Applied Microeconomics For Public Policy Makers

A Provisional Text



Prajapati Trivedi

About the author...

Professor Prajapati Trivedi holds the distinguished State Trading Corporation Chair for economics and management of public enterprises at the Indian Institute of Management (IIM), Calcutta, Where he is the Chairman of the Centre for Studies in Public Enterprise Management. In addition, he is a visiting faculty member of Harvard University, Where he teaches at the J.F. Kennedy School of Government and the Harvard Institute for International Development (HIID).

After completing his B.A. (Honours) in economics from St. Stephen's College, University of Delhi and M.Sc (Economics) from the London School of Economics, Professor Trivedi Joined the economics faculty of the St. Stephen's College. Later, he obtained his ph.D from Boston University and taught at several leading Universities in the U.S.A.

An Internationally recognized expert on public enterprises, Dr. Trivedi has worked as a consultant for the governments of Korea, Venezuela, Pakistan, Nicragua, India as well as several international agencies. While he has written and published extensively on various aspects of public enterprise management and policy, his main interest continues to be the application of microeconomics analysis to the problems of pricing and performance evaluation of public enterprises.

About the book...

This book is a guided tour through an economist's workshop, introducing readers to various microeconomics concepts and thier utility in analyzing economic problems. However, unlike many textbooks, this book does not present microeconomics as just one thing after another. The choice of topics was guided by one over-riding criterion: Whether the concepts included in the book is useful for understanding or analyzing economics policies, in general, and public policies in particular.

For every concept included, this book answers the following questions:

- Why do we need the concepts?
- What is it all about?
- How can it be used?
- What are its limitations?

This book differs from other microeconomics texts in another more fundamental way. Each policy is analyzed primarily from the 'public' perspective rather than 'private' perspective. That is, it focuses on 'costs' and benefits from the society point of view rather than an individual's point of view. It does not, however, supplant the private perspective, rather, it supplements it.

This book has emerged out of the author's lecture notes which have been used for more than a decade at the Public Enterprise Workshop organised by the Harvard Institute for International Development and for five years at the J.F.Kennedy School of Government. Harvard University.

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(A PROVISIONAL TEXT)

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By

Prajapati Trivedi
Indian Institute of Management
and
Harvard University

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For
Supreeti

PREFACE

The main purpose of this book is to provide the reader with a clear and logical connection between all topics covered in an introductory economics course. It is intended for students encountering economics for the first time as well as for mid-career students who need a refresher course in economics. However, this book is not an encyclopedia of economic topics or a grab bag offering far more than any instructor can realistically cover in a one semester course. Unlike many textbooks, this book does not present microeconomics as just one thing after another. I have been selective rather than encyclopedic, analytical rather than descriptive. The inclusion of every concept in the book has been justified and its connection with other concepts explained clearly. The choice of topics was guided by one over-riding criterion: Whether the concept included in the book is useful for understanding or analyzing economic policies, in general, and public policies in particular.

This book has been organized as any manual should be for beginners wanting to become technicians in any field. After all, economists can be viewed as technicians who are involved in finding solutions to economic problems. Much like the car mechanics who are technicians involved in finding solutions to problems with a car. Therefore, just as a good car mechanic has to be familiar with the tools he needs and has to know how the car works to be able to solve the problems of a car, a good economist has to be familiar with the economic tools at his disposal and the working of the economy to be able to solve the problems of an economy. That is, the process of training an economist is in some sense similar to the process of training a car mechanic or, for that matter, any other technician. The car mechanic has to first gather all the tools he will need, find out their functions and their limitations as well as learn how to deploy them to solve problems with a car. For instance, a car mechanic will have to first buy a timing gun and learn how to use it before tuning a car. Similarly, an aspiring economist has to first become familiar with the tools of economic analysis and then learn how to use them to diagnose and solve economic problems.

We start this book with the assumption that the readers want to become competent economists but their tool kits are empty. Therefore, they must begin acquiring the necessary tools of economic analysis one by one. Since some tools are functionally related, I have placed them together and termed them equipment sets. For every equipment set we answer the following questions:

(a) Why do we need it?
(b) What is it all about?
(c) How can it be used?
(d) What are its limitations?

This book is a guided tour through an economist's workshop, introducing readers to various equipment sets and their uses in analyzing economic problems. However, unlike some textbooks, if a concept is not necessary to analyze an economic problem or economic policy, we do not include it in our guided tour. As the tour proceeds and we become familiar with more and more equipment sets, our capacity to analyze problems increases very rapidly.

Most standard textbooks include a lot of interesting material in the form of biographical sketches of economists, newspaper items, and little boxes with jokes and cartoons and photographs. Clearly, this

book cannot be a perfect substitute for such 800 page textbooks. However, in an attempt to outdo each other on this front, these textbooks have gone for an overkill. Readers often get distracted by this overdose of interesting material and lose sight of the essentials. Therefore, an important purpose of this book is to serve as a road map to help one travel through these great textbook jungles without losing one's perspective and sense of direction.

