and real interest rates except in the very short run. Government manipulations can affect *AD* and real variables only temporarily. The only variable that the government can determine is the price level. How that is accomplished is what we will consider next.

**Money and the Price Level**

Apparent to economic observers in Europe, at least as far back as the sixteenth century, was the direct, positive relationship that existed between the quantity of money in an economy and that economy's price level. The gold and silver imports from the New World drove prices up steadily for 150 years in what has been called the Price Revolution. David Hume, among others, formalized the relationship between money and prices in the quantity of money equation of exchange (described earlier):

**money • velocity = output • prices**

**or**

$$MS \bullet V_{FS} = NI = Q \bullet P$$

In that equation, final sales velocity is a measure of the average number of trips that a unit of currency makes through the circular flow in a year.

With four variables moving all at once, the equation tells us very little. But the neoclassical economists narrowed things considerably. First, they observed that velocity varies little in the long run, so changes in the money supply necessarily lead to

changes in money *NI.* In addition, in the world of neoclassical economics, the economy is always at full employment. This means increases in the money supply will not cause real *NI* to rise. Thus, with velocity and output constant, changes in the money supply translate directly into changes in prices, and only prices. That is the *quantity theory of money.* Double the money supply, and the price level will double. Halve the money supply; prices halve. Changes in the money supply may have temporary effects on real variables such as output and employment, but eventually those money supply changes will show up only in changes of the level of prices. Monetary policy can create inflation or deflation but not a real contraction or a real expansion. But then, in an economy at full employment, who would want to meddle with monetary policy anyway.

**4. The Keynesian Interpretation**

John Maynard Keynes was educated in the neoclassical tradition. In fact, his teacher at Cambridge was Alfred Marshall, the dean of neoclassicism. But, as is the case for many leaders of revolutions, Keynes saw contradictions between the model and the real world. Keynes broke from the Cambridge tradition in the 1930s with the publication of *The General Theory of Employment, Interest, and Money.* In that work Keynes outlined his disputes with the neoclassical model and offered an alternative interpretation of the workings of the labor, product, and loanable funds market. Most importantly, Keynes's prescriptions for ending recessions and depressions called for explicit government involvement. Laissez-faire policy died with the advent of Keynesianism. That is part of what made Keynes's philosophies so revolutionary. The relationship between government and the economy has never been the same since; nor has macroeconomics.

**The Keynesian Critique**

Keynes's complaints against the neoclassical interpretation came in two forms. He pointed out that the real world did not work as smoothly as the perfectly competitive neoclassical model. That is,

wages and prices are not as flexible as the model presumes. He also seriously questioned the fundamental relationships between saving and investment and the interest rate; and in so doing, did great damage to the contention that the economy automatically adjusts to full employment without the government's help.

***The Labor Market*** Keynes's background in England, where unions ruled the labor market, made it impossible for him to believe that the money wage cuts that would supposedly eliminate unemployment during a recession would ever happen. If all workers were brought together and convinced that wage cuts would not only not hurt them, but might help them, then it might be possible for wage declines to be well-received. But the labor market does not function that way in reality. Union leaders balk at money wage cuts. Thus, in spite of the existence of widespread unemployment, wages are stubbornly slow to decline, and the labor market stays in disequilibrium. Involuntary unemployment persists, and output remains below full employment. Downwardly rigid wages make for long-term unemployment. Only an increase in the level of *AD,* which will generate an increase in labor demand, will eliminate such unemployment.

***Deflation*** Keynes also had little faith in the positive results of deflation. It is true, Keynes said, that falling prices will generate an increase in the quantity of AD. But, he argued, declining money incomes due to declining production will cause the *level* of *AD* to be falling even while the quantity of *AD* at any given level is rising. That is, the *AD* curve could be shifting left possibly as fast as prices fall, leaving *AD* well short of *AS* at full employment. Besides, in an economy where prices and wages are declining due to low sales and unemployment, a negative psychology and loss of confidence develops. Deflationary expectations actually cause people to slow their buying, which further reduces the level of AD. Here Keynes is describing a drop in velocity. In general Keynes felt that it was

unlikely that a recovery would rise from the ashes of a deflation of wages and prices.

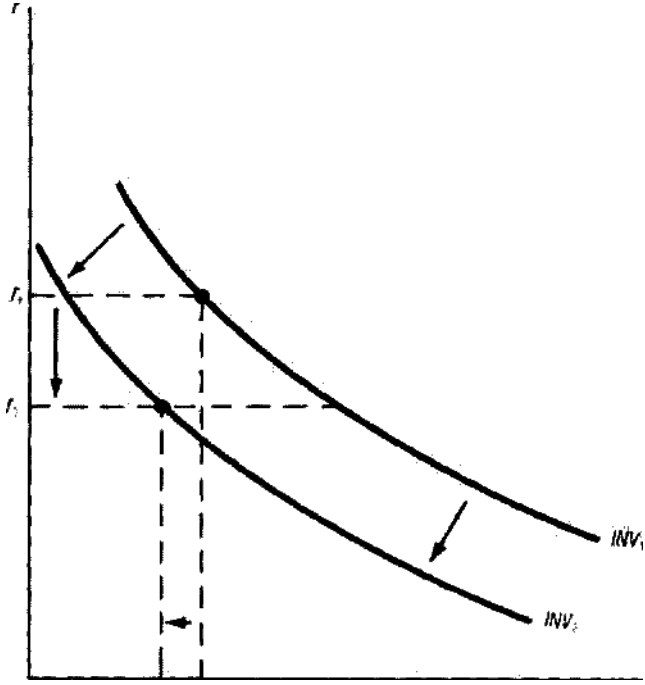
***The Interest Rate*** Keynes's criticism of the neoclassical view of the loanable funds market was much more fundamental. He did not believe that the interest rate is determined by the interaction of saving and investment. Instead, he theorized that interest rates are determined by the supply of and demand for liquidity. (We will study his liquidity preference model more closely. Keynes did not foresee interest rate movements equating saving and investment. Not only is the interest rate not determined in the neoclassical loanable funds market, said Keynes, but neither saving nor investment is such a simple function of the interest rate as the neoclassicists represented it.

Keynes disputed the premise that saving varies significantly in accordance with the interest rate. He believed that saving is a function primarily of disposable income – that a consumer's consumption is based upon his or her disposable income, and saving is simply disposable income minus consumption. In other words, consumers make their saving decisions based upon the amount of disposable income left after consumption. Changes in the interest rate thus have little impact on this decision. This view contrasts sharply with the neoclassical view that consumers spend whatever is left after the saving decision is made. The declining interest rates that accompany a recession will have little positive impact on saving rates, and therefore on consumption, if consumers act as Keynes predicted.

According to Keynes, investment – *that is, purchases of capital – is a function* of the interest rate and of the expected rates of return on investment. Potential buyers of capital compare the expected rates of return on their planned investment projects against the interest rate, which is the opportunity cost of money. All else being equal, lower interest rates will bring forth greater investment. But during a recession, all else is not equal. The declining sales that are part of a recession drive down the expected rates of return on most

investment projects. It is not unusual during a recession for expected rates of return to fall faster than interest rates, causing investment to fall in spite of declining interest rates, as Figure 3-13 illustrates. According to Keynes's view, the investment curve in Figure 3-14 would be shifting left during a recession at the same time that the saving curve is shifting right. This event opens up the possibility of the saving and investment curves intersecting at negative interest rates. In such a case *S* is greater than *I* and *AS* is greater than *AD* at all positive interest rates, and an automatic recovery is impossible.

**Figure 3-13 Falling expected rates of return on investment**




In the Keynesian world, interest rates, no matter how flexible, might not eliminate a shortfall of *AD.* And if wages and prices are not downwardly flexible, we cannot expect deflation to bring the

quantity of *AD* back up to the level of full employment output. An equilibrium between *AD* and *AS* at a level of output below full employment is very likely.

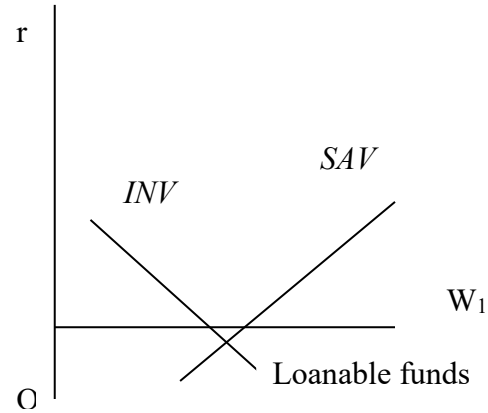
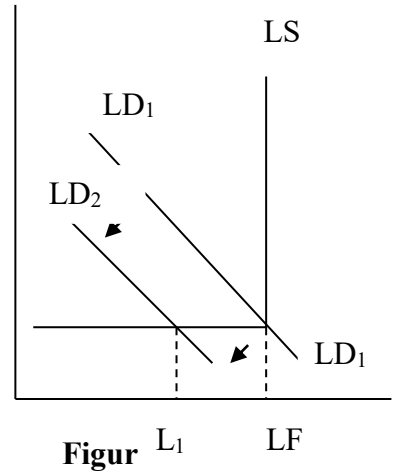



**Figure 3-14 Negative equilibrium interest rate**




**Figur labor market**

***Keynes's Aggregate Supply*** The only assumption needed to convert the neoclassical model of *AS* to the Keynesian model is wage rigidity. If wages will not fall in the face of unemployment, producers cannot afford extensive price reductions. Output will fall below full employment and stay there when *AD* is low. Let us see what wage rigidity does to *AS.*

Figure 3-15 depicts a Keynesian labor market with absolute wage rigidity in the downward direction. With labor demand at $LD_X$, the equilibrium wage is $w_1$, and *LD* equals *LS* at full employment. Suppose the level of *AD* falls, causing the *LD* curve to shift to the left to $LD_2$. At $w_1$, *LS* exceeds *LD,* and unemployment exists. In the neoclassical model, wages would fall until *LD* equals *LS* again at *LF.* But in the Keynesian scenario, wages do not respond, and employment falls to $L_1$, which is the quantity of labor demanded now at $w_1$.

Since employment is below *LF,* output falls below full employment. It is very unlikely that deflation will occur here, since wages will not fall and allow costs to decline. The result is an L-shaped *AS* curve like that in Figure 3-16. Price levels below P, are

not acceptable to producers, since wages will not fall below $w_1$. Should *AD* drop from $AD_X$ to $AD_2$, labor demand would shift from $LD_1$ to $LD_Z$, employment would fall to $L_1$, and *AS* would drop to $Q_1$ and stay there in equilibrium below full employment. The key to whether equilibrium output lies below full employment or not, according to Keynes, was the level of **aggregate expenditures** *(AE)* – Keynes's version of *AD* in a world with constant prices (and wages and interest rates for that matter). If the level of aggregate expenditures falls short of output at full employment, protracted unemployment is possible.

**Aggregate Expenditure Theory**

The emphasis on the level of *AD* in modern theories and policies is a product of Keynes's *General Theory.* Keynes held that what determines whether an economy experiences a recession, full employment, or inflation is the level of aggregate expenditures. Theory and policy have been demand-side oriented ever since massive increases in government expenditures in the 1940s abruptly ended the Great Depression and apparently proved Keynes was right. He argued that the level of *AE* is likely to vary as a result of changes in **autonomous expenditures –** Keynes's version of exogenous determinants of the level of AD, that is, variables that change the velocity of money. Keynes believed that a better understanding of aggregate expenditures and their determinants would allow policy-makers to adjust the level of expenditures in order to counteract undesirable changes in their level.

In order to study the level of aggregate expenditures, Keynes divided them into three main parts (omitting net foreign expenditures):

***AE*** **= consumption expenditures + investment expenditures + government expenditures**

That looks a lot like the division of *AD* that we said could be made earlier in this chapter. In fact, the difference between the terms *aggregate demand* and *aggregate expenditures* is very small. Both *AD* and *AE* are the sums of the desires of spenders in all sectors to

buy goods and services in the product market. Aggregate expenditures can be viewed as simply aggregate demand in a Keynesian world of fixed wages, prices, and interest rates. Thus, *AE* is a specialized case of *AD.* For our purposes, however, *AD* and *AE* are essentially the same. When we discuss Keynesian models, particularly the income-expenditure model in the next chapter, we will use the term *expenditures* to emphasize that these models carry Keynes's specialized assumptions with them.

Given his three-way division of *AE,* Keynes went on to provide separate theories for the determinants of consumption expenditures and investment expenditures. Since most government expenditures are determined by political decisions, Keynes considered government expenditures to be the ultimate example of an autonomous expenditure variable, a variable whose determinants lie outside the model.

***Consumption*** Keynes posited that consumption expenditures, or simply consumption *(C),* are primarily determined by the level of consumers' disposable income *(DI).*

$$C = c\,(DI)$$

Although he was not the first to establish this direct relationship, he was the first to set it out in a rigorous, testable format. Keynes's basic consumption theory states that as disposable income rises, so does consumption; and when disposable income falls, consumption falls. Critical to Keynes's consumption theory is his *fundamental psychological law,* which states that while a consumer's spending moves up and down with his or her disposable income, the change in spending is less than 100 percent of the change in disposable income. That is, the ratio of the change in consumption to the change in disposable income is less than 1. Keynes called this ratio a consumer's **marginal propensity to consume *(MPC).***

$$\frac{\text{change in consumption}}{\text{change in disposable income}} = \frac{\Delta C}{\Delta DI} = MPC < 1$$

The term *marginal propensity to consume* is a mouthful, but it simply means the fraction that a consumer tends to spend of any income increase. If a consumer's *DI* rises by $1,000 and his or her C rises by $900, that person's *MPC* is .9 or 9/10. We would expect that a $1,000 decline in income would produce a $900 decline in consumption. What about the other $100? That goes into saving (if *DI* rises) or comes out of saving (if *DI* falls). Logically, each consumer has a **marginal propensity to save *(MPS)*** equal to 1 minus the *MPC.*

**Since $DI = C + S$, $S = DI - C$**
**and $\Delta DI = \Delta C + \Delta S$**
**and $MPC + MPS = 1$.**

Keynes also allowed for other less important autonomous variables to influence consumption, but the *MPC* concept establishes a link between changes in *DI* and *AD* by proposing a simple relationship between C and *DI.* It is a relatively easy task to estimate a consumer's *MPC* or an economy-wide *MPC.* It is also possible to estimate the influence of autonomous variables on the level of consumption, and we will assign them the symbol *C.* With those two pieces of information, one can formulate a Keynesian consumption function:

$$C = \overline{C} + MPC \cdot DI$$

With such a formula, it is possible to estimate the quantity of consumption expenditures at any level of disposable income.

***Investment*** In the Keynesian model of the economy, investment expenditures, or simply investment (*I*), is the most volatile part of *AE.* The two main variables that Keynes saw determining the level of investment are interest rates and the expected rate of return on the capital investment. Whether a potential investing firm has the financial capital already or must borrow it, the interest rate is the opportunity cost of the capital. In order for an investment project to be profitable, its rate of return must exceed the interest rate. What makes investment demand so subject to change is the fact that both the interest rate and business

people's revenue expectations vary a great deal. Changes in the cost of money and the likely profitability of using the money can lead to significant swings in the levels of *I* and *AE*.

Investment projects, such as purchasing machinery, are meant to add to a firm's profits. It is difficult, however, to calculate how profitable a machine will be, because the increased revenues that it is supposed to generate are in the future, while the cost of buying the machine is in the present. In calculating the expected rate of return for a machine, a firm must predict the likely net revenues that will be generated over time and compare them to the costs.

It is obvious that the revenues must at least exceed the cost of the machine. In order for the machine to be truly profitable, the revenues must exceed the cost by enough to cover the interest payments. If the money to buy the machine is borrowed, it is clear that revenues must pay for both the price tag on the machine and the interest on the loan. Otherwise, it pays not to borrow. If the firm has the money already, it has the option of lending the money to someone else and earning interest instead of buying the machine. Again, net revenues must cover both the price tag and the interest earnings that could have been received by simply lending the money. Either way, the investment project is profitable if, and only if,

**the expected rate of return > interest rate**

The level of investment will change, according to Keynes, if either of these two variables change. All else being equal, investment moves in the opposite direction of the interest rate. A rise in the interest rate, reduces the profitability of potential investment projects, which leads to a reduction in investment. Should the interest rate fall, investment will rise. Hold the interest rate constant, and investment will move in the same direction as the profit expectations of potential investors. A wide variety of autonomous variables can influence the expected rate of return on any investment project. Consequently, *I* is much more difficult to predict than C.

***Equilibrium and Full Employment*** What truly set Keynes apart from his theoretical predecessors was his contention that while automatic adjustments lead the product market to an equilibrium between *AD* and *AS,* this equilibrium need not occur at full employment. In the Keynesian model, full employment is the goal, and equilibrium is the reality. *AD* can equal *AS* at an output level below full employment, while labor demand can equal labor supply and still leave the quantity of labor demand lower than the labor force. With both the product and labor markets in equilibrium, and wages resistant to declines in spite of unemployment, output will stay at $Q_1$ (in Figure 3-16). Without wage declines, there is no automatic process that will bring output back up to *FE.* This is the Keynesian equilibrium below full employment: the economy is stuck in the middle of a recession or depression.

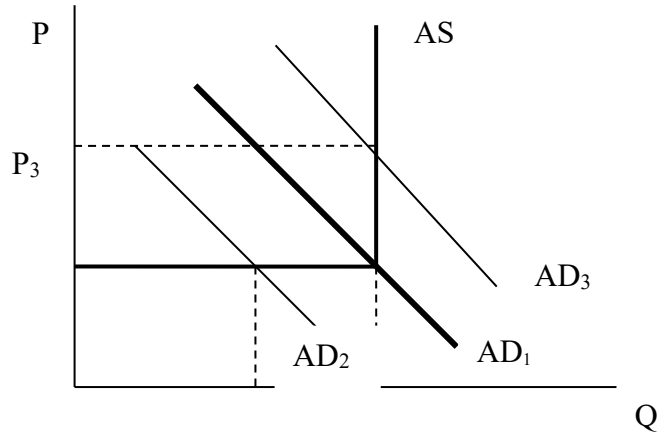



**Figure 3-16 Keynesian AD-AS model**

What this economy needs is more *AD.* If the level of *AD* were to increase, shifting the *AD* curve from $AD_2$ back to $AD_1$, the level of labor demand could rise, and *Q* would rise to *FE.* Unless that increase in *AD* is somehow generated, output will stay at $Q_1$ indefinitely.

Should the level of *AD* rise to the extent that the *AD* curve shifts farther to the right than $AD_1$ (to $AD_3$), inflation will result. Such an increase in *AD* will cause *AD* to exceed output at full employment. Since *AS* is limited in real terms to *FE,* all that can happen is that the excess of *AD* will cause prices to rise above $P_1$. As prices rise, *NI* rises above *FE,* but real *NI* stays at *FE.* The inflation will cause the quantity of *AD* to fall until *AD* equals *AS* at $P_3$. Equilibrium money *NI* has risen, and the entire rise comes in the form of rising prices.

Thus, in the Keynesian world equilibrium can occur at money *NI* levels above or below full employment. Either inflation or unemployment occurs if *AD* is not exactly equal to *AS* at *FE.* Unemployment can be cured with an increase in the level of *AD;* inflation can be halted with a decrease in the level of *AD.* Fighting one problem need not cause the other, and both inflation and unemployment will not exist at the same time.

***The Role of the Government*** Since the economy is very likely to settle into equilibrium at output levels below full employment, it is destined to experience unemployment. To Keynes, there were no automatic forces that would bring the economy out of a depression. Inflation would eliminate excess *AD,* but deflation would not eliminate excess AS – unemployment would simply result. If the economy is unable to generate a level of *AE* consistent with equilibrium at full employment, then it is the government's responsibility to adjust *AE* through its spending and taxing powers in order that equilibrium can land right at full employment. Fiscal policy was born, and *laissez-faire* died with Keynes.

Notice that all Keynesian policy prescriptions refer to changes in *AE.* Keynesian economics is demand-side macro. His level of output is strictly a function of the level of *AE. NI* rises or falls only as a result of changes in the level of *AE,* according to his theory, never as a result of changes in the level of *AS.*

**5. A Modern Synthesis**

The neoclassical and Keynesian models represent opposite extremes. The former assumes perfect wage and price flexibility, while the latter assumes complete wage and price rigidity (at least in the downward direction). The neoclassical model portrays an economy that no longer exists, if it ever did, and the Keynesian system is only truly applicable to an economy in the middle of a depression.[13] As one might expect, the modern real world lies somewhere between the two extremes. Wages and prices can certainly display downward inflexibility in the contemporary economy, but then it is difficult to tell how upwardly rigid they are during inflationary times. Clearly, however, the modern *AS* curve is not perfectly horizontal at income levels below full employment nor perfectly vertical at full employment output.

Since the *AS* curve is not perfectly vertical at full employment, it is possible for the product market to be in equilibrium at output levels below and above full employment. Unemployment and inflation are not only possible, but likely. Since the *AS* curve is not shaped like an L on its back, as the most restrictive Keynesian assumptions suggest, inflation and unemployment are not mutually exclusive, and policy prescriptions are not as simple as Keynes implied. Let us reproduce the model we developed in the first part of this chapter and reaffirm the picture of the economy that we want in the back of our minds (and often in the front) throughout the rest of the book. If we now return to the macro model that we derived, we can see that it is a bit of a compromise between the neoclassical and Keynesian interpretations.

Figure 3-8 is reproduced in Figure 3-17 to portray our models of *AS* and *AD* and reaffirm what the shapes of the curves tell us. *AD* can be divided into three main parts as Keynes divided it, and we will often use that breakdown. Regardless of the subdivision, however, all parts of AD obey the *law of demand* in that the quantity of *AD* rises when the price level falls, and falls when the price level rises. Aggregate supply obeys the *law of supply* at all income levels, with greater quantities of *AS* coming at the cost of higher prices. Let us compare our model with its predecessors.

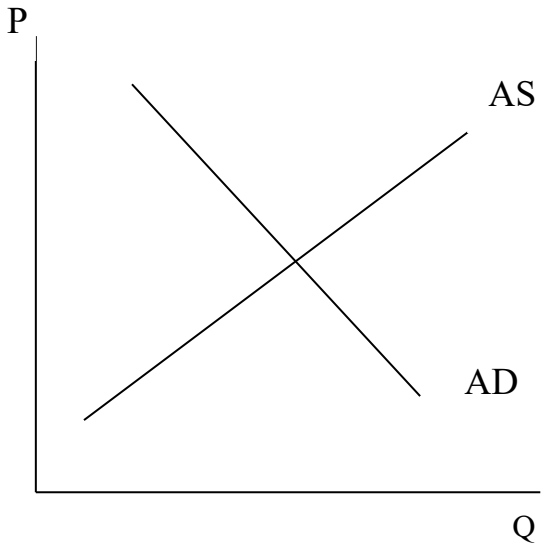



**Figure 3-17 The modern models *AD– AS***

**Aggregate Demand**

As described earlier, the *AD* curve represents how the quantity of *AD* varies with changes in the general price level. The lower the general price level, the greater is the quantity of output that can be purchased with the same money income. The location of the *AD* curve is determined by the level of *AD,* which is most fundamentally a function of the two most basic determinants of money income (money supply and the velocity of money). Multiplied together, they determine money *NI.* The level of *AD* rises only when either or both of the money supply or velocity increases, and thereby increases the spending power of all three sectors.

In regard to the level of AD, the easiest way to distinguish between the neoclassical and Keynesian points of view is to note the differences in their emphasis. The neoclassical economists argued that it is changes in the money supply that primarily bring about changes in the level of *AD.* They admitted that unusual events could occur that would lead to temporary variations in velocity, but they

maintained that these variations were infrequent and of minor importance. And, regardless of whether the level of *AD* is changed by adjustments in the money supply or velocity, these changes in *AD* would ultimately only affect the price level.

To Keynes, the level of *AD* was critical, since he believed that full employment equilibrium is not automatic. Keynes emphasized his "autonomous" changes *(exogenous* in our terminology) in all three parts of *AD.* He was well aware of the impacts of money supply changes on the level of *AD,* but he believed that the level of autonomous spending was of greater direct importance to it. And no form of spending is more autonomous or supposedly more controllable than government spending. Changes in government spending could be expected to change the level of spending within Keynes is not speaking of changes in the money supply, he must be speaking of changes in the velocity of money. His variations in autonomous spending require changes in the rate at which money circulates through the circular flow.

The neoclassical economists, as well as the monetarists of today (who are really neo-neoclassicists), believed that most lasting changes in the level of *AD* come from changes in the money supply, with very little happening to velocity. In sharp contrast, Keynesians deemphasize the influence of money over the level of *AD* and concentrate instead on changes in the level of autonomous spending. These latter changes presume significant variations in the velocity of money.

In Chapter 10, after we have studied a Keynesian income-expenditure model and the fiscal policy prescriptions that derive from it, and after we have covered the money market and the monetary policy formulas that derive from it, we will reconsider this disagreement about the relative importance of the two fundamental determinants of the level of AD, the money supply and velocity. At that time, we will try to establish which view is more reliable and under what circumstances the relative reliability varies. Until then, we will speak of a number of variables that can influence the level of *AD,* such as income, the interest rate, exogenous portions of consumption and investment, government spending and taxes, and

demand-side inflationary expectations. Keep in mind that these variable influences are all just subcategories of changes in the money supply or velocity.

**Aggregate Supply**

No horizontal or vertical sections exist in our *AS* curve. Virtually every supply curve in the individual factor markets, including labor, capital, energy, and so forth, slopes up and to the left. This shape reflects market imperfections that are magnified as the short-run limit to supply is approached. The composite of all of the factor supply curves shapes the *AS* curve. Few factor supply curves are perfectly horizontal or vertical; therefore, the *AS* curve should not be either horizontal or vertical. Factor price flexibility keeps the *AS* curve from being horizontal, but a significant degree of factor price rigidity keeps it from being vertical. Factor and product markets are neither as efficient as the neoclassical economists saw them nor as rigid as Keynes assumed them to be.

Although wages and prices are to some degree downwardly rigid in our economy today, they are not perfectly rigid, and they never have been. During recessions, producer prices fall even when retail prices are still rising, and labor unions do accept pay cuts in the face of low demand in their industry. Labor concessions at Chrysler and other struggling firms a few years back showed us that. And, most importantly, prices must and do rise as output rises from levels below full employment. Thus, the *AS* curve rises gradually until output nears the full employment level. When output reaches full employment, factor market conditions work to push up factor costs at an increasing rate. This is because factor supplies are reaching their limit and output is nearing capacity. Although the *AS* curve does become very steep, it is never perfectly vertical. A little more output can always be squeezed out. As *AS* nears capacity, that squeeze becomes increasingly more expensive. Thus, the *AS* curve we will envision is always upward sloping with the degree of the slope being minimal at output levels below full employment. But

that slope steepens and rapidly increases as output passes full employment.

Short-run reductions in factor costs cause the *AS* curve to shift downward, while long-run improvements in productivity of any input cause the *AS* curve to shift down and to the right. The rightward shift is a long-term economic growth change. Any increase in factor costs that are initiated on the supply side will shift the *AS* curve straight up. In general, shifts of factor supply curves cause shifts in the *AS* curve. Stated another way, changes in the availability of factors of production cause changes in the ability of the economy to supply output at any given price level.

That completes our preliminary look at the theoretical background for the model of *AD* and *AS* that we will use in this book to analyze the product market. We will put that model on the back burner for a while, though, while we look at a Keynesian income-expenditure model for determining the equilibrium level of output in the product market and an equilibrium model of the money market. The Keynesian model is rife with limitations because it assumes constant prices and interest rates. It was designed for an economy with plenty of excess capacity, unutilized factors of production, and a slack money market. While that economy may be unrealistic, the model allows for a specific quantification of *AE* and *Q* that is very informative and useful to our ultimate goal of understanding the entire macro economy.

**Summary**

1. The most fundamental determinant of the level of *AD* is money national income *(NI),* which is a function of the money supply and the velocity of money.
2. Variables such as the interest rate and inflationary expectations can change the level of velocity in the short run and thereby temporarily change the level of *AD.*
3. The quantity of *AD* obeys the law of demand, while the quantity of *AS* obeys the law of supply.
4. The quantity of output produced is limited by the capacity of

an economy, which depends on the quantity and productivity of factors of production.

5. The level of *AS* is determined by factor costs and factor productivity.

6. Changes in the levels of *AD* and *AS* cause all changes in the levels of output and prices.

7. Unemployment is caused most often by declines in the level of *AD,* but drops in the level of *AS* also contribute to higher unemployment.

8. Demand-pull inflation is caused by excessive increases in the level *of AD* relative to the ability of output to expand.

9. Cost-push inflation is caused by a decline in the level of *AS.*

10. Neoclassical economists believed that wage, price, and interest rate flexibility would always guarantee that the product market would tend toward full employment output.

11. Government policy designed to help the economy to full employment was both unnecessary and unwanted in the neoclassical model.

12. Keynes believed downward wage rigidity made long-term unemployment a reality; he also believed that interest rate flexibility would not guarantee the equality of saving and investment.

13. To Keynes, the key to the state of the economy was the level of *AE,* which he divided into consumption, investment, and government expenditures.

14. Should the level of *AE* be insufficient to maintain full employment, government spending should fill the gap, according to Keynes.

**Key Concepts to Know**

1. How the determinants of demand and supply at the micro level are converted into determinants of AD and *AS* at the macro level.

2. That all changes in the level of *AD* must fall into two categories: changes in the money supply or velocity.

3. What determines the level of capacity and output.

4. What causes the level of *AS* to change.

5. The impacts on output and prices of changes in the levels of *AD* and *AS.*

6. The causes of unemployment and inflation within the framework of the *AD-AS* model.

7. How a flexible wage rate would guarantee that output would always return to the full employment level in the neoclassical model, and why the *AS* curve in that model is vertical.

8. How a shortfall of *AD* is automatically eliminated by a decline in the interest rate in the neoclassical model.

9. How output equilibrates *AD* and *AS* in the Keynesian model more than the price level does, as in the classical model.

10. Why Keynes's belief in wage rigidity produces a horizontal *AS* curve.

11. The difference between equilibrium and full employment, and which can be more easily manipulated by government policy.

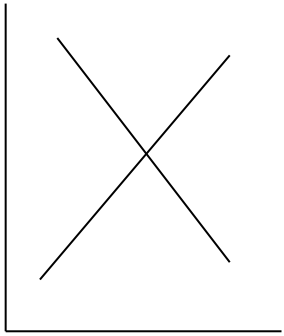
12. How government spending could be used to push equilibrium output up to the full employment quantity.

**Terms**

aggregate demand
aggregate supply
money supply
velocity
inflationary expectations
economic growth
short run
equilibrium
expansion
contraction
labor productivity
demand-side
supply-side
growth recession
demand-pull inflation
cost-push inflation
money illusion
aggregate expenditures
autonomous expenditures
marginal propensity to consume
marginal propensity to save

**Test**

1. The sigp a lines.



2. AD = C + I + ____

2. One measure of *AS* is GNP, which in turn is conceptually equal to *NI,* or the sum of wages,_____.

3. _____ – usually defined as currency plus checking account deposits – multiplied by the rate of turnover, or circulation, of that money through the circular flow.

4. Money supply · _____ = total final sales

5. Once the level of aggregate demand is established, the final variable needed to determine the exact quantity of output that will be demanded is the general _____.

6. Since the quantity of output cannot be _____ without knowing the level of *P,* and since *P* results from interactions of _____ of *AD* and *AS,* we should move on to discuss the _____ of the level of *AS* so that we can complete our picture.

7. The economy's ability to produce goods and services at any given time is determined by the quantity and quality of its factors ( _____) of production.

*8*. AE = _____ + investment expenditures + _____

**Goals**

To investigate the determinants of aggregate demand and aggregate supply.

To demonstrate the impacts of changes in the levels of aggregate demand and aggregate supply on output and prices.

To show the causes of unemployment and inflation.

To present the neoclassical version of the labor and loanable funds markets and see how that shapes their interpretation of the AD-AS model.

To outline Keynes's criticisms of the neoclassical model.

To introduce Keynes's model of AD and AS and its implications.

**New Symbols**

| | | | |
|---|---|---|---|
| AD | aggregate demand | PROD | productivity |
| AS | aggregate supply | EQ | equilibrium |
| I | investment demand or expenditures | LF | labor force |
| X | net product exports | w | wages |
| MS | money supply | LD | labor demand |
| V | velocity | LS | labor supply |
| $V_{FS}$ | final sales velocity | AE | aggregate expenditures |
| R | land and raw materials | MPC | marginal propensity to consume |
| M | labor | MPS | marginal propensity to save |
| L | capital | | |

**Suggested Readings**

Anderson, Leonall C, and W.H. Locke. National Income Theory and Its Price Theoretic-Foundations. New York: McGraw-Hill, 1979.

Keynes, John Maynard. The General Theory of Employment, Interest, and Money. New York: Harcourt, Brace, and Jovanovich, 1936.

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Tobin, James. "How Dead Is Keynes?" Economic Inquiry 15 (October 1977): 459-68.

# Theme 4. An Income-expenditure model of the product market

1. The Income-Consumption Relationship
2. The Aggregate Expenditures (AE) Model
3. Equilibrium versus Full Employment
4. Adding Spending and Taxing
5. A Complete Income-Expenditure Model

To analyze present economic conditions and predict future conditions, one needs a system or model to help identify the variables that determine the level of equilibrium output in the product market. As we have already seen, the level at which equilibrium occurs as compared to the full employment *(FE)* level of output reveals much about the present state of the economy. Also, knowing where output is now and where equilibrium will be allows us to anticipate the course that the economy will take in the near future.

As we discussed in Chapter 1, a model simplifies complex economies, in many cases by reducing the number of variables that are monitored. In this chapter we will create a model of *AD* and *AS* that does just that and is easily applied to the economy and the kinds of data that are readily available.

No model is easier to understand than the Keynesian income-expenditure model. As we have noted, this model's assumptions are definitely unrealistic, but its demonstration of the automatic adjustment process that takes the product market to equilibrium is unrivaled in clarity and ease of presentation. As long as we remain constantly aware of the Keynesian model's shortcomings and restrictive assumptions, it is a good starting point for model-building.

The Keynesian model of the product market assumes that, unless output is at *FE,* increases in *NI* will come strictly in the form of increases of output. Prices do not rise or fall; only output does.

Thus, *NI* and output *(Q)* are the same in a simplified Keynesian world. All changes in income are changes in real income along the horizontal portion of Keynes's *AS* curve. In a Keynesian model of income and expenditures, *AS = NI = Q.*

A complete Keynesian income-expenditure model shows that equilibrium in the product market occurs when aggregate expenditures *(AE)* equal *NI.* Aggregate expenditures are the sum of spending by the four sectors – consumption *(C),* investment *(I),* government purchases *(GP),* and net foreign expenditures *(X).*

$$\boldsymbol{AE = C + I + GP + X}$$

**at equilibrium;**

$$\boldsymbol{NI = AE = C + I + GP + X}$$

In the first stages of our presentation of the income-expenditure model, we will leave out the government (and foreign sector) in order to concentrate on what the product market does without the influence of government spending and taxing. Thus, for a while we can equate national income *(NI)* with disposable income *(DI).* Later, when we add the government sector, *DI* will no longer equal *NI.*

Our first step will be to examine the relationship between income and consumption expenditures. Next we will add investment expenditures to consumption and lay out the conditions of equilibrium between *AE* and *NI.* After comparing equilibrium income to full employment, we will add government expenditures and taxes into the model to see how they affect *AE* and equilibrium *NI.* Finally, in the last section, we will expand the model and make it more sophisticated by adding the foreign sector and elaborating on the determinants of taxes and investment.

### 1. The Income-Consumption Relationship

To follow a Keynesian format means first of all to investigate what determines the level of consumption expenditure. Although, as we will study in depth in Chapter 12, much debate has surrounded

the exact nature of the relationship, no one has offered any description of consumption that is not based primarily on some measure of consumer *DI.* Massive amounts of evidence support the contention that consumption is closely related to *DI.* Our job is to determine the exact form that this relationship takes so that we will be able to predict the level of consumer expenditure. Your spending is a function of your *DI,* is it not? So it makes sense to study the income-consumption relationship.

**Consumer Habits**

As we discussed in Chapter 1, all scientists, both social and physical, try to explain phenomena by establishing causal relationships. Establishing a relationship is easier than determining the exact form that the relationship takes. One can hypothesize forever, but ultimately it is necessary to gather some data and measure the closeness of the relationship between the cause and effect variables. This data-gathering and measurement are what make a study scientific. In the case of consumption and *DI,* we know that they are related. How they are related is the question. In order to answer that question we must gather data about consumers' incomes and consumption habits.