This book differs from other microeconomic texts in another more fundamental way. Each policy is analyzed primarily from the public perspective rather than private perspective. That is, it focuses on costs and benefits from the society's point of view rather than an individual's point of view. It does not, however, supplant the private perspective, rather, it supplements it.

This book has emerged out of my lecture notes which I have used for more than a decade at the Public Enterprise Workshop organized by the Harvard Institute for International Development. It was only after I had used my lecture notes for five years at the Kennedy School of Government, Harvard University, that I was finally convinced about the merits of converting them in to a quasi-text. I first used the draft of this book for teaching my economics class in the 1985 Summer Program for Public Administrators at the Kennedy School. The word about this book percolated through the grapevine and next year it was adopted as a supplement to a well established text book for all economics sections in this program. Finally, in the following year it was decided to drop that well established text book and rely solely on the draft of this book. At this stage it became difficult not to think of polishing the draft to make it look like a real book.

The polishing job turned out to be more difficult than I had anticipated and I must confess that my car analogy began to desert me at this. Unlike a car, I realised that if I polished the draft too much I might change its basic character and, thus, make the draft lose its distinct identity. In the end, therefore, I decided to make only those changes that did not alter the basic philosophy of the original draft. Consequently, this book is neither a full-fledged text book nor a set of lecture notes. It is, as the title suggests, a provisional text book which will have to be refined in the future to acquire the status of a proper text book.

Since this book has been developed out of my lecture notes, I have not kept a good track of material that I have borrowed from others. All throughout my efforts were always directed to making these notes more effective. Therefore, in many instances, when I found an idea presented effectively, I made use of it enthusiastically without attempting to reinvent the wheel. I now regret not keeping detailed notes over these years because I cannot thank all the individuals I would have wanted to. However, those familiar with the classic text books in this area will immediately recognize the extent of my gratitude to them.

The seeds for this book were planted in my mind during the challenging and enthralling classes on the Theory and Practice of Investment Planning conducted by Amartya Sen at the London School of Economics in the early seventies. His constant emphasis on simplification of esoteric concepts and intuitive understanding got us permanently addicted to the joys of economic analysis.

However, there are some other individuals without whom this book would not have become a reality. The first step towards this book was taken when Leroy P. Jones recommended my name as his replacement for teaching the microeconomics course in the Public Enterprise Workshop at the Harvard Institute for

International Development (HIID) in 1979. Given his considerable reputation as teacher, it was not easy to follow in his footsteps. Yet, since he is also a teachers' teacher, he freely provided me with his notes and shared his experience in handling this course.

I was also fortunate to have worked at HIID under the leadership of Richard Mallon, who encouraged and supported the writing of my lecture notes. His belief in the usefulness of a microeconomics component in the Public Enterprise Workshop at HIID and constant attempts to improve the integration of economic theory and public enterprise policy issues, contributed a great deal to the improvement in the quality of my lecture notes over the years. However, it was Richard Hook who as the Director of the Public Enterprise Workshop reminded me most consistently about the potential of converting the lecture notes into a text.

At the Kennedy School of Government, John Thomas not only provided encouragement but also took the risk of pitting my lecture notes against the then prevailing text. I also benefited from regular interactions with Edith Stokey during the review meetings with the economics faculty for the Summer Program for Public Administrators.

The production of the book benefited from the help and commitment of many students at the Indian Institute of Management Calcutta. However, the contributions of V.Suresh and Debashish Bhattacharya stand out in this respect.

Finally, the debt to my family seems to be growing at an exponential rate with each book that I write. I only hope that when my children Puru and Pia grow up they will have a better world to live in and that this book would have contributed in a small measure toward that goal. For my wife Supreeti's contributions, there is no way I can adequately thank her except to put on record that this book is as much hers as mine.

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CHAPTER ONE

INTRODUCTION

CHAPTER ONE

INTRODUCTION

THE ECONOMIC PROBLEM

In a very broad sense economics is what economists do. And what do they do? Well, they are primarily engaged in analyzing and providing answers to the various economic problems faced by individuals and the society.

If I were to ask you which is the most important, rather fundamental, economic problem of your country, chances are that you would mention either inflation or unemployment or lack of growth or some equally abhorrent economic problem. However, all these problems are merely manifestations of the most fundamental problem, which happens to be the problem of *scarcity*.

Consider for a moment the broad-brush economic history of the United States in the twentieth century. The average worker now produces about four times as much as the worker at the turn of the century—and does so with less effort, in a shorter workweek. If average workers can now produce so much, why don't they relax? If, with relatively little effort, they can live as well, or better than their grandparents lived, why should they worry about economic problems at all? Why do they continue to struggle to make a living? The answer is simple: even the wealthiest nations on earth are not free from the economic problem of *scarcity*.