***Gathering Some Data*** Suppose that in order to gather consumption data, we ask some people about their spending habits. The first respondent tells us that she makes, after taxes, $15,000 and spends all $15,000. When asked what she would spend if she made $20,000 for one year, she answers, "$19,000." We note that when given this hypothetical raise, she spends four-fifths and saves one-fifth, since her spending rose by only $4,000. Just to test that ratio, we ask her what she would spend with a disposable income of $10,000, and she answers, "$11,000." She actually would spend beyond her income at $10,000, meaning she would either borrow money or spend some of her savings, which is called **dissaving.**

With that much information we can interpret the consumer's data:

| Disposable Income | Consumption | Saving |
|---|---|---|
| $10,000 | $11,000 | $ –1,000 |
| 15,000 | 15,000 | -0- |
| 20,000 | 19,000 | + 1,000 |

This consumer breaks even at an income of $15,000, saves part of her income when it is above $15,000, and dissaves when her income falls below $15,000. Each $5,000 change in income leads to a $4,000 change in spending, indicating a ratio of 4/5. She has a tendency to change consumption by four-fifths of marginal variations in her income. This 4/5 ratio is her marginal propensity to consume *(MFC):*

$$\frac{\Delta C}{\Delta DI} = MPC = \frac{4}{5}$$

There clearly is a relationship between this consumer's income and consumption, and the relationship appears to be stable.

Curious about the dissaving at $10,000, we wonder what the consumer might spend if she made only $5,000, or even nothing, for a year. But she is gone; we must take a guess. Since the 4/5 ratio held for the other two income changes, we do what all economists do – we make an assumption. We assume the 4/5 ratio will hold for all income changes, and we extend the chart

| Disposable income | Consumption | Saving |
|---|---|---|
| $ -0- | $ 3,000 | $-3,000 |
| 5,000 | 7,000 | -2,000 |
| 10,000 | 11,000 | -1,000 |
| 15,000 | 15,000 | -0- |
| 20,000 | 19,000 | + 1,000 |

Whenever we lower income by $5,000, we lower consumption by $4,000, using that 4/5 ratio. At $5,000, the respondent would spend $4,000 less than she said she would spend at $10,000, leaving

her spending $7,000 and dissaving $2,000. If she earned nothing for a year, according to our extrapolation, she would still spend $3,000. Apparently, there is a level of consumption ($3,000 in this case) that does not depend on income. After all, she would need to eat.

We can even speculate on how much the respondent would spend if she made $1,000. If she spends $3,000 with no income, and exactly four-fifths of any increases in income while saving the other one-fifth, why not add $3,000 onto four-fifths of $100,000? The result is $83,000.

We can estimate the respondent's consumption at any income level by using the following formula:

$$\mathbf{C = 3{,}000 + 4/5\ \mathit{DI}}$$

Consumption at an income of $20,000 is

$$\mathbf{C = 3{,}000 + 4/5\ (20{,}000) = 3{,}000 + 16{,}000 = 19{,}000}$$

Consumption at an income of $15,000 is

$$\mathbf{C = 3{,}000 + 4/5\ (15{,}000) = 3{,}000 + 12{,}000 = 15{,}000}$$

These estimates match the respondent's data and confirm that the formula can be used for all income levels, including $100,000:

$$\mathbf{C = 3{,}000 + 4/5\ (100{,}000) = 3{,}000 + 80{,}000 = 83{,}000}$$

Following the same procedures, we interview another person whose answers lead to the following chart:

| Disposable income | Consumption | Saving |
|---|---|---|
| $10,000 | $11,000 | $-1,000 |
| 15,000 | 15,500 | - 500 |
| 20,000 | 20,000 | -0- |
| 25,000 | 24,500 | + 500 |

This consumer's *MPC* ratio appears to be steady at 9/10. Each $5,000 income change prompts a $4,500 consumption change. Making another assumption, we use 9/10, extrapolate to an income of zero dollars, and estimate that the second respondent would spend $2,000 as the following chart shows:

| Disposable income | Consumption | Saving |
|---|---|---|
| $ -0- | $ 2,000 | $-2,000 |
| 5,000 | 6,500 | -1,500 |
| 10,000 | 11,000 | -1,000 |

With that information we devise a second formula:

$$\mathbf{C = 2{,}000 + 9/10 \cdot Dl}$$

This formula predicts the second respondent's consumption at all income levels, based on the assumption that the *MPC* ratio stays at 9/10.

***Interpreting the Data*** After interviewing many consumers, we conclude there is a great variety of consumer habits, but they all fit a general model of

$$\mathbf{C = consumption\ at\ zero\ income + MPC \cdot DI}$$

That formula is exactly the formula Keynes theorized, which was presented in the previous chapter, namely:

$$\boldsymbol{C = \overline{C} + MPC \cdot DI}$$

We have devised a model of consumer behavior that allows us to portray the consumption habits of any consumer once we have determined only two pieces of information, $\overline{\overline{N}}$ and *MPC.* The *MPC* can be calculated from just two income and consumption figures. By assuming a constant *MPC,* it is another simple matter to extrapolate down to a zero income and to compute C, which is the part of consumption that is not a function of *DI* – that is, the exogenous part of the consumption model.'

It may be that the income-consumption relationship looks entirely different from what Keynes hypothesized and we devised, there is nothing sacred about this model. Perhaps a better model exists. In fact, as we shall see in Chapter 12, more sophisticated and better models do exist. None, however, eliminates the *MPC;* and most short-run models incorporate a variable like $\overline{\overline{N}}$ to allow for other, exogenous variables. While our model is very simplified, it is also a reasonably accurate predictor of C. Undoubtedly, there are other variables (lumped within $\overline{\overline{N}}$) that should be taken into account if we want a truly accurate predictive tool, but as a descriptive model, this Keynesian consumption model is adequate.

**The Consumption Model**

To produce a consumption formula for the entire economy, without any information about nationa*l* consumption, we would have to sum the consumption habits of many sampled consumers and derive a formula based upon that aggregation of data.

Suppose we found that individual *MPCs* varied from .5 all the way to an impressive 1.2 among our sampled consumers, but the average *MFC* was 4/5. Also, suppose that the average $\overline{\overline{N}}$ figure among our respondents was $2,000. In that case, the typical consumption formula for the average consumer in our survey would be:

$$\mathbf{C = 2{,}000 + \textit{4/5 DI}}$$

If we have 100 million households in the economy, and the average consumption formula of $C = 2{,}000 + 4/5\ DI$ is representative of those consumers, it is possible to calculate an economy-wide consumption formula:

$$\textbf{\textit{C = 200 billion + 4/5 DI or NI}}$$

***Properties of the Model*** Using the formula, we can calculate consumption and saving (which is always *DI* – C) at a variety of income levels as is shown in Table 4-1. Note that every time income rises by $100 billion, *C* rises by $80 billion. This result is in keeping

with an *MPC* of 4/5. Note also that, at the same time, saving rises by $20 billion, which indicates that the economy's marginal propensity to save *(MPS)* is 1/5. Therefore:

$$\textbf{\textit{MPC}} + \textbf{\textit{MPS}} = 1, \text{ where } \textbf{\textit{MPC}} = \frac{\Delta C}{\Delta DI} \text{ and } \textbf{\textit{MPS}} = \frac{\Delta S}{\Delta DI}$$

This equation makes sense, since the only two things a consumer can do with *DI* is spend it or save it.

When the level of income is at 1,000 billion, *C* = 1,000. All that is produced is purchased by the household sector. Should *NI* drop below 1,000, the economy as a whole *dissaves* – an unlikely situation in a growing economy. But if income falls far enough, it is possible for *C* to exceed *DI* for a short period of time. This last occurred during the Great Depression, when *NI* fell by about 30 percent. At all income levels above 1,000 in our example, *DI* exceeds *C,* and positive saving occurs. This is a more likely situation for a growing economy. Such saving can fuel capital investment.

Associated with every consumption formula is a saving formula. In this case, saving at all income levels fits the formula:

***S = -200 billion + 1/5 DI or NI***

**Table 4-1. Income and consumption**

| National or disposable income | Consumption | Saving | MPC | MPS | APC |
|---|---|---|---|---|---|
| 500 | 600 | -100 | 4/5 | 1/5 | 1,20 |
| 600 | 680 | -80 | 4/5 | 1/5 | 1,13 |
| 700 | 760 | -60 | 4/5 | 1/5 | 1,09 |
| 800 | 840 | -40 | 4/5 | 1/5 | 1,05 |
| 900 | 920 | -20 | 4/5 | 1/5 | 1,02 |
| 1,000 | 1,000 | 0 | 4/5 | 1/5 | 1,00 |
| 1,100 | 1,080 | 20 | 4/5 | 1/5 | .98 |
| 1,200 | 1,160 | 40 | 4/5 | 1/5 | .97 |
| 1,300 | 1,240 | 60 | 4/5 | 1/5 | .95 |
| 1,400 | 1,320 | 80 | 4/5 | 1/5 | .94 |
| 1,500 | 1,400 | 100 | 4/5 | 1/5 | .93 |

This formula indicates that at a zero income level, $S = -200$. The saving formula fits perfectly with the consumption formula, since at D/ = 0, C = 200. In general, consumption and saving formulas for any economy have the following forms and properties:

$$\mathbf{C} = \overline{C} + \boldsymbol{MPC \cdot DI}$$

$$\boldsymbol{S} = \overline{S} + \boldsymbol{MPS \cdot DI}$$

$$\overline{S} = -\overline{C}$$

**Since MPC + MPS = 1,**

$$\mathbf{C} = \overline{C} + \boldsymbol{MPC \cdot DI}$$

$$\boldsymbol{S} = \overline{S} + \boldsymbol{MPS \cdot DI}$$

$$+$$

$$\boldsymbol{S} = \overline{S} + \boldsymbol{MPS \cdot DI} = \boldsymbol{C + S = DI}$$

Try to confirm this with our specific formulas.

Another piece of data provided in Table 4-1 is the **average propensity to consume *(APC),*** which is the ratio of total consumption to total income, *C/DI.* The percentage of total income that the individual consumer spends varies from one income to another, with that percentage generally falling as income rises. So, too, does the *APC* for the model economy. It begins at 1.20 in the table, falls to 1 at DI = 1,000, and reaches .933 at *DI* = 1,500. The *APC* is not a very useful piece of information for building an income-expenditure model, but it is important to our discussion in Chapter 12. We will leave it until then. Be sure to note, however, that even when the *MPC* is constant, the *APC* varies. In reality, as income rises over time, the value of C approaches zero, and the value of the *APC* approaches the value of the *MPC.* If C = 0, *MPC* = *APC.*

By assuming a constant *MPC,* we have created a formula that fits the format of an equation for a straight line. The *MPC* in the real world is probably not so stable. For our purposes, however, a constant *MPC* weakens the model insignificantly while making it easier to understand and much easier to graph. Figure 4-1 shows our consumption formula plotted on axes depicting spending on the

vertical axis and *NI* or *DI* on the horizontal. Every straight line, including this *consumption function,* fits the general mathematical format of where *Y* is the

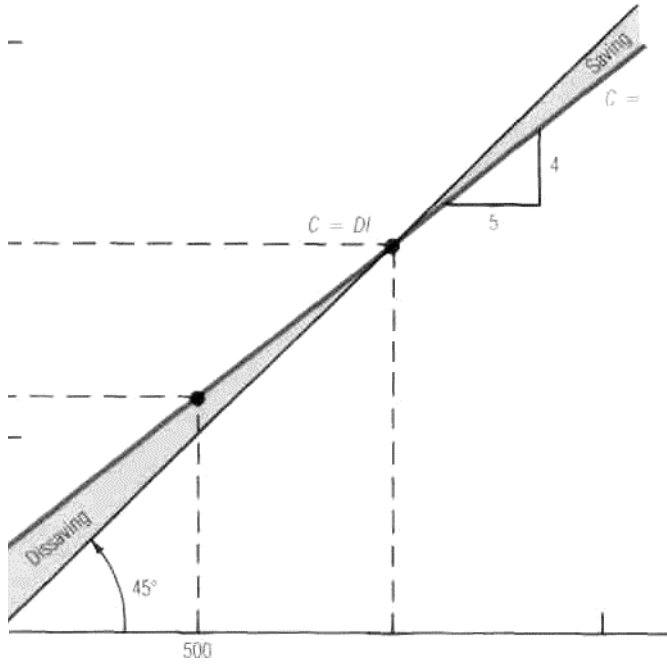


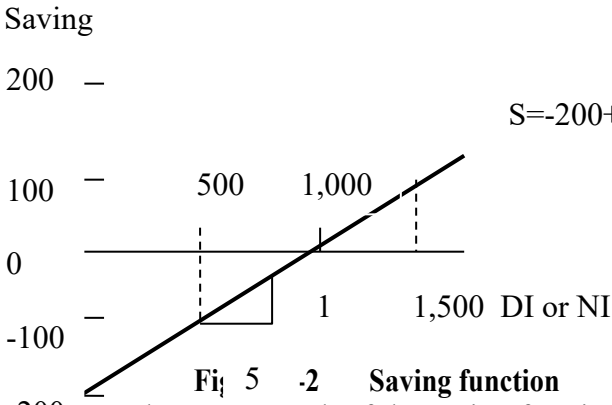

**Figure 4-1 Consumption function**

$$Y = mX + b$$

dependent variable, *m* is the slope, *X* is the independent variable, and *b* is the intercept (or constant or shift parameter). In our model, consumption *(C),* is the dependent variable, *MPC* is the slope, income *{NI* or *DI)* is the independent variable, and exogenous consumption *(*$\bar{\tilde{N}}$*)* is the intercept.

The other line on the graph is a 45° line. It is included on this and other graphs as a reference line. Since the 45° line bisects the angle between the two axes, any point on that line is an equal distance from both axes. The 45° line is a locus of all points on the graph where spending equals income (output). As a result, all of the points on the 45° line are candidates for equilibrium – that is, the income level at which expenditures equal income. It is also useful to think of the 45° line as the income or aggregate supply line to which consumption (or later aggregate expenditures) can be compared. The vertical distance between the 45° line and the consumption function measures the amount of saving (or dissaving) at all income levels. At *NI* = 1,000, where C = *NI,* the consumption function crosses the 45° line. Since *S* = 0 at this income, it makes sense that the distance between the consumption line and the 45° line is zero.

Graphs of the consumption function are simply another way of expressing the income-consumption relationship. No information is contained in Figure 4-1 that is not in Table 4-1. The graph is just another method of expressing it. We will use formulas, tables, and graphs to present the model. You can choose whichever is the most elucidating, or use all three.




**Fi 5 -2 Saving function**

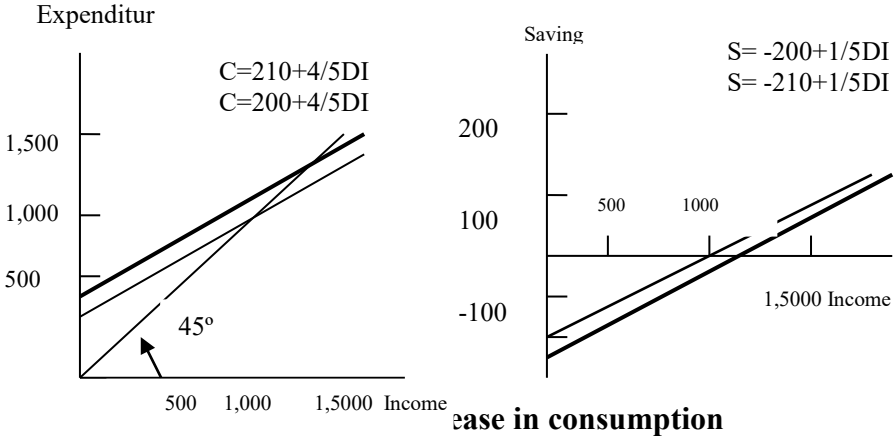
4-2 shows the graph of the saving function associated with eco consumption function shown in Figure 4-1. Saving starts out at – 200 billion and rises at a slope of 1/5, corresponding to the *MPS.* At

*NI* = 1,000, saving is zero. The vertical distance between the saving function and the horizontal axis is equal to the vertical distance between the consumption function and the 45° line in Figure 4-1.

Should consumption habits change, saving changes in the opposite direction. For example, should all consumers decide to spend $100 more at all income levels, the consumption function would shift up by $10 billion ($100 times 100 million) and the saving function would shift down by $10 billion as in Figure 4-3. The new formulas would be

$$C = 210 + 4/5\ DI\ or\ NI$$
$$S = -210 + 1/5\ DI\ or\ NI$$

The new functions are parallel to the original ones, since the *MPC* and *MPS* did not change, but the C figure is higher, and the $\overline{S}$ figure is lower by the $10 billion. When the *MPC* rises, the *MPS* falls. For example, if the *MPC* rises to 9/10, the *MPS* falls to 1/10. In that case, the consumption function has a steeper slope, and the saving function has a flatter one.




**ease in consumption**

**2. The Aggregate Expenditures (AE) Model**

So far we have generated a consumption model that, though simplified, can be a very accurate predictor of the level of consumption demand, given a level of *DI.* Our goal, to be able to

use our knowledge of *AE* to predict the level of M over the next year, is not far off. What we still must do is add investment expenditures *(I)* to consumption so that we will have a model of aggregate private expenditures. We will leave most of our detailed study of investment theory. Our purpose here is not so much to investigate what determines the level of investment demand as to study the impact that investment expenditure (and a change in the level of investment) has on the level of *AE* and on the ultimate level of equilibrium *NI*.

**Investment**

Investment spending is the most volatile of the three parts of *AE*. Consumption and government spending follow relatively stable or predictable courses, with consumption consistently following the level of W quite closely, and federal spending varying fairly predictably. Investment spending, on the other hand, can change suddenly and with a wide amplitude. It rises rapidly in a healthy economy and falls – sometimes drastically – in a sagging economy. During the Great Depression, net investment plunged by over 100 percent, until it was actually negative, which means that producers were reducing their capital stock rather than adding to it. The level of *AE* is only partly determined by investment, but changes in *AE* are often initiated entirely by changes in investment. Therefore, it is vitally important to understand the influence of investment spending on the level of *AE* and equilibrium *NI*.

***Predicting Investment*** Predicting the level of investment expenditures requires an understanding of the investment decision and the variables that influence it. At this stage we will only briefly examine the variables and their relationship to investment. Once we understand what would hypothetically have to be done in order to make some predictions of investment spending for a given year, we will just add those predictions to our model of consumption. That will give us the aggregate expenditures model we seek.

The Keynesian theory of investment presented in the previous chapter will serve us very well here. While the investment decision-making process can be analyzed with much more sophisticated models, very few economists would disagree with the idea that the investment decision – whether or not to purchase additional manufacturing plants and equipment – is based on profit expectations. When businesses invest, they are adding to their firms' capacity to produce goods and services. The potential benefit is increased sales revenues or decreased costs of production or both. A capital investment is expected to improve net revenues. Naturally, a piece of capital has a purchasing cost, both in the manufacturer's price tag and in the financial market's cost of borrowing. A potential investor must weigh these costs and expected benefits to determine if the piece of capital will increase or decrease the firm's profits. Only when the piece of capital will increase profits should the investment be made.

Although the decision is probably quite different for every firm, we can identify the variables that will primarily determine the level of investment spending for the entire economy. On the revenues side, the expected state of the economy in the future is crucial. Any number of variables could turn out to be important in shaping it, such as current and expected government policies, inflation rates, and consumer spending levels.

What is critical is the expected level of sales. In order to make the decision to add to productive capacity, a producer must be confident of the need for such an increase. Rising sales must be foreseen in order to justify investment that expands production capacity. It is even argued by some that an increase in investment spending requires an expectation of not only rising sales, but an acceleration in the rate of increase.

On the cost side, one variable that is important to all investors, regardless of the investment, is the interest rate. It determines the cost of acquiring funds for the firms that do not have funds, and it determines the opportunity cost for firms that do have the funds. Firms' financial managers have kept close track of movements in

interest rates in recent years. Where in the past, corporations primarily were borrowers in the money market, they have become lenders of late, taking advantage of high yields on short-term securities. As a result, corporations are keenly aware of the cost both of acquiring funds and of locking them up in long-term capital investments. There is no doubt that, all else being equal (such as output and prices), high real interest rates discourage private investment. Investment and the real interest rate move in the opposite direction.

The addition of investment to the income expenditure model could increase the number of unknown variables from one (presently *NI)* to a very large number.

> ***I = I (r,* profit expectations)**
> **profit expectations = *pe* (output, sales, political events, expected level of *AE,* etc.)**

In order to keep the model relatively simple for ease of understanding, it is standard to limit it to one unknown variable, *NI.* What about investment and all of its determining variables? We will assume that we use all of those many variables to make a prediction or a group of predictions about the level of investment, but investment will enter the model as an exogenous (influenced by variables outside our model) but predictable variable. For example, suppose that we arrive at our prediction for investment expenditures by surveying a large number of corporate heads about their investment plans for the upcoming year. Their plans are based on the large number of variables that we spoke of, but we ask only for their plans, not for information on those variables. By aggregating these plans over the entire economy, we estimate investment demand for the year without having to add a myriad of variables to our model. Our prediction may be wrong, but for now we are interested in what our prediction tells us about *AE,* not in its accuracy. Besides, we can try other possible investment levels in order to see what impact those differences might have on *AE* and the level of *NI.* So if it seems as if we are pulling an *I* figure out of the

air, remember that for exposition purposes we are indeed doing so; but in reality one could derive that figure from evidence on a number of variables.

***Adding Investment to Consumption*** Let us now add investment to our model of consumption demand, which will continue to be

$$\mathbf{C = 200 + \textit{4/5 NI}}$$

Aggregate expenditures are now the sum of *C* and *I.* Suppose that after our extensive survey of business peoples' plans, we predict a level of investment of $100 billion. We are going to study *AE* with only one predicted level of *I* at a time. Therefore, *I* will not vary with income as *C* does. *I* is not a function of *NI;* it is an autonomous expenditure. We want to see what level of M will likely result if *I* = 100. We will try other levels of *I* later. Our present information about the economy is

$$\mathbf{C = 200 + 4/5\ NI}$$
$$\mathbf{\bar{I} = 100}$$
$$\mathbf{AE = C + I = 200 + 4/5\ NI + 100}$$

Using that information we can construct Table 4-2, which shows the levels of C, *S, I,* and *AE* that would occur at a variety of levels of *AS* or *NI.* The level of $\bar{I}$ stays the same as stated, and *C* and *S* vary, based upon the *MPC* of 4/5 and *MPS* of 1/5. The *NI* = *AS* column tells us how much output is produced in dollar terms, and the *AE* column tells us how much output will be demanded by the combination of the household and business sectors. *AE* can be calculated for all *NI* levels by substituting *NI* into the *AE* equation (just given), making sure to add $\bar{C}$ and $\bar{I}$ onto *MPC* times *NI.* Only at *NI* = 1,500 does *AE* = *NI.*

**Table 4-2. Income-expenditure equilibrium**

| NI = AS | Consumption | Saving | Investment | AE = C + 1 | Market Conditions |
|---|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| 500 | 600 | -100 | 100 | 700 | *AE* > AS and I > S by |
| 1,000 | 1,000 | 0 | 100 | 1,100 | 200 |
| 1,100 | 1,080 | 20 | 100 | 1,180 | *AE* > AS and I > S by |
| 1,200 | 1,160 | 40 | 100 | 1,260 | 100 |
| 1,300 | 1,240 | 60 | 100 | 1,340 | *AE* > AS and I > S by 80 |
| 1,400 | 1,320 | 80 | 100 | 1,420 | *AE* > AS and I > S by 60 |
| | | | | | *AE* > AS and I > S by 40 |
| | | | | | *AE* > AS and I > S by 20 |
| 1,500 | 1,400 | 100 | 100 | 1,500 | *AE* = AS and I = S *EQ* |
| 1,600 | 1,480 | 120 | 100 | 1,580 | *AS* > AE and S > I by 20 |
| 1,700 | 1,560 | 140 | 100 | 1,660 | *AS* >AE and S > I by 40 |

For the visually minded, we can graph the data from Table 4-2 onto Figure 4-4. The consumption function is exactly the same as in Figure 4-1.

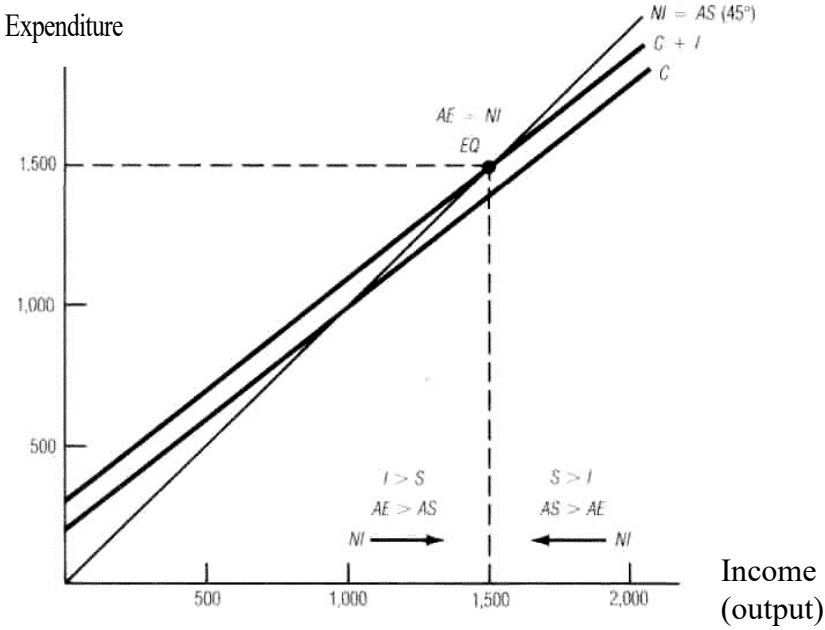



**Figure 4-4 The AE curve and equilibrium**

The *AE* line simply lies $100 billion above the *C* line, accounting for the predicted level of *I*. The slope of the *AE* line is the same as the *C* line, 4/5. *AE* rises as *NI* rises because of

consumption. Every \$100 increase in NI generates an \$80 increase in *AE,* due solely, in this model, to the change in *C.* The *AE* line is parallel to the *C* line. Spending at NI = 0 is now \$300 billion, which is equal to $\overline{C} + \overline{I}$. Note that the *C* line still crosses the *NI* (45°) line at *NI* = 1,000, but the *AE* line crosses the *NI* line at *NI* = 1,500 – the same M level at which *AE* = *NI* in Table 4-2.

Figure 4-5 plots the saving and investment data from Table 4-2. The *S* line is exactly the same as in Figure 4-2, with a slope of 1/5 equal to the *MPS.* The I line is horizontal at a level of \$100 billion, since we have fixed our prediction of $\overline{I}$ at that level. Note that the two lines intersect at *NI* = 1,500, the level at which *S* = *I* and *AE* = *NI.* That is equilibrium *(EQ)* in the product market.

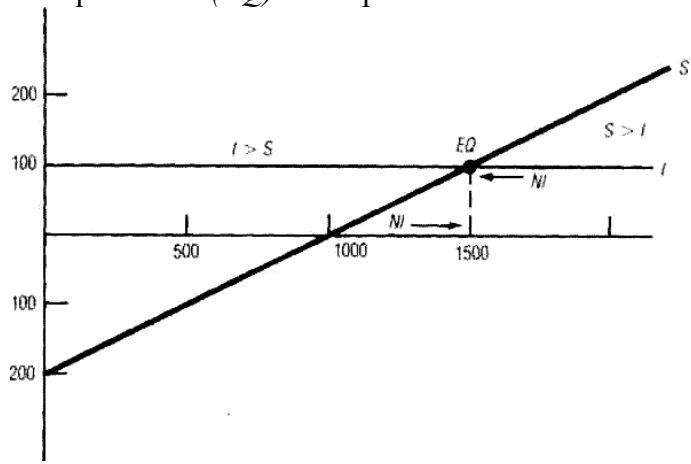



**Figure 4-5 Saving-investment**

**Equilibrium**

The concept of equilibrium is critical to all of economics. It is particularly important to grasp the significance of the equilibrium level of aggregate income –what it means, how the market tries to reach it, and how *NI* moves from one equilibrium level to another. In the example just discussed and graphed, the equilibrium level of income is *NI* = 1,500. At that income, *AE* = *NI.* We want to illustrate in this section how we can be sure that *NI* will automatically move

to a level at which *AE* = *NI* and what that knowledge allows us to say about economic conditions.

The Automatic Process Let us first consider income levels other than NI = 1,500. For example, at *NI* = 1,000, *NI* = *C*, *S* = 0, but *AE* is 1,100. The household sector spends enough at M = 1,000 to buy up all the aggregate supply. If consumption were the only part of aggregate demand (that is, if *I* were zero), equilibrium would occur at M = 1,000. Instead, *AE* is greater than *NI* by $100 billion, which is exactly the amount by which investment exceeds saving. Since *AE* is greater than *NI*, producers throughout the economy will sell all $1,000 billion with ease and still have, in the aggregate, $100 billion in demand left over. Temporarily, producers will try to satisfy the excess *AE* out of inventories. The excess of AE will encourage more production; producers will try to take advantage of the extra demand to increase production, market shares, and profits. According to Keynes's view, output alone will rise as long as $1,500 billion is below full employment *NI*. Thus output, if it starts at $1,000 billion, will not stay there. Output will rise in response to the excess of *AE*.

The excess of *AE* is even more pronounced at income levels below $1,000 billion where consumption exceeds *NI*. At income levels above *NI* = 1,000, consumption falls short of *NI* because saving is positive, but investment injects more spending into the circular flow than the amount of this shortfall. The result is that producers can sell all of their output and still have customers left over. Output will automatically rise at any *NI* level below *NI* = 1,500, because AE exceeds M at all income levels below M = 1,500.

The situation is just the opposite if income starts out at a level higher than $1,500 billion. At *NI* = 1,600, for example, *AE* = 1,580, and *S* = 120 while *I* = 100. AE falls $20 billion short of M. Consumers earn $1,600 billion and spend $1,480 billion. This leaves a shortfall of $120 billion. Investment makes up $100 billion of this, but that is not enough. Producers will find that they cannot sell all of their output, and inventories will build up. It will be necessary for the producers to cut back production. Income (output) will fall due to the excess of output over expenditures. At all income levels above *NI* = 1,500, AE falls short of *NI*

because investment does not completely match saving. Output goes unsold. The automatic response of suppliers is to reduce output, which causes income to fall.

Only at *NI* = 1,500 does *AE* = *NI* and *I* = *S*. When income reaches $1,500 billion, it stays there. How can we be sure? It is simple. If production falls below $1,500 billion, AE will exceed income and spur production back up. And if production rises above $1,500 billion, the shortage of expenditures brings production back down. The forces of supply and demand automatically lead to a level of income at which *AE* = *NI* and *I* = *S*. We can summarize this in the following manner:

**If NI < EQ, AE > NI, I> S, NI ↑ (output ↑ ).**
**If NI > EQ, AE < NI, I< S, NI ↓ (output ↓ ).**
**If NI = EQ, AE = NI, I = S, NI stays the same.**

On the graph, equilibrium occurs where the AE line crosses the 45° line, indicating *AE* = *NI*. This happens at *NI* = 1,500. At all income levels below $1,500 (that is, to the left of 1,500 on the graph), the *AE* line lies above the 45° line, indicating *AE* > *NI*. To the right of 1,500 on the graph, the *AE* line lies below the 45° line, telling us that *AE* < *NI*. The intersection at *NI* = 1,500 depicts equilibrium.

Note that on both the table and the two graphs at all levels of *NI* the difference between AE and NI is always the same as the difference between *I* and *S*. This comparison shows us that in the income-expenditure model, the difference between *AE* and *NI* is always equal to the difference between injections and withdrawals. Investment is the injection; saving is the withdrawal. When injections exceed withdrawals by $X, *AE* exceeds *NI* by the same $X. Equilibrium only occurs when injections equal withdrawals. It is the movements in *NI* that bring AE equal to *NI* and injections equal to withdrawals.

The product market may not always be in equilibrium – in fact, it seldom is – but it is always adjusting itself toward equilibrium. In our example, *NI* may not start out at 1,500, but the forces of supply and demand quarantee that *NI* will head toward $1,500 billion.

Let us observe the equilibrating process a little more closely. Suppose NI is $1,400 billion. At that income level, *AE* = 1,420; *AE* > *NI*

by $20 billion. Producers throughout the economy cannot meet all of their orders. To do so, they would have to expand production by 20 so that *NI* = 1,420. It may seem that output has caught up to *AE*, but it has not, yet. Since output has increased by $20 billion, *NI* has also. If income is up by $20 billion, consumption must be up by $16 billion, given that *MPC* = 4/5. At *NI* = 1,420, *AE* = 1,436. Aggregate expenditures are still greater than output, but the difference is now only $16 billion. Producers still cannot meet their orders, and output continues to rise. The gap between AE and *NI* gets progressively smaller. Income stops rising when it reaches $1,500 billion, and the gap between *AE* and *NI* is zero.

Notice that we have not mentioned the government or any policy of any kind in describing the process by which the product market reaches equilibrium. The economy does not need any help in reaching equilibrium. It happens automatically, whether we like the result or not. Producers respond to discrepancies between demand and supply by changing output until *AE* = *NI*. Equilibrium is not a policy equilibrium occurs, but they do not help the market get to equilibrium. It may be that the' market seldom reaches equilibrium before a change in the level of *AE* sends it toward a new equilibrium. Nevertheless, the market is always heading to some predictable equilibrium level of *NI*. The fact that the target moves a lot does not change the other more important fact that output and income are tracking equilibrium like a heat-seeking missile follows a jet.

***The Significance of Equilibrium*** Knowledge of equilibrium and the automatic adjustment process that heads the economy to equilibrium greatly simplifies the job of understanding what is going on in the economy. Production cutbacks and worker layoffs are parts of the process by which *NI* falls toward equilibrium Production increases (and inflation in a non-Keynesian model) are parts of the process by which *NI* rises toward equilibrium. Output and prices do not go just anywhere, they go toward equilibrium levels. And we now know some of the rudimentary techniques of predicting the *NI* level at which equilibrium occurs.

Even though *NI* may not start out at an equilibrium level (demand and supply responses are often patterned by trial and error, hit and miss),

the interaction of *AE* and output will bring *NI* toward the level where *AE* = *NI*. If we were asked to predict the level of *NI* for the economy in the upcoming year, our best prediction would be our estimate of the equilibrium *NI*. Even if, at the beginning of the year, the rate of production would lead to an output level other than $1,500 billion, the failure of *AE* to match output would bring about automatic adjustments in the level of production until it reached the equilibrium level later in the year. As long as our estimates of consumption and investment are correct, we cannot lose, because *NI* will eventually end up at equilibrium. Should the levels of *C* or *I* change, equilibrium will change, and so would our prediction. Often part of AE does change before *NI* reaches equilibrium. This sends *NI* toward a new equilibrium even before it reaches the old one.

Many predictions about the future state of the economy are based upon an estimate of equilibrium *NI* and a comparison of the estimate to the existing level of *NI* as computed by the Department of Commerce. If the estimate of equilibrium is accurate, a conclusion about the direction in which *NI* will be moving is a simple matter. Should our estimate of 1,500 be accurate, and *NI* is presently measured to be 1,600, we can be certain that *NI* will be declining in the near future. This conclusion makes sense, since at *NI* = 1,600, *AE* < *NI*. We could predict a contraction or a recession. On the other hand, if M is presently measured at 1,400, we can use our estimate of equilibrium at *NI* = 1,500 to predict that *NI* will rise in the upcoming months. We can do this because at *NI* = 1,400, *AE* > *NI*. Remember, our ability to make such predictions is predicated on the assumption that the *I* and **C** information we used to build our model is accurate. If our estimate of I is wrong, so is our prediction. With that warning in mind, we can state the following:

**If present NI > equilibrium NI, NI will ↓.**
**If present NI < equilibrium NI, NI will ↑.**

The magnitude of the gap between present *NI* and equilibrium *NI* foretells the impact that the consequent rise or fall in *NI* will have. For example, if present *NI* is 1,0(X}, while equilibrium *NI* is predicted to be 800, we can expect *NI* to fall by $200 billion, or 20 percent. That, by the

standards established in Chapter 2, would be an enormous decline, requiring significant cutbacks in production and employment. It may be a depression. A 5 percent gap would mean a considerably less severe contraction.

In the other direction, the size of the gap can mean the difference between output expansion and inflation. For example, if present *NI* is 1,000 and predicted equilibrium is 1,200, inflation would be a good guess. Why? Is inflation predicted only because $AE > NI$ at $NI = 1{,}000$? No. Though it is true that if $EQ = 1{,}200$, AE will exceed *NI* at $NI = 1{,}000$, we cannot conclude that inflation will occur because of that. As we know, excess AE can lead to greater output as well. We predict inflation because of the size of the gap. A rise in *NI* from 1,000 to 1,200 would mean a 20 percent increase during the upcoming months. Can real *NI* rise that fast in a year? Not in the United States, where real *NI* rises at an average rate of 3.5 percent and has not risen faster than 7 percent in any year since the Korean War. Will *NI* rise to 1,200? Yes. How? It will rise by some increased output, but mostly by rising prices. This is, of course, contrary to the Keynesian assumption of either output or prices rising.

A knowlege of the limitations of output allows us to use our prediction of equilibrium to reach conclusions about the possibility of inflation occurring. In either direction, a wide gap between present *NI* and predicted *EQ* can mean serious economic problems.

***Calculating Equilibrium*** So far we have seen two methods of determining equilibrium and depicting the relationship between *AD* and *AS* at income levels above and below equilibrium. It is possible to find equilibrium by producing a table such as Table 4-2. Such a table requires a lot of effort, though it is quite informative. Or if one is very handy with a ruler and graph paper, equilibrium can be found by looking for the *NI* level at which the *AE* line intersects the 45° line. Unless you are a drafter, the possibility of error is great. A better method of finding equilibrium is to use algebra. In order to find equilibrium, calculate at what income level $AE = NI$ or $NI = C + I$. Only at equilibrium does $NI = C + I$.

How do we solve an equation like that? It has three unknowns. It would be impossible to solve it without the information we have about *C*

and *I.* We have estimated that *C = 200 + 4/5 NI*, and that *I* will be 100. With those figures we can find the *NI* level where *NI = C + I:*

**At EQ, NI = C + I.**
**Since C = 200 + 4/5 NI**
**and $\bar{I}$ = 100**
**NI = 200 + 4/5 NI + 100 at EQ.**

We have simply substituted our *C* and *I* information into the equilibrium equation. We can now solve for *NI* by using standard rules of algebra:

**NI - 4/5 NI = 200 + 100**
**and**
**1/5 NI = 300**
**so**
**NI = 1,500 when NI = C + I**

Equilibrium occurs at *NI* = 1,500, as we have already established. This algebraic method is by far the simplest method of calculating equilibrium.

Since this method is so handy, let us take a bit more time with it. As we said, at *NI* = 1,500, *AD = AS*. Let us confirm this:

**At NI = 1,500, C = 200 + 4/5 (1,500)**
**or C = 200 + 1,200 = 1,400**
**plus $\bar{I}$ = 100**
**gives AE = C + $\bar{I}$ = 1,500 = NI.**

We should also confirm that *I = S:*

**Since C = 1,400 and S = NI - C,**
**S = 1,500 - 1,400 = 100 = $\bar{I}$ .**

These are the kinds of calculations that were used to fill in all of the figures in Table 4-2 and can be used to compare *AE* to *NI* or *S* to I at all income levels.

Just to be sure that we are handy at finding equilibrium, let us find the equilibrium income level for an economy with a consumption formula of C = $200 billion + 3/4 DI and a predicted investment level of $300 billion.

**At EQ, NI = C + I.**

**Since C = 200 +3/4 NI and $\bar{I}$ = 300,**

**NI = 200 = ¾ + 300.**

**NI – 3/4NI = 500**

**¼ NI = 500**

**EQ NI = 2,000 when NI = C + I**

**C = 200 + ¾ (2,000) = 1,700 at EQ**

**$\bar{I}$ = 300**

**C + $\bar{I}$ = 2,000 = AD = AS = NI**

**S = 2,000 – 1,700 = 300 = $\bar{I}$**

**That should do it for now.**

**The Income Multiplier**

As income rises and falls in the economy, it is simply adjusting to a difference in expenditures and income, and it is moving toward an equilibrium level. If income is rising, it must be below equilibrium; if it is falling, it must be above equilibrium. When income is rising or falling, it is going from an old equilibrium to a new one. The former income level is no longer the equilibrium because some change in autonomous expenditures has left *AE* different from *NI*. A change in autonomous expenditures will throw the economy out of equilibrium, and income (output) will move to a new equilibrium. It is changes in the level of *AE* – Keynes's model does not allow for changes in the level of *AS* – and the adjustments that result from such changes that we want to study here.

**A Demonstration** Suppose the market is in equilibrium at *NI* = 1,500. Any exogenous change in consumption or investment away from what we described before will lead to a change in *AE* at all income levels. The result will be that $1,500 billion will no longer be equilibrium. If *AE* rises, income rises; if *AE* falls, so does income. By

now, that is obvious. What is not so obvious is how much income will change with a change in *AE*.

Suppose investment rises by $10 billion from $100 billion to $110 billion. With that extra $10 billion in expenditures, *NI* = 1,500 is no longer equilibrium. AE is now $1,510 billion because of the additional $10 billion in spending. Since *AE* = 1,510 and *NI* = 1,500, *AE* exceeds *NI*. Income will definitely rise, and it will rise by more than $10 billion. We know that it will rise by more than $10 billion, because, as we observed earlier, as *NI* catches up to *AE, AE* does not stand still. A rise in *NI* to 1,510 will not bring about equilibrium, since consumption rises when income does.

In order to determine by how much income rises as a result of the initial $10 billion increase in aggregate demand, we can simply use algebra to find the new equilibrium:

**If C = 200 + 4/5 NI and $\bar{I}$ = 110**
**NI = 200 + 4/5 NI + 110.**
**1/5 NI = 310**
**NI = 1,550 at equilibrium**

As Table 4-3 confirms, *NI* = 1,550 is indeed the new equilibrium. *AE* = *NI* = 1,550 and *S* = *I* = 110. An initial increase in investment of 10 leads to an ultimate increase in AE and *NI* of 50. The expansion of output and income is five times the initial change in investment. Income changes by some multiple of the change in investment.

What we have demonstrated is the effect of Keynes's income multiplier (MULT). Any autonomous change in AE will set off a process that will lead to a change in income, in the same direction, that is some multiple of the change in AE. The multiplier in the example above is 5. Why 5? Because when the economy is in equilibrium, not only does *AE* = *NI*, but *I* = *S*. If investment rises, it will suddenly be greater than saving. The differential is equal to the gap between *AE* and *NI*. In order for equilibrium to be reestablished, not only must *NI* catch up to AE, but S must catch up to *I*. Saving increases as income does.

How much must income rise in order for saving to rise by the $10 billion? When

**Table 4-3. Demonstrating the income multiplier**

| NI = AS | Consumption | Saving | Investment | AE = C + I | Market Conditions |
|---|---|---|---|---|---|
| 1,000 | 1,000 | 0 | 110 | 1,110 | AE >NI and I>S by 110 |
| 1,400 | 1,320 | 80 | 110 | 1,430 | AE > NI and I>S by 30 |
| 1,500 | 1,400 | 100 | 110 | 1,510 | AE > NI and I>S by10 |
| 1,550 | 1,440 | 110 | 110 | 1,550 | AE = NI and I = S |
| 1,600 | 1,480 | 120 | 110 | 1,590 | NI> AE and S > I by 10 |
| 1,700 | 1,560 | 140 | 110 | 1,670 | NI > AE and S> I by 30 |

*NI* rises by $50 billion from *NI* = 1,500 to *NI* = 1,550, saving rises from *S* = 100 to S = 110, where it equals investment. Equilibrium is reestablished.

***The Formula*** The magnitude of the rise in income resulting from a rise in demand depends upon the value of the *MPS.* The less out of every dollar increase in income that is saved, the more income must increase in order for saving to catch up to an increase in investment. We can derive a simple formula that expresses this relationship:

At equilibrium:

$$\mathbf{NI = C + I} = \bar{C} + \mathbf{MPC \cdot NI} + \bar{I}$$

**Therefore**:

$$\mathbf{\Delta NI} = \Delta\bar{C} + \mathbf{MPC \cdot \Delta NI} + \Delta\bar{I}$$

$$\mathbf{\Delta NI - MPC \cdot \Delta NI} = \Delta\bar{C} + \Delta\bar{I}$$

$$\mathbf{\Delta NI\ (1 - MPC)} = \Delta\bar{C} + \Delta\bar{I}$$

$$\mathbf{\Delta NI} = \Delta\bar{C} + \Delta\bar{I} \cdot \frac{1}{1 - MPC}$$

$$\mathbf{\Delta NI} = (\Delta\bar{C} + \Delta\bar{I}) \cdot \frac{1}{MPS}$$

**thus**

$$\Delta AE \text{ x } (\frac{1}{MPS}) = \Delta NI$$

**or**

$$\Delta AE \text{ x } MULT = \Delta NI$$

**where**

$$MULT = \frac{1}{MPS} = \frac{1}{1 - MPC}$$

In our example, the initial change in *I* of 10 led to an ultimate change in *NI* of 50. This makes sense, since the *MPS* is 1/5, and the multiplier is equal to 5.

$$MULT = \frac{1}{MPS} = \frac{1}{1/5} = 5$$

$$10 \cdot \frac{1}{1/5} = \Delta NI$$

$$10 \cdot 5 = \Delta NI = 50$$

All autonomous changes in *AE* lead to multiple changes of income, and the size of the income multiplier is determined by the size of the *MPC.* The higher the *MPC* (the lower the MPS), the higher is the multiplier. For example:

**If *MPC* = 4/5, *MULT* = 5,**

**but if** $MPC = 9/10, MULT = \frac{1}{1/10} = 10$

A $10 billion autonomous increase (decrease) in investment in an economy with an *MPC* of 9/10 would lead to a $100 billion increase (decrease) in income as the economy moves to the new equilibrium. Other examples of multipliers are:

**If the *MPC* = 3/4,** $MULT = \frac{1}{1/4} = 4$

**If the *MPC* = 7/8,** $MULT = \frac{1}{1/8} = 8$**.**

**If the *MPC* = 3/5, *MULT* =** $\frac{1}{2/5} = 5/2 = 2\ ½.$

***The Process*** Intuitively, we can account for the fact that autonomous changes in expenditures lead to multiple changes in income if we remember that one person's spending becomes another's income. When investment rises by $10 billion, that means $10 billion worth of more spending and, as a result, sales and income. As Table 4-4 shows, the revenues received by the companies selling the machines to the investors become income to the household sector in the form of wages, rents, interest, and profits. A $10 billion increase in income leads to an $8 billion increase in consumption and *AE,* with the other $2 billion going to saving. Suppose the people who spend the $8 billion all buy automobiles. Auto sales climb by $8 billion. That generates $8 billion in income to the household sector, which leads to another $6.4 billion increase in consumption and *AE.*

**Table 4-4. The multiplier process**

| Spending Round | Increase in Sales | Income to Household | Increase in Consumption | Increase in Saving | Spending to Business |
|---|---|---|---|---|---|
| #1 | 10.00 → | 10.00 | 8.00 | 2.00 | 8.00 |
| #2 | 8.00 → | 8.00 | 6.40 | 1.60 | 6.40 |
| #3 | 6.40 → | 6.40 | 5.12 | 1.28 | 5.12 |
| #4 | 5.12 → | 5.12 | 4.09 | 1.02 | 4.09 |
| #5 | 4.09 → | 4.09 | 3.27 | .82 | 3.27 |
| #6 | 3.27 → | 3.27 | 2.62 | .65 | 2.62 |
| #7 | 2.62 → | 2.62 | 2.10 | .52 | 2.10 |
| | etc. | etc. | etc. | etc. | etc. |
| Total | 50 | 50 | 40 | 10 | 40 |

More television sets, food, clothing, and so forth, are sold as a result of the original $10 billion purchase of machines. At each stage, however, one-fifth of the income increase is leaked into

saving. Eventually, after many cycles of the circular flow, all $10 billion has leaked to saving. At that time, $50 billion in new sales has been recorded, and income has caught up to *AE,* after a mutual total increase of $50 billion. Notice that the initial stimulant, the $10 billion autonomous increase in *I*, causes an eventual rise of $50 billion in both *NI* and *AE.* Every time M tries to catch up to *AE, AE* rises again, because C rises with *NI.* But, since *C* rises only four-fifths as fast as *NI, NI* does catch up to *AE* after they have both risen by a total of $50 billion. In the end, as Table 4-4 shows, *I* has risen by 10, C by 40, and both *AE* and *NI* by 50. A new equilibrium is established. Take away the initial $10 billion investment spending increase, and the source of income for all of the other consumption increases will disappear at the same time. Every sale in every round is fueled by the initial $10 billion increase in investment. Income will fall by $50 billion if investment falls by $10 billion. The multiplier process works in both directions.

For another representation of the multiplier, look at Figure 4-7. The equilibrium at $NI = 1{,}500$ is recreated with $AE = NI = 1{,}500$ and $S = I = 100$. The investment line $I'$ represents $I = 110$ instead of 100. The new *AE* line intersects the 45° line at 1,550, indicating $AE = NI$ at that higher income level. The *S* line intersects the higher $I'$ line at $NI = 1{,}550$. An upward shift in expenditures of 10 leads to a rightward climb in income of 50 due to the slope *(MPC)* of the consumption line. The higher the *MPC,* the steeper is the slope of the *C* line, and the greater is the rightward increase in income caused by an upward shift in *AE.*

***The Significance of the Multiplier*** Upon being first introduced to the income multiplier, most students think it is a good thing for an economy to have. After all, the multiplier makes it much easier to get income up. A $50 billion rise in income requires only a $10 billion hike in investment. There is another side to that issue, however. A mere $10 billion drop in investment leads to a $50 billion drop in income. The multiplier magnifies all variations in demand into much bigger variations in income, and that is not

necessarily a good thing at all. If one part of *AE* varies a great deal, *NI* will also, and to an even greater extent. Private investment can be quite volatile due to sharp changes in the expected state of the economy or in the interest rate. Those swings in investment can be translated into wide swings in income through the multiplier. If one were building an economy from scratch, stability would likely be an important goal. It would be wise to build one with a low *MPC* and a low income multiplier, since that economy would be relatively stable – that is, less likely to experience severe swings in *NI* with the accompanying by-products of unemployment or inflation.

The income multiplier affects the economy as the product market moves from one equilibrium to another. Changes in the level of *AE* knock the product market out of equilibrium and send *NI* in the same direction as the change in *AE.* It is important when using this model to know exactly what change in *NI* will result from any change in *AE.* For one thing, changes in *AE* will undoubtedly occur, and we want to know what to expect as a result. Secondly, when we discuss fiscal policy, we will want to have an idea about exactly what change in *AE* the economy needs in order to shift equilibrium from one *NI* level to a more desirable one. We will apply the income multiplier any time a change in *AE* occurs or is being considered in the income-expenditure model.

Any autonomous change in *AE* leads to the income multiplier process in the pattern summarized by the multiplier formula:

$$\Delta AE \cdot MULT = \Delta NI$$

We can substitute changes in any of the three parts of *AE* into this formula:

$$\Delta C \cdot MULT = \Delta NI$$

**or** $\Delta I \cdot MULT = \Delta NI$

***or*** $\Delta GP \cdot MULT = \Delta NI$

Fiscal policy can affect the levels of two of the parts of *AE* and therefore the ultimate level of equilibrium *NI.* As we will see in the next section, the multiplier formula can be used to determine what

change in *AE* is needed to shift equilibrium so that it lands at full employment *NI*.

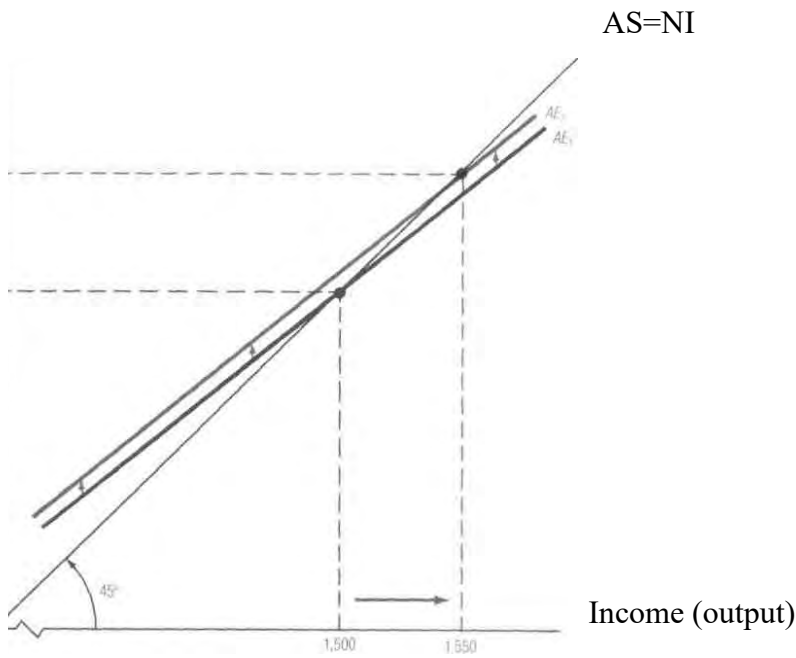



**Figure 4-6 Depicting the income multiplier**

***Some Perspective on the Multiplier*** It might be wise to stop here and gain some perspective on how Keynes's income-expenditure model, particularly the income multiplier process, fits in with our *AD-AS* model. We said the level of *AD* is determined by the level of money *NI*, which in turn is a function of the money supply and velocity. The increases in spending that set off the income multiplier process, such as increases in $\overline{\tilde{2}}$ or $\overline{\tilde{N}}$ (or later, $\overline{GP}$*),* are changes in what Keynes called autonomous spending. As such, these changes must be presumed to be the result of a rise in velocity. If velocity does rise with increases in $\overline{\tilde{2}}$, $\overline{\tilde{N}}$, or $\overline{GP}$, we can safely say that *NI* rises, and so does the level of *AD*. That means

the *AD* curve in Figure 4-7 shifts to the right by the amount of the initial increase in autonomous spending-let us say, by $10 billion. The *AS* curve in that graph is a strict Keynesian *AS* curve.

But Keynes claims the process does not end there. He claims the rise in output and *NI* of $10 billion will cause consumption to rise by another $8 billion, then by 6.4, and 5.2, and so on, as the income multiplier process works its way through the circular flow. The increase in velocity is not confined to the initial increase in autonor spending. Velocity rises throughout the entire circular flow, s P off a series of progressively smaller rightward shifts in the *AD* curve, which eventually add up to $10 billion times the income multiplier. The complete composite shift leaves equilibrium income higher by $50 billion (assuming a multiplier of 5).

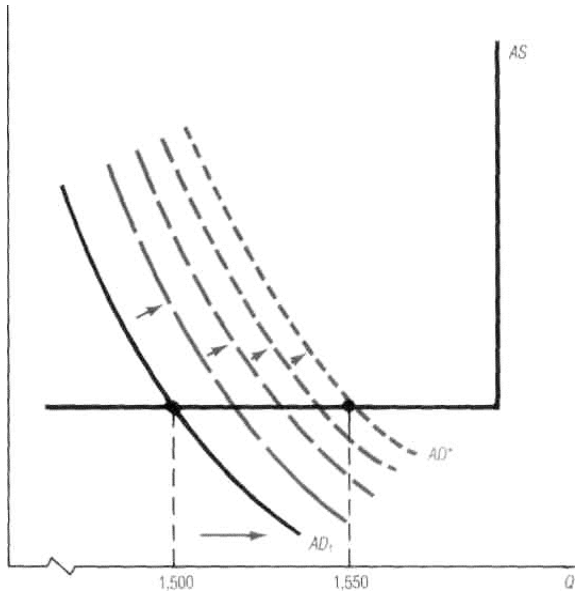



**Figure 4-7 Alternative depiction of the income multiplier**

A similar increase of autonomous spending was depicted in Figure 4-6 with one upward shift of the Keynesian expenditure or *AE* curve. The result was a rightward movement along the income

axis of $50 billion as the multiplier process worked its way through the circular flow. In the end, *AE* has risen by $50 billion without any change in *P.* That means the *level* of *AD* has risen by $50 billion in our *AD-AS* model. This increase in the level of *AD* can be depicted on our *AD-AS* model as a series of shifts in the *AD* curve (as in Figure 4-7), which add up to a $50 billion increase in M with prices held constant. That picture emphasizes the consumption increases that are set off by the increases in *NI.* Or we can simply show one right-ward shift of $50 billion that emphasizes the complete increase in velocity throughout the circular flow that is necessary in order for the increase in the level of *AD* to occur.

Keynes's income multiplier is a theory, not a fact. It, along with most of Keynes's *AD* theory, is tied to what velocity is and what causes it to change. Some non-Keynesians would argue that if there is no increase in the money supply in the circular flow, there will be no increase in the level of AD. And further, if the money supply does in fact rise, income will rise by the change of the money supply times velocity as the new dollars take several trips through the circular flow. From that point of view, observations of the income multiplier process could simply be observations of the numerous trips each dollar takes through the circular flow during a given time period. The numerical measure of those trips is the definition of velocity. We can sum up this puzzle with a few equations:

**The level of** $AD = MS \cdot V = NI$

$$\Delta(MS \cdot V) = \Delta NI$$

**and from Keynes**

$$\Delta AE \cdot MULT = \Delta NI$$

**therefore**

$\Delta AE \cdot MULT = (MS\text{-}V)$ **either** $A\ MS \cdot V$ ***or*** $MS \cdot AV$

These equations sum up the Keynesian-monetarist debate. We are not quite ready to tackle that controversy. We will wait until Chapter 10 to further analyze where changes in the level of AD can come from and what form they take.

### 3. Equilibrium versus Full Employment

One of Keynes's most important contributions to the study of the economy was the idea that the product market does not automatically equate supply and demand at full employment as the classical economists felt; but rather, income adjusts to the one level where aggregate demand equals aggregate supply. There is nothing within the equilibrating process that assures full employment. That means that the equilibrium level to which *NI* moves could bring with it unemployment or inflation. Being in equilibrium is not necessarily a good thing. In fact, equilibrium is a neutral situation – neither bad nor good in itself. It is in comparing equilibrium to full employment that we determine the state of the economy.

The full employment level of income *(FE NI)* is that output or income level at which the labor market is enjoying full employment. As mentioned earlier, *potential NI* means the same thing. Equilibrium *NI* can occur at levels above, below, or exactly at full employment *NI.* Only when equilibrium *NI* equals full employment *NI* does the economy stand a good chance of avoiding inflation and unemployment. To Keynes, the probability of that happening was no better than the probability of equilibrium landing at any other level. He held that there is no automatic process that brings *EQ NI* and *FE NI* together. And he contended that the inflation and unemployment problems created by the failure of *EQ NI* and *FE NI* to match up are only curable or avoidable by some adjustment to the level of *AE* that will lead to a different *EQ NI,* one that is closer to *FE NI.*

#### The Unemployment Situation

If equilibrium occurs at an income level below the full employment level, the economy will suffer from unemployment. Any time the economy produces an output that is less than it would produce at full employment, it stands to reason that demand-deficiency unemployment exists.

Under these circumstances, the economy can use an injection of aggregate demand to push the income level up to full employment and to eliminate unemployment.

Table 4-5 and Figure 4-8 illustrate an example of the unemployment situation. Suppose equilibrium in our economy occurs at *NI* = 1,500, as proposed earlier in this chapter. Suppose further that through calculating the output that would be produced with 94 percent of the labor force employed, we estimate that the full employment level of output is $1,600 billion. Clearly, fewer workers are required to produce $1,500 billion than to produce $1,600 billion. Therefore, at M = 1,500, unemployment exists. *AE* equals *NI* at *NI* = 1,500, yet unemployment is above the full employment rate.

The output level of *NI* = 1,600 is attainable. The factors of production are available. If the president of the United States ordered producers to expand output from $1,500 billion to $1,600 billion, they could hire the excess workers and do it. The problem is that all $1,600 billion of the output would not be sold. As both the table and graph show, *AE* falls short of *NI* at *NI* = 1,600 by $20 billion. This shortfall is often called a **deflationary gap.** With sales of only $1,580, producers would have little choice but to cut back production. Output and income would not remain at $1,600 billion. They would automatically fall to *NI* = 1,500, which is the highest level of M at which all of aggregate supply is totally sold. The *NI* level of $1,600 billion is attainable but not maintainable. As output falls from *NI* = 1,600 to *NI* = 1,500, unemployment returns. Whether we like it or not, output will end up at *NI* = 1,500.

The problem is that there is insufficient demand to maintain production at the full employment level. Specifically, autonomous expenditures would have to rise by $20 billion in order for all $1,600 billion to be sold at full employment. An additional $20 billion in *AE* would make equilibrium occur at *NI* = 1,600 instead of *NI* = 1,500. For example, if investment rose by $20 billion, *AE* would equal 1,600 at *NI* = 1,600. In fact, if *I* rose by 20 to 120, *I* would exactly equal 5 at M = 1,600 which confirms that equilibrium

would be attained. An initial increase in investment of $20 billion would stimulate *AE* enough to generate an eventual $100 billion total rise in *AE* and *NI.* The increased output would mean more jobs and the elimination of the excess unemployment.

Another way in which we could determine how much more demand would be needed to achieve equilibrium is to use the following **full employment gap formula,** which is based upon the income multiplier formula:

**Table 4-5. Unemployment equilibrium**

| NI=AS | C | S | I | AE=C+I | Market conditions |
|---|---|---|---|---|---|
| EQ=1,500 | 1,400 | 100 | 100 | 1,500 | AE=As, S=I |
| FE=1,600 | 1,480 | 120 | 100 | 1,580 | AE < AS, I<A by 20 |

$$\frac{FENI - EQNI}{MULT} = \Delta AE \text{ needed to make EQ NI = FE NI.}$$

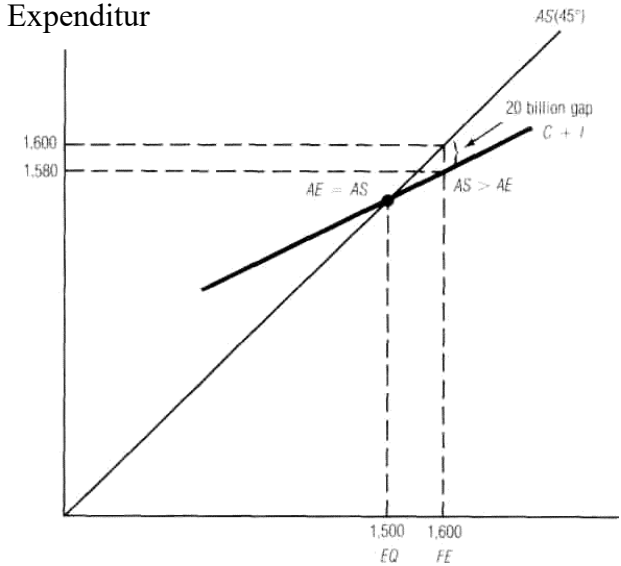



**Figure 4-8 Unemployment equilibrium**

This formula calculates the change in *AE* needed to shift *EQ* up or down to equal *FE NI.* Using our numerical example:

$$\frac{1\sigma600 - 1\sigma500}{5} = 20$$

This tells us AE needs to be increased by $20 billion in order to get EQ to occur at NI = 1,600. Again, we find that an increase in *AE* of $20 billion will accomplish equilibrium at full employment.

**The Inflation Situation**

When equilibrium occurs at an income level that is higher than the full employment *NI* level, excessive *AE* at full employment will cause inflation. M will always catch up to *AE,* no matter how high it goes. But if *AE* rises above the level of output that would be produced at full employment, the main way *NI* can catch up is through higher prices. Aggregate supply and income rise in money terms, but not much in real terms. What the economy needs, in this case, is less demand so that the level of output at which *AE* equals *NI* is at the full employment level rather than beyond it.

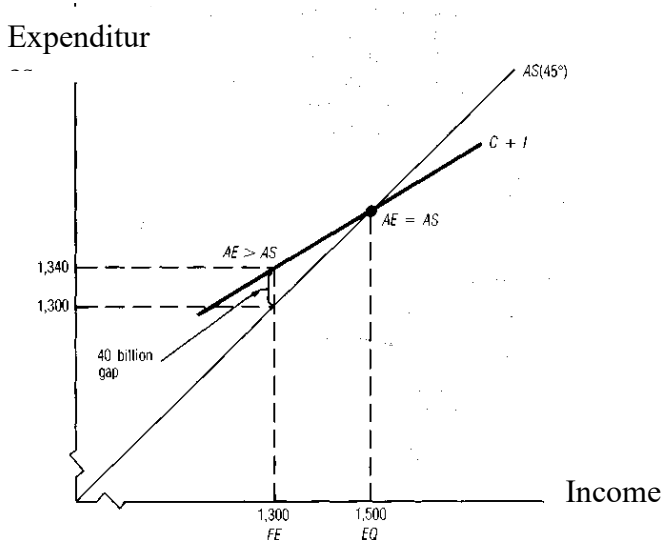



**Figure 4-9 Inflation equilibrium**

The inflation situation is depicted by Table 4-6 and Figure 4-9. Given the same equilibrium at *NI* = 1,500, we can exemplify inflationary circumstances by supposing that the level of production at full employment is $1,300 billion. At the *NI* level of $1,300 billion, *AE* exceeds production by $40 billion. This is often called an **inflationary gap.** Since the labor force is fully employed at *NI* = 1,300, the expansion of production is quite difficult. Producers have more than enough customers; what they lack are easily obtainable factors of production. The excess of demand for finished goods will be translated into an excess demand for factors of production. A shortage of factors will drive up their prices and push up the prices of finished goods. Unable to reach equilibrium in real terms, aggregate supply automatically rises to meet demand through more expensive products rather than more products. The gap on the graph between the *AE* line and the 45° line *at NI* = 1,300 is filled primarily by inflation.

The problem is that production cannot keep up with demand. Consumers and investors are spending too much money relative to production. In order to alleviate the pressure on prices, *AE* must be dampened by $40 billion. Such a reduction in demand would leave *AE* equal to *NI* at *NI* = 1,300. Income would rise no farther, nor would prices have to climb. For example, if investment were reduced by $40 billion down to $60 billion, saving would equal investment *at NI* = 1,300, equilibrium would occur at *NI* = 1,300, and the excess demand at full employment would be eliminated.

We can again use the full employment gap formula to calculate the change in *AD* needed to avoid inflation:

$$\frac{1{,}300 - 1{,}500}{MULT} = \frac{-200}{5} = -40$$

This computation confirms that *AE* must be reduced by $40 billion to avoid the inflation that the excess demand at *EE* would cause.

**Table 4-6 Inflation equilibrium**

| *NI = AS* | *C* | S | I | *AE = C + I* | Market Conditions |
|---|---|---|---|---|---|
| *FE* = 1,300 | 1,240 | 60 | 100 | 1,340 1,500 | *AE > AS, I > S* |
| *EQ* = 1,500 | 1,400 | 100 | 100 | | by 40 *AE = AS,S* |

The same prescription for ending inflation could be derived from the income multiplier formula. Since *NI* is overshooting the full employment level by $200 billion as it rises to equilibrium at *NI* = 1,500, we need to bring the equilibrium level down by $200 billion. Using the formula, we can see that such a reduction in income would require a drop in aggregate demand of $40 billion:

$$\Delta AE \cdot MULT = \Delta NI$$

**goal: ΔNI = -200**

$$\Delta AE \cdot 5 = -200$$

$$\Delta AE = -200/5 = -40$$

With a multiplier of 5, an initial drop of $40 billion in autonomous expenditures would bring both *AE* and *NI* down by the desired $200 billion.

In both the inflation and the unemployment cases, *AE = NI* at equilibrium, but not full employment. A deficiency in *AE* at full employment exists in the unemployment case, while an excess of *AE* drives income past full employment in the inflation case. It is the product market's automatic movement to the equilibrium income level rather than the full employment level that creates the problem. That movement is characterized by declining production and rising unemployment in one case and rising prices in the other. Neither situation is desirable.

Little can be done to change the full employment income level in the short run. As we know, the availability of factors and their productivity determine that. But theoretically we can change the income level at which equilibrium occurs. Fiscal and monetary policies are said to have the powers to manipulate aggregate demand in order to promote equilibrium at full employment. That is the

fundamental premise of Keynesian economic policy-making: Equilibrium may not be at a desirable level, and it is in the government's power to change the income level at which the economy reaches equilibrium

**4. Adding Spending and Taxing**

Government purchases *(GP)* are one of the three main parts of *AE,* and changes in *GP* result in changes in *AE* in the income-expenditure model. The levels of *GP* and *AE* go in the same direction. Taxes affect consumption through the effect of taxes on *DI.* An increase in taxes causes consumption to fall because *DI* falls. Therefore, changes in taxes result in changes in the level of AE that go in the opposite direction.

Recalling Chapter 3, we know that the level of AD changes fundamentally only when the money supply or velocity changes. Variations in government spending and taxes in and of themselves do not change the money supply. Therefore, fiscal policy must influence the level of AD through its effect on the velocity of money. Whether that effect is great or small is something we will consider at length in Chapter 10. For now, we will assume changes in government and taxes affect the level of AE as Keynes theorized – that is, through their effect on components of autonomous spending. Qualitatively we should be quite safe. No matter how strong an impact fiscal policy has on the level of *AD,* great or small, we will assume that the level of *AE* moves in the same direction as *GP* and the opposite direction of taxes *(T).* It is that same assumption that has guided policy-makers since World War II in using fiscal policy to increase and decrease the level of *AD* – sometimes on purpose, but often by accident. Let us continue to develop the model that many of those policy-makers used as a guide.

**Government Purchases**

As we mentioned earlier, there are two kinds of government spending *(G):* purchases *(GP)* and transfer payments *(GT).* When government spending is discussed in the media, a distinction between the two is seldom made. But purchases and transfers have

decidedly different effects on the level of *AE.* When purchases rise, *AE,* output, and M rise immediately and directly by an amount equal to the increase in *GP.* This increase comes in the form of more sales of goods and services in the business sector or more output of services in the government sector. When transfer payments rise, disposable income rises immediately and directly by an amount equal to the increase in *GT.* The increase in *DI* will generate an increase in consumption. Only then do *AE,* output, and M rise. And, as we know, the rise in C will be less than the rise in *DI,* since a fraction of *DI* is saved. Thus, changes in purchases have a greater and more direct effect on *AE.* For now, we will concentrate solely on changes in government purchases.

***Government Purchases and* AE** As far as *AE* is concerned, government purchases look exactly the same as private investment. In the long run, it may make a great deal of difference to productivity and growth whether *GP* or I increases, but in the short run, *AE* rises in exactly the same fashion if the government buys a plane from Acme Air or if Eastern Airlines does. Acme Air does not care; all it cares about is its ability to produce and sell one more plane. In either case *AE* rises dollar for dollar, with a rise in *GP* and I, and sales directly rise by that amount as well. Because of this similarity, it is quite easy to add *GP* to our model and determine the results.

Let us recall the model that we used earlier:

$$\mathbf{C = 200 + 4/5\ \mathit{NI}}$$
$$\mathbf{\mathit{I} = 100}$$

Without a government, we predicted an equilibrium income level of $NI = 1{,}500$. Let us now assume that government purchases for the upcoming year will total $200 billion. *AE* is now the sum of $C + I + GP,$ and equilibrium will occur when $C + I + GP = NI = AS.$ Let us calculate at what income that new equilibrium will occur:

***At EQ, NI = C + I + GP.***
**C = 200 + 4/5 *NI***
***I* = 100**
**GP = 200**
**NI = 200 + 4/5 *NI* + *100* + *200***
**1/5 NI = 500**
***NI* = 2,500 when *NI* = *C* + *I* + *GP***

Notice that it would not have mattered if we had increased *I* to 300 instead of introducing a *GP* of 200. Equilibrium still would have occurred at *NI* = 2,500. Both *I* and *GP* are autonomous spending, and they affect the model and the level of *AE* in the same way.

Table 4-7 and Figure 4-11 illustrate the equilibrium with *GP* included in the model. Note that at NI = 2,500, not only does *NI* = *C* + *I* + *GP*, but *GP* + *I* = *S.* That means injections equal withdrawals, as must always be the case at *EQ* in this model. Saving is still the only withdrawal in the model, while *I* and *GP* are the injections. It is a little silly to dwell on this right now, since we have our government spending $200 billion without collecting taxes, but notice that if the government spends beyond taxes, it must borrow savings from the household sector. It either taxes part of your income or it borrows part. Ultimately, the household sector must be the source of funds for government spending.

**Table 4-7. Equilibrium with *GP* in the model**

| *NI* = | C | S | I | *GP* | *AE* | Market Conditions |
|---|---|---|---|---|---|---|
| 1,500 | 1,40 | 100 | 100 | 0 | 1,500 | *EQ, AE = N, S = I* |
| 1,500 | 1,40 | 100 | 100 | 200 | 1,700 | *AE > NI* by 200, *GP + I > S* |
| 2,000 | 1,80 | 200 | 100 | 200 | 2,100 | *AE> NI* by 100, *GP + I > S* |
| 2,500 | 2,20 | 300 | 100 | 200 | 2,500 | *EQ, AE = NI, GP + I = S* |
| 2,500 | 2,20 | 300 | 300 | 0 | 2,500 | *EQ, AE = NI, GP + I = S* |

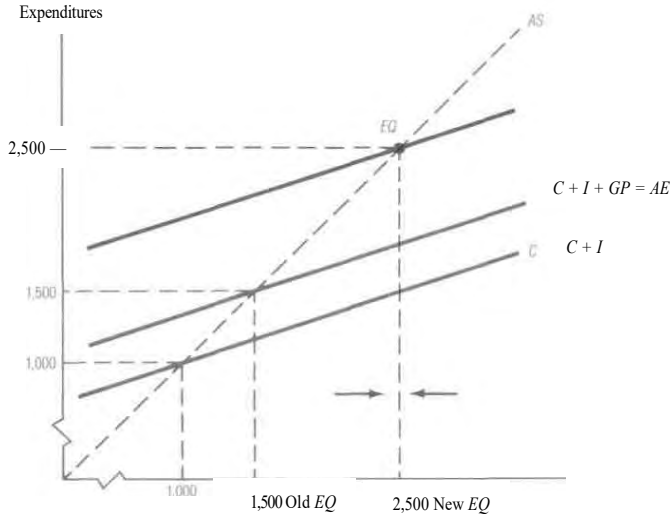



**Figure 4-10 Equilibrium with GP in the model**

***The Government Purchases (GP) Multiplier*** The income multiplier (MULT) equals 1/ MPS and applies to all changes in AE in a manner that can be described by the formula:

$$\Delta AE \cdot MULT = \Delta NI$$

We established that changes in $\overline{C}$ or $\overline{\ }$ or $\overline{GP}$ could be substituted into the formula. An increase in government purchases increases AE initially by an amount equal to the increase, and the multiplier process generates a total increase in *NI* equal to some multiple of the increase. Therefore, the government purchases *(GP*) multiplier formula is:

$$\Delta GP \cdot MULT = \Delta NI \qquad GP\ MULT = MULT = \frac{1}{MPS}$$

$$200 \cdot 5 = 1{,}000$$

In the example above, *G*P rises by $200 billion from zero to 200. That increase raises *AE* initially by $200 billion; and at the end of the multiplier process, NI rises by $1,000 billion to the new equilibrium.'" It takes that climb of 1,000 to generate the necessary increase of 200 in S to match the increase in *GP*. The *G*P multiplier equals the income

multiplier. An injection of $1 of *GP* will lead to an increase in NI of $1 times the multiplier. If the government wishes to raise *NI* by $5, it need increase GP by only $1 when the *MULT* is 5. As we suggested earlier, the application of fiscal policy requires knowledge of the size of the income multiplier, since any change in *G*P is magnified by the multiplier process.

The impact of government purchases on AE works in both directions. Should the government reduce its purchases back to zero, EQ NI would fall right back down to 1,500. This brings up an important point. Once the government augments AE with an increase in GP, it is difficult to reverse the policy without seriously reducing AE. When government spending is used as a crutch, even in the aggregate, throwing that crutch away can be very painful. It is no wonder spending seldom declines.

**Government Taxing – Lump Sum**

Taxes are still, in spite of continued budget deficits, the primary source of funds for government spending. Most of the tax revenues come from personal income taxes, sales taxes, and social security taxes. In order to learn just one thing at a time, we will temporarily assume all tax revenue comes from lump-sum taxes as opposed to those connected to income. That way we can isolate on the impact of taxes on AE and M without worrying about how tax revenues vary, in reality, with the level of NI. We will relax this assumption later in this chapter. For now, simply assume everyone pays the same amount of tax to the government regardless of that person's income.

**Taxes and Disposable Income**

With the introduction of taxes into our model, we must now make a distinction between national income (*NI*) and disposable income (*DI*), which heretofore have been equal. From this point on, *DI* equals *NI* minus taxes (*T*):

$$\mathbf{DI = NI - T}$$

Since consumption is primarily based upon *D*I, tax changes affect **A***E* through *DI* and *C*. An increase in taxes causes DI to fall by an amount equal to the tax increase. The drop in *DI* causes *C* to fall. But it is

important to remember that C will not fall by the same amount as *DI*. C will fall by the *MPC* times the drop in *DI*. As a consumer's *DI* falls, both *C* and *S* fall. Part of the tax payment comes out of the consumer's savings account. Thus, the results of a tax increase and decrease are

$$\mathbf{T \uparrow, DI \downarrow, C \downarrow \text{ by } MPC \cdot \Delta DI}$$
$$\mathbf{T \downarrow, DI \downarrow, C \uparrow \text{ by } MPC \cdot \Delta DI}$$

The change in *AE* resulting from a change in taxes is equal to the change in *C*. Thus, when taxes rise by *$*X, *C* and *AE* fall by *$X* times the *MPC*. Since AE falls with a tax increase, we would expect *NI* to fall as well. Let us add taxes to our model and see how they affect consumption and equilibrium. For now, we will leave spending out in order to concentrate on the effect of taxes. Suppose the government collects taxes of $200 billion.

$$\mathbf{c = 200 + 4/5\ DI \text{ and } / = 100; GP = 0}$$
$$\mathbf{DI = NI - T}$$
$$\mathbf{T = 200}$$
$$\mathbf{DI = NI - 200}$$
$$\mathbf{\text{thus } C = 200 + 4/5\ (NI - 200)}$$
$$\mathbf{\text{or } C = 200 + 4/5\ NI - 160.}$$

Notice that as a result of raising taxes by 200 from zero to $200 billion, *DI* falls by 200, and *C* falls by 160, which is a fall of 200 multiplied by the *MPC* of 4/5. The equilibrium with taxes included can now be calculated:

$$\mathbf{\text{At EQ, } NI = C + I + GP}$$
$$\mathbf{\text{or } NI = 200 + 4/5\ (NI - 200) + 100 + 0}$$
$$\mathbf{NI = 200 + 4/5\ NI - 160 + 100}$$
$$\mathbf{1/5\ NI = 140}$$
$$\mathbf{NI = 700 \text{ when } NI = C + I + GP}$$

Equilibrium income falls, as a result of the tax increase, from *NI* = 1,500 to *NI* = 700. Notice that *NI* does not equal $C + I + GP - T$. The effect of taxes is included within C so that the influence of the MPC can be accommodated. Table 4-8 and Figure 4-11 illustrate the impact of

taxes on consumption and the resulting equilibrium. Note that C and S are based upon *DI*, which is now different from *NI.* Since *DI* is $200 billion less than *NI, C* is down by $160 billion, compared to its level before the tax. The first two lines of the table and the shift of the *C* line in the graph demonstrate this decline in consumption. Note also that S falls by 40, which is 1/5 of 200. One-fifth of the tax payment comes out of saving and the other four-fifths come out of consumption. The *C* and *S* lines shift downward because *C* and *S* are less at all levels of *NI,* since the government has taken away $200 billion of the *NI.*

As in the case of the addition of government purchases, equilibrium is disturbed. In this case, it is disturbed by a rise in withdrawals. The addition of 200 in taxes raises withdrawals by a net amount of 160 (since S goes down by 40). Equilibrium can only be reestablished when injections again equal withdrawals. As NI falls, S falls. It is not until 5 falls by another 160 that equilibrium is reached at NI = 700.

**Table 4-8. Equilibrium with taxes in the model**

| HI = AS | DI = NI - 1 | C | S | T | I | AE | Market Conditions |
|---|---|---|---|---|---|---|---|
| 1,500 | 1,500 | 1,400 | 100 | 0 | 100 | 1,500 | EQ with T = 0 |
| 1,500 | 1,300 | 1,240 | 60 | 200 | 100 | 1,340 | AE < NI by 160, S + T> I |
| 1,000 | 800 | 840 | -60 | 200 | 100 | 940 | AE < NI by 60, S + T > I |
| 700 | 500 | 600 | -100 | 200 | 100 | 700 | AE = NI, S + T = I |

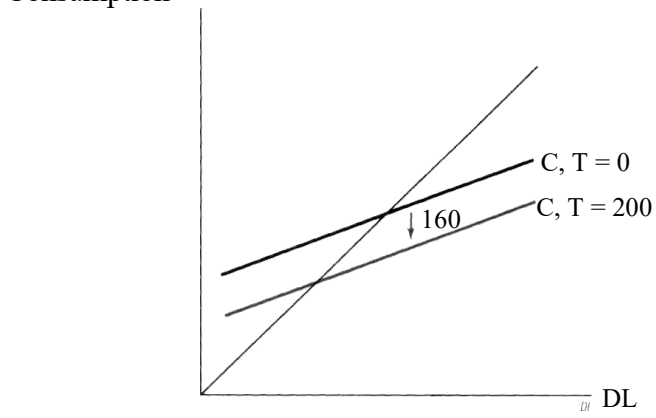



**Figure 4-11 Taxes and the consumption function**

At *NI* = 700, withdrawals, *S* + *T*, equal injections. The $200 billion rise in T is counterbalanced by a $200 billion fall in *S.* Granted, this is an extremely large tax increase, and we have no government spending. Nevertheless, the qualitative conclusions hold: All else being equal, a tax increase causes *DI* to fall, which leads initially to a drop in *C* and *S* by a ratio based upon the *MFC* and *MPS*. Then, as the economy adjusts to the decline in AE and heads to a new equilibrium, *NI, DI, C*, and *S* all fall even farther. Taxes may finance good government spending, but that always comes at the expense of *C* and *S*. If no other autonomous variable changes when taxes are increased, the fall in *S* will equal the rise in T. Luckily, as we will discuss later, other things do change; and the drop in *S* is not always quite so drastic in reality.

**The Tax (T) Multiplie**r The income multiplier applies to tax changes. Since tax changes cause consumption changes, we have a change in *AE* and equilibrium *NI*. The income multiplier of *1/MPS* applies to changes in C, and the size of the change in C equals the value of the change in *T* times the *MPC*. That is

$$\Delta C = -\Delta T \cdot MPC \text{ since } \Delta C = \Delta DI \cdot MPC \text{ and } \Delta DI = -\Delta T$$

Therefore, ***the tax (T) multiplier*** formula is

$$-\Delta T \cdot MPC \cdot MULT = \Delta NI$$

$$\textit{the tax multiplier} = MULT \cdot MPC$$

In the example given above, taxes rise by 200 and NI falls by 800:

$$200 \cdot 4/5 \cdot 5 = -\Delta NI$$
$$200 \cdot 4 = -800$$
$$\text{or } 160 \cdot 5 = -800$$

The same income multiplier is used here as in the change in *GP*. It is equal to 5. The change in *AE*, however, is only four-fifths as big as the change in *T*. Thus, the change in *T* leads to a change in *NI* that is only four times as big as the change in T. When economists refer to the tax multiplier, they usually mean the income multiplier multiplied by the

*MPC*. That number is always smaller than *MUL*T itself, since the *MP*C is less than 1.

There really is only one multiplier here – the income multiplier. It is part of both the *GP* and the T multiplier formulas. But a 200 change in *GP* will lead to a 1,000 change in *NI*, while a 200 change in T leads to only an 800 change in *NI* (in the opposite direction, of course). Thus, in terms of final results, it appears that the *GP* multiplier is 5 and the *T* multiplier is only 4. Just remember the following formulas, and there can be no confusion.

**ΔGP · MULT = ΔNI (the GP formula)**
**-ΔT · MPC · MULT = ΔNI (the 7 formula)**
**MULT = 1/MPS in both**

Because of the difference in how changes in taxes affect *AE* (indirectly through *DI* and *C*), tax changes, dollar for dollar, have a smaller impact on AE than do changes in GP. In order to reduce *AE* by a given amount, we need only to reduce GP by that amount; but we would have to raise *T* by a larger amount. GP changes pack a bigger clout.

The Balanced Budget Multiplier The difference between the tax and government purchases multiplier formulas creates an interesting result. Equal changes in *T* and *GP* do not cancel out each other in terms of the net effect on *AE*. That is, if *GP* and *T* are increased by equal amounts, *AE* and *NI* rise; and if *G*P and T are decreased by equal amounts, *AE* and *NI* fall. Suppose, for example, that we raise both *GP* and T by $50 billion in an economy with an *MPC* of 4/5 (and, therefore, a *MULT* of 5):

**GP ↑ 50 · 5 = NI ↑ 250**
**T ↑ 50 · 4/5 · 5 = NI ↓ 200**

---

**GP & T ↑ 50 = NI ↑ 50**

We can see why *NI* rises. When taxes are raised by 50, *DI* falls by 50, and *C* falls by 40, with the rest of the decline in *DI* coming out of saving, which falls 10.

Consumers would have spent only four-fifths of the 50. The government, however, spends all of the $50 billion. There is a net rise in AE of 10. When AE rises by 10, *NI* rises by ten times 5, or 50. In other words, the government takes the $10 billion that was not going to be spent and spends it. That is the difference.

When income is transferred from consumers to the government, *AE* rises. When income is returned, *AE* falls. This result assumes consumer savings sit idly in banks. That is a big assumption.

In this example, **the balanced budget multipl**ier – the ratio of the change in *NI* to the equal changes in *GP* and *T* – is equal to 1. That is, *NI* goes up by the same amount that *GP* and *T* do. As long as *MULT* is simply *l/MPS*, the balanced budget multiplier will be 1, regardless of the value of the *MPC*. Later in the chapter, when we define a more realistic and sophisticated multiplier formula, we will see that the real world multiplier is much lower than simply *1/MPS*. Correspondingly, the balanced budget multiplier is only a fraction of 1 in the real world.

Actually, the exact value of the balanced budget multiplier is not very important. Policy-making is seldom exact enough for that to really matter. What is important to remember, however, is the qualitative relationship that the balanced budget multiplier suggests. Changes in *GP*, dollar for dollar, have more impact on *AE* than changes in *T*. Equal increases in *GP* and T will cause *AE* to rise a bit, and equal decreases in *GP* and *T* will cause *AE* to fall a bit. That means if policy-makers wish to increase *GP* but not *AE*, they must raise taxes by a bit more than they raise *GP*. In the example above (which admittedly exaggerates the balanced budget multiplier effect), T must be raised by 62.50 to counteract an increase in *GP* of 50, since such a tax increase would cause *C* to fall by 62.50 times 4/5 (or 50).

Make sure you understand that the balanced budget multiplier refers to equal *changes* in *GP* and *T*. Such changes will not balance the budget; they will not unbalance it either. The balanced budget multiplier is actually a misnomer. The "balanced budget" part refers simply to the equal or balanced changes in *GP* and *T*, not to the actual state of the total budget. It is interesting to note, however, that if one wanted to increase *AE* without resorting to deficit spending, it would be possible to do so by

raising *GP* and *T* by equal amounts. But possible does not mean advisable.

**Taxes and Transfer Payments** We pointed out at the beginning of this chapter that government transfer payments (*GT*) have a smaller impact on *AE* than government purchases, since transfers affect *AE* only indirectly through *DI.*

This is exactly what we have said about taxes. Both *GT* and *T* affect *AE* through changes in *D*I and *C*. In both cases the change in *C* equals the change in *DI* times the *MPC.* An increase in *GT* affects *AE* and *NI* the same as a decrease in *T*, and a cut in *GT* has the same effect as a rise in *T*. Transfer payments are like negative taxes or tax rebates. A government check is a government check. As a result, it is a minus transfer payments:

$$\mathbf{NT = T - GT}$$

**and, therefore:**

$$\mathbf{DI = NI - NT}$$
$$\mathbf{= NI - T + GT}$$

Remember that an increase in *GT* is the same as a reduction in *T*. To accomplish some given increase in *AE*, it is necessary to raise *GT* by a larger amount than *GP*. An increase in purchases raises *AE* by a greater amount than an increase in *GT*.

**Putting It Together**

Putting government purchases and taxes into the model one at a time helps us concentrate on their respective impacts on aggregate expenditures, but it only makes sense to put them both in the model at the same time. So let us look at income and expenditures with *GP* = 200 and *T* = 200 included simultaneously.

$$C = 200 + 4/5\ DI$$
$$I = 100$$
$$GP = 200$$
$$NT = 200$$

Solving for equilibrium *NI*.

**NI = C + I + GP**
**NI = 200 + 4/5 (NI - 200) + 100 + 200**
**NI = 200 + 4/5 NI - 160 + 100 + 200**
**1/5N I = 340**
**NI = 1,700 when AE = NI**

Equilibrium occurs at *NI* = 1,700. This should be no surprise. Before we had any government at all in the model, equilibrium was at *NI* = 1,500. Now that we have added *GP* and *T* to the model and they are equal, the balanced budget multiplier tells us that the new equilibrium should be 200 greater than the old one. Table 4-9 and Figure 4-12 summarize the conditions at equilibrium. Note that at NI = 1,700, not only does *AE = NI* but *I + GP* equals *S + N*T. At equilibrium, injections (*I* + GP) equal withdrawals (*S + NT*) in the income-expenditure model.

**Table 4-9. Equilibrium with GP and NT in the model**

| NI = AS | Dl | C | S | NT | I | GP | AE = C + I + GP |
|---|---|---|---|---|---|---|---|
| 1,700 | 1,500 | 1,400 | 100 | 200 | 100 | 200 | 1,700 |

We chose to show a balanced budget just for the heck of it. Suppose, however, that *GP* exceeds *NT*, a budget deficit. Since *GP + I* must equal *S + NT* at equilibrium, a government budget deficit necessitates an excess of saving over investment in the private sector. What the government does not pay for out of taxes it must borrow out of household saving. This is a two-sided coin. Keynes would point out that if saving exceeds investment, the private sector needs the government to run a deficit to keep *AE* from falling short of *NI* and causing a contraction. That may be the case during a recession. But at other times, when saving is not greater than investment to begin with, a deficit budget will force investment to be less than saving. That will occur by way of either *NI* rising, and pulling saving up with it (that is good), or investment falling to make room for government borrowing (that is bad). Which one occurs is something we will consider more than once later in the book.

## 5. A Complete Income-Expenditure Model

With the three main parts of AE now included in the model, we have a fairly complete model, but not quite. The model we have built so far is not realistic enough to be as useful as we might like, nor is it as inclusive as it should be. In this final section we want to spruce up the model by upgrading it and adding a couple of options. We will definitely need to replace the lump-sum tax and transfer payment part of the model with one that is related to the level of M, as is the economy's tax and transfer system. And while it is not necessary, it would make the model more accurate to add an investment expenditure variable that is related to NI, and a variable that accounts for net foreign expenditures. The last two parts will add on those two options with as little pain as possible.

### An income-related tax and transfer system

Thus far we have included taxes or net taxes as a totally autonomous variable unrelated to the level of *NI.* In actuality, the level of net taxes varies directly with *NI.* As long as the federal government taxes our incomes and spending, taxes will vary in the same direction as *NI.* In addition, transfer payments such as unemployment compensation and aid to low-income families rise when *NI* falls. This makes sense, since unemployment would be rising if output is falling, and since more families qualify for government aid when income is declining. The disbursement of such aid declines as output expands and the economy creates more economic opportunities.

In short,

$$\boldsymbol{NT = T - GT = \overline{NT} + W \cdot (NI)}$$

where $\overline{NT}$ stands for exogenously determined levels of *T* and *GT,* and where $\overline{MT}$ is the marginal net tax rate. We can state that

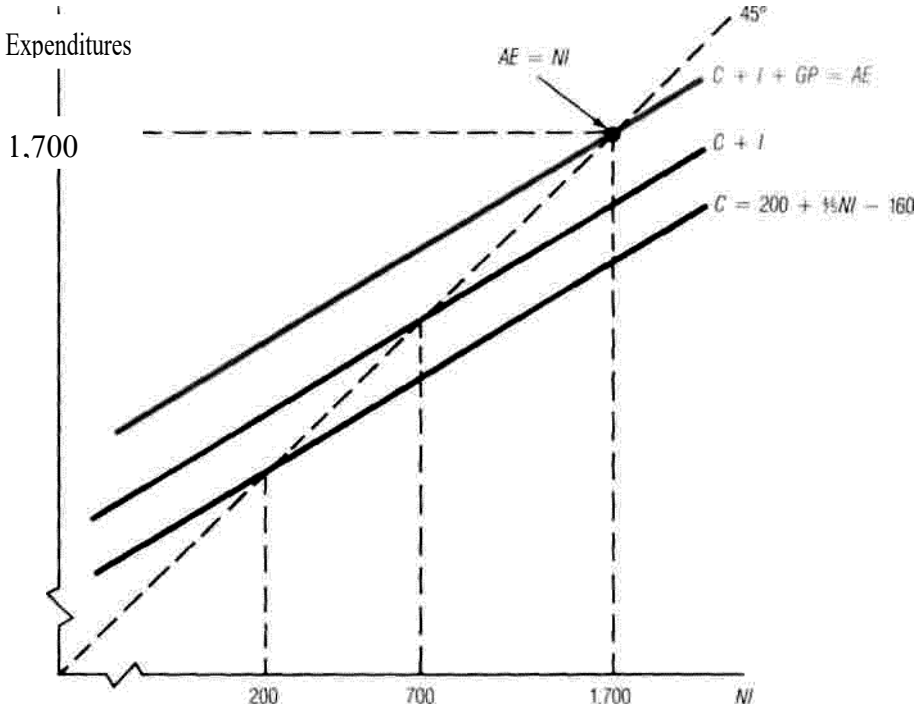



**Figure 4-12 Equilibrium with GP and NT in the model**

**As NI↑, T↑ and *GT* ↓;**
**therefore, as NI↑, NT↑.**
**As NI↓ T↓, and GT↑;**
**therefore, *as NI* ↓ , *NT* ↓.**

**Endogenous Net Taxes** Let us now convert the tax system in our model from the lump-sum system of the previous section to a more realistic net tax system that ties the level of *AT* to *NI.* Instead of *T* = 200, suppose we use *NT* = -225 + 1/4 *NI.* Fiscal policy can exogenously change the net tax rate (*MT* – which equals 1/4 in this case) or the exogenous *AT* (- 225 in this case) through legislative changes of the tax or transfer system. *NT,* however, will vary *endogenously* whenever *NI* changes.

Such a formula for *NT* indicates that when *NI* = 0, *NT* = -225. That is, transfer payments (which are treated as negative taxes) dominate when income is very low; but as income rises, income taxes begin to outweigh the transfers. Thus, if *NI* = 1,000, *NT* = -225 +1/4(1,000), which equals 25. Or if *NI* = 1,600, *NT* = 175. The 25 percent net marginal tax rate *(MT)* is a fairly realistic one for an average net tax rate over all income levels. Although the tax rate is constant, the combination of taxes and transfer payment in the formula *NT* = -225 + *1/4 NI* causes the ratio of net taxes to income to rise as *NI* rises. This is reasonably realistic but not necessary to the argument. The – 225 number for $\overline{NT}$ was chosen only because it allows *GP* to equal *NT* at an equilibrium *NI* of 1,700. We may as well start out again with a balanced budget.

Let us first calculate equilibrium:

**At EQ, NI = C + $\bar{I}$ + $\overline{GP}$**
**If C = 200 + 4/5DI, DI = NI – NT,**
**NT = -225 + ¼ NI,**
**$\bar{I}$ =100, and**
**$\overline{GP}$ = 200.**
**NI = 200 + 4/5(NI + 225 – 1/4NI) + 100 + 200**
**NI = 200 + 4/5NI + 180 – 1/5NI + 300**
**2/5NI = 680**
**NI = 680 · 5/2 = 1,700 at EQ**
**NT = -225 + ¼(1,700)**
**= -225 + 425 = 200**
**NT = 200 = GP**

We should notice that 2/5 *NI* has replaced 1/5 *NI* in the next-to-last step of the solution. More on that soon. At *NI* = 1,700, *AD = AS* and, just for convenience, *NT = GP*. At any income level other than *NI* = 1,700, however, *NT* does not equal 200, and the budget is not balanced. Figure 4-13 illustrates how net taxes vary endogenously with *NI* and how the state of the budget changes as *NI* does. At income levels below *NI* = 1,700, the budget automatically moves

into a deficit; and at income levels above *NI* = 1,700, the budget reads a surplus.

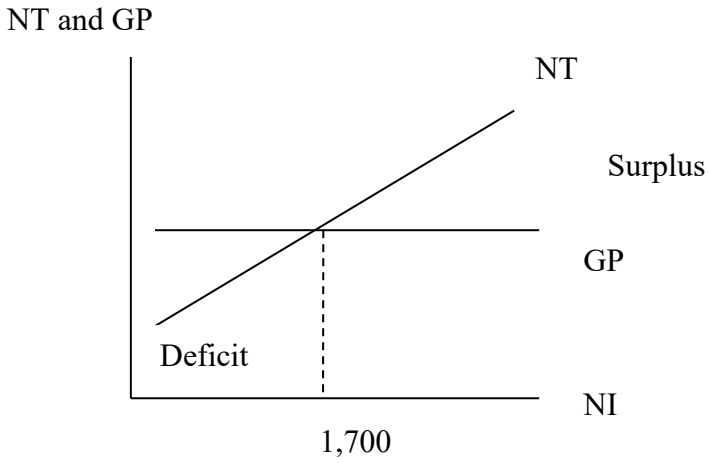



**Figure 4-13 Automatic budget changes**

***The Weakened Multiplier*** Notice that in the last step of calculating equilibrium, *NI* equals 680 times 5/2 instead of 5, as was the case in the lump-sum tax model. That change clues us into a difference in the income multiplier effect with an income-related net tax system. An income-related tax and transfer system works to reduce the income multiplier. Actually, the multiplier *(MULT)* is not altered; it is always equal to 1*/MPS.* But the change in *NI* resulting from a change in autonomous spending is less. Therefore, the multiplier effect is weakened.

For example, let us raise investment expenditures by 10 and see how much income rises. Using the same figures for *C, GP,* and *NT* as before, but using *I* = 110 instead of *I* = 100, let us calculate equilibrium.

$$\mathbf{NI = 200 + 4/5(NI + 225 - 1/4NI) + 110 + 200}$$
$$\mathbf{NI = 200 + 4/5(NI + 180 - 1/5NI) + 310}$$
$$\mathbf{2/5NI = 690}$$
$$\mathbf{NI = 690 \cdot 5/2 = 1{,}725}$$

The change of investment was 10, and the change in *NI* is 25. This result suggests a multiplier effect of 2.5 instead of 5, which was the value of *MULT* in the lump-sum tax model. The multiplier effect is lower than *MULT* because of the endogenous change in net taxes that is triggered by the change in *NI.*

We need a new multiplier formula that incorporates the impact of the income tax and transfer system. By following the same procedure that we used to find *MULT,* we can find a new multiplier; let us call it *MULT II* (The Sequel).

$$\textbf{MULT II} = \frac{1}{MPS + MPC \cdot MT}$$

Where MT is the marginal tax rate.

**ΔNI = is related to NI by MT.**

In our example above**, MULT II = 2.5**:

$$\textbf{MULT II} = \frac{1}{1/5 + 4/5 \cdot 1/4} = 2.5$$

Whatever the value of *MULT* is, *MULT II* will be *smaller* as long as *MT* is greater than zero. The multiplier effect is equal to 1 over the fraction of income changes not spent.

If you recall, we established earlier that the existence of an income multiplier is not a good thing. It magnifies changes in *AE* to create multiple changes in *NI.* We concluded that if we were building an economy, we would want one with a small multiplier. The *MPC* determines the income multiplier, but the income-related tax and transfer system weakens the multiplier effect. The fact that the *MPC* for the United States is close to 9/10, but the actual measured multiplier effect is closer to 2.5 instead of 10, is primarily explained by the impact of the tax-transfer system.

For example, if a country's *MPC* = .9, and its *MT* is .33, its *MULT II* is only 2.5:

**If MPC = .9 and MT = .33,**

$$\textbf{MULT II} = \frac{1}{.1 + .9 \cdot .33} = 2.5$$

The impact of a income tax and transfer system on the multiplier and the budget has important implications for the operation of fiscal policy. We will return to *MULT* II when we discuss the automatic stabilizer and automatic fiscal policy in Chapter 8.

**Relating Investment to National Income**

As we will see in Chapter 13, the level of investment expenditures tends to move in the same direction as *NI* This is because an expanding economy causes expected rates of return on planned investment projects to rise, while a contracting economy causes expected rates of return to fall. Sales, rates of return, and capital expenditures are all positively related. In order to capture the positive relationship between *I* and *NI* in the income-expenditure model, it is possible to add an extra term to the investment formula.

$$I = \bar{I} + MPI\ (NI)$$

Where $\bar{I}$ is the familiar autonomous investment and *MPI* is the **marginal propensity to invest –** the ratio by which investment expenditures rise as *NI* rises.

Let us see what that does to our numerical example of income-expenditure equilibrium. Suppose I now equals 15 + *1/10(NI).*

**C = 200 + 4/5DI**
**I = 15 +1/10NI**
**NT = -225 +1/4 NI**
**GP = 200**
**NI = 200 + 4/5(NI + 225 - 1/4NI) + 15 + 1/10NI + 200**
**NI = 200 + 4/5(NI + 180 - 1/5NI) + 15 + 1/10NI + 200**
**NI = 200 + 8/10(NI + 180 - 2/10NI) + 15 + 1/10NI + 200**
**NI- 7/10 NI = 595**
**3/10NI = 595**
**NI = 595·3/33 = 1983.33**

The level of equilibrium is not important, since we made up some new numbers, but notice the change in the multiplier in the last step. Instead of 2.5, we now have 3.33. By making investment expenditures a function of *NI,* we have boosted the multiplier effect. Let us write this new multiplier formula, *MULT III:*

$$\boldsymbol{MULT\ III} = \frac{1}{MPS + MPC \cdot MT - MPI}$$

$$\boldsymbol{\Delta NI = \Delta AE \cdot MULT\ III}$$

**when *NT* is related to *NI* by *MT,* and *I* is related to *NI* by *MPI.***

In the above example, *MULT III* = 3.33

$$\text{MULT III} = \frac{1}{1/5 + 4/5 \cdot 1/4 - 1/10} = 3.33$$

Changes in *AE* are magnified by income-related investment expenditures.

**Adding Net Foreign Expenditures**

This model is getting pretty crowded, but to be truly complete, we should add net foreign expenditures. The level of exports, as we will see in Chapter 14, is primarily a function of the exchange rate, which certainly is exogenous to the income-expenditure model. So we will include product exports *(EX)* as another autonomous expenditure item.

Imports are a function of the exchange rate as well, but they are also related to the level of NI. As income rises, part of it is spent on foreign products. We will relate imports to income through *MPM,* the **marginal propensity to import –** the ratio by which import expenditures rise with M. The level of import expenditures is thus a combination of autonomous import expenditures *($\overline{IM}$),* which is determined by exogenous variables, plus the income-related *MPM* times *NI.*

Let us see what we have.

**exports = *EX* =** $\overline{EX}$

**imports = *IM* =** $\overline{IM}$ **+ *MPM(NI)***

**and**

**net foreign expenditures *(X) = EX - IM***

***X* =** $\overline{EX}$ **-** $\overline{IM}$ **- *MPM(NI)***

If we add this final item to our income expenditure model, we get the following formulas:

***C* =** $\overline{C}$ **+ *MPC(NI -NT)***

***I*=** $\bar{I}$ **+ *MPI(NI)***

***GP = GP***

***NT* =** $\overline{NT}$ **+** $\overline{MT}$ ***(NI)***

***X* =** $\overline{EX}$ **-** $\overline{IM}$ **- *MPM(NI)***

At equilibrium:

***NI = C + I + GP + X***

***NI = C + MPC(NI - NT) +*** $\bar{I}$ ***+ MPI(NI) +*** $\overline{GP}$ **+** $\overline{EX}$ **-** $\overline{IM}$ **- *MPM(NI)***

**and**

$$\textbf{ΔNI=AE x } \frac{1}{MPS + MPC \cdot MT - MPI + MPM} = \Delta AE \cdot MULT \ \ \textbf{\textit{IV}}$$

The latter equation shows the complete income multiplier, *MULT IV,* which includes taxes and transfers, investment, and imports, all related to the level of *NI.* This final multiplier is smaller than *MULT III,* since imports act as a withdrawal, the same way saving and taxes do. *MULT IV* is equal to 1 over the marginal propensity not to spend on domestic goods.

This is as complete an income expenditure model as we care to present. In fact, it is more complete than we want to use most of the time; and it is likely more complete than you want to see. But now that we know what all of the possible building blocks look like, we

will be comfortable with using a simplified version for later demonstrations. It is better to know what is missing than to simply assume it away without first giving it a fair presentation. Now that we have beaten equilibrium in the product market to the point of submission, why not let the product market rest for a while and shift to the money market in the next chapter.

**Summary**

1. Consumers increase and decrease their consumption in direct proportion to changes in their income, and the marginal propensity to consume measures that proportion, while the marginal propensity to save measures the fraction of income changes that go into and out of savings.

2. In addition to disposable income, there are other variables that affect consumption. Their influence can be lumped into one exogenous variable, $\bar{\bar{N}}$, which would also be the quantity of consumption at zero income.

3. If it is assumed that a consumer's or an economy's marginal propensity to consume is constant over all income levels, it is possible to use a consumption function of $C = \bar{\bar{N}} + MPC \cdot DI$ to estimate consumption demand.

4. Empirical evidence indicates that, at least in the short run, aggregate consumption does fit the format of $C = \bar{\bar{N}} + MFC \cdot DI$.

5. By adding an exogenously determined estimate for investment demand onto the consumption function, an *AE* equation can be formed which, when compared to *NI,* can be used to predict the equilibrium level of W.

6. Through automatic adjustments by producers to differences between income and *AE,* output moves to an equilibrium level where *AE* equals income.

7. Since income can be expected to move toward equilibrium, comparisons of current income to predicted equilibrium income can allow one to make prognoses about the direction in which income will be moving and, therefore, the state of the economy in the upcoming months.

8. Exogenous changes in the level of *AE* set off an income multiplier process through the circular flow such that income changes by a multiplier times the change in *AE,* and the size of that multiplier is directly related to the size of the marginal propensity to consume.

9. When equilibrium income lands below full employment, a deflationary gap exists, and *AE* needs to be increased by an amount equal to the difference between equilibrium and full employment incomes divided by the income multiplier.

10. When equilibrium income exceeds full employment, an inflationary gap exists, and demand needs to be reduced.

11. Government purchases affect the level of *AE* in much the same way as investment, and both are treated as autonomous spending in the Keynesian model. This means the same income multiplier applies to both.

12. Tax changes affect *AE* through their impact on disposable income and, in turn, consumption.

13. Since the *MFC* is applied to all tax changes as well as changes in transfer payments, changes in government purchases have a bigger impact on *AE* than equal changes in taxes or transfer payments.

14. Relating taxes and transfer payments to income weakens the income multiplier effect. The same holds for income-related imports, but the opposite is the case for income-related investment.

**Key Concepts to Know**

1. That in Keynes's model of consumption, the marginal propensity to consume, which is constant, measures than ratio of *changes* in consumption and income, not just the ratio of consumption to income. That latter ratio is called the average propensity to consume.

2. Income minus consumption is saving, and exogenous changes in consumption result in opposite changes in saving.

3. While disposable income in the aggregate never comes close to zero, it makes sense to speak of consumption at zero income,

since that term isolates exogenous consumption (not determined by the level of disposable income).

4. That regardless of the exact quantity or form that investment takes in the income expenditure model, *AE* and income automatically adjust until *AE* equals income.

5. That income is always heading toward a predictable equilibrium level, even if the level of *AE* may change before equilibrium is reached.

6. How to calculate equilibrium with an algebraic equation.

7. How to calculate the income multiplier, given a marginal propensity to consume or to save.

8. That Keynes's income multiplier and the velocity of money are two ways of looking at the same process in the circular flow,

9. How to calculate the changes in income that result from a change in *AE,* and how to calculate the change in *AE* needed to set off a prescribed change in income from one equilibrium to another.

10. Why there is a negative sign in the tax multiplier formula.

11. That equal changes in taxes and government purchases do not cancel each other out with respect to the level of AD.

12. Why transfer payments can be treated as negative taxes.

13. What adding income-related net taxes, investment, and imports does to the size of the income multiplier effect.

**Terms**

dissaving
average propensity to consume
income multiplier
deflationary gap
full employment gap
formula
inflationary gap
government purchases
multiplier tax multiplier
balanced budget multiplier
marginal propensity to invest marginal propensity to import

**Test**

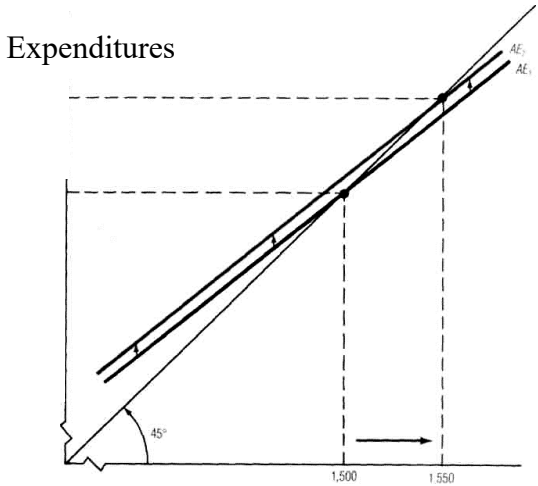
1. Aggregate expenditures are the sum of spending by the four sectors: 1.consumption *(C*
*2.* investment *(I)*
*3.*
*4.*

2. C = consumption at zero income + _____. That formula is exactly the formula Keynes theorized, which was presented in the previous chapter, namely:
$C = \overline{C}$ + _____

3. *MPC* + *MPS* =
1. 1
2. 0
3. -1
4. 0,1

4. MULT = $\frac{1}{MPS} = \frac{1}{1 - \_\_\_\_}$

5. What is figure?



6. There are two kinds of government spending *(G):* purchases *(GP)* and _____*(GT).*

*7.* DI = NI – _____-

8. The tax multiplier = MULT · _____

9. Transfer payments are like negative _____ or tax _____. A government check is a government check. As a result, it is a minus transfer payments:

NT = T - GT

and, therefore:

Dl = _____

= NI – T + ___

**Goals**

To develop a model of the income-consumption relationship.

To add investment onto the consumption function in order to create a model of aggregate expenditures.

To see how the product market automatically moves toward equilibrium.

To study the significance of equilibrium.

To demonstrate the income multiplier and evaluate its significance.

To compare equilibrium to full employment.

To see how government spending and taxes affect expenditures and equilibrium.

To expand the model to include income-related forms of net taxes, investment, and net foreign expenditures.

To analyze the impact on the income multiplier effect of these income-related variables.

**New Symbols**

| | |
|---|---|
| APC | average propensity to consume |
| MULT | income multiplier |
| MT | marginal tax rate |
| MULT II | income multiplier (income-related net taxes) |
| MPI | marginal propensity to invest |
| MULT III | income multiplier (income-related investment) |
| EX | product exports |
| IM | product imports |
| MPM | marginal propensity to import |
| MULT IV | income multiplier (income-related net exports) |

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The economic mechanism of managing the marketing activity of food enterprises.

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