This problem of scarcity arises because of two fundamental facts of life:

1. *Human wants are virtually unlimited or insatiable.* This hardly needs further explanation. A person with a motorcycle may want to own a car, any car. A person with a small car wants to have a luxury car. A person with a luxury car may aspire to own a small jet. A person with a small jet airplane may want a bigger one and a person with a bigger jet may want a swimming pool inside. This just goes on and on.

2. *Economic resources to satisfy these human wants are limited.* But, what do we mean by "economic resources"? In general, this term refers to all the natural, human and man-made resources that go into the production of goods and services. These economic resources are usually classified under the following categories:

Land: Economists mean much more by land than a layman does. Land refers to all natural resources—all "free gifts of nature"—which are usable in the productive process, such as arable land, forests, mineral and oil deposits, and water resources.

Capital: This refers to all man-made aids to production; that is, all tools, machinery, equipment and factories, storage, transportation and distribution facilities used in producing goods and services and getting them to the ultimate consumer.

Labor: This is a broad term which the economist uses in referring to all of man's physical and mental talents usable in producing goods and services. Thus the services of a ditch digger, retail clerk, machinist, teacher, professional football player and nuclear physicist all fall under this heading.

Entrepreneurial Ability: Because of their special significance in a capitalistic economy, this special set of human talents is sometimes put as a separate category distinct from labor.

All these economic resources, land, labor, capital and entrepreneurial ability, have one fundamental characteristic in common: Economic resources are scarce or in limited supply.

This fact of limited resources combined with the fact of unlimited human wants leads to the fundamental economic problem of scarcity: **WE CANNOT HAVE EVERYTHING WE WANT;** we must thus make choices.

THE THREE FUNDAMENTAL PROBLEMS OF AN ECONOMY

The following are the three areas of choice faced by all societies trying to satisfy the unlimited wants of their citizens with the limited supply of resources at their disposal:

(i) **WHAT** to produce? Society must somehow decide what collection of goods and services will most fully satisfy its wants. Actually, the basic question of determining what is to be produced can be divided into two closely related sub-questions.

> (a) What goods and services are to be produced? Answering this entails, in effect, the setting up of a list of goods and services which society deems important enough to produce. How should society apportion its scarce resources among those products which it is capable of producing? Should it produce drill presses? Automobiles? An ICBM system? Society must choose what items to include in —and what items to exclude from — the list of goods that are to be produced.
>
> (b) In what quantities does society want these goods produced? Without asking how this decision has been reached, suppose society decided that bread, drill presses, automobiles and athletic stadiums are the items from the above list which it actually wants to produce. The fact that resources are scarce tells us that society cannot produce unlimited amounts of the goods on this list. Society must now decide how many loaves of bread, how many drill presses, how many automobiles and how many stadiums it wants in its total output.

(ii) **HOW** should this total output be produced? This question can also be broken into parts.

> (a) How should society steer resources into industries producing goods that it wants produced and, conversely, keep resources away from industries producing goods wanted in very small amounts or not at all?

(b) What firms in the various industries are to do the producing, and how are they to obtain the needed resources?

(c) What is the most efficient combination of resources for each firm to use in producing a given level of output? More subtly, what is the best technology to use in production?

(iii) **FOR WHOM** shall goods be produced? How is society to distribute, divide or ration the total output among various individuals or families? Should output be distributed on the basis of need? Or on the basis of one's contribution to production? What degree of inequality in the sharing of output is necessary or desirable?

These three choice problems, *what, how,* and *for whom* to produce, are called the **THREE CENTRAL PROBLEMS OF AN ECONOMY,** or the **THREE FUNDAMENTAL PROBLEMS OF AN ECONOMY.** Every economy—primitive, capitalistic, mixed, socialistic, centrally planned—faces these three choice problems because they are a result of the universal problem of *scarcity.* **WHAT** to produce, **HOW** and **FOR WHOM** to produce would not be problems if resources were unlimited. If an infinite amount of every good could be produced, or if human wants were fully satisfied, it would not matter if too much of any particular good were produced. Nor would it then matter if labor and materials were combined unwisely. Since everyone could have as much as they wished, it would not matter how goods and incomes were distributed among different individuals and families.

Solving the Fundamental Problems

Alas, we know *scarcity* and not abundance is the harsh reality faced by all societies, rich or poor, and so these central problems have haunted and will continue to haunt all societies in the foreseeable future. However, the way these problems are solved is different in various types of economies. In a primitive economy, custom may influence every facet of behavior. WHAT, HOW, and FOR WHOM may be decided by reference to traditional ways of doing things.

In a centrally planned economy, the planning commission may find the solutions to the three central problems. At the other extreme, in a free enterprise system, the answer to these central problems is provided by the prices determined in the free markets for goods and services.

In this book our starting point will be the functioning of the free market system. As public managers[1] you may question the wisdom of studying the workings of a free enterprise system. The strongest justification for doing so lies in the fact that the analytical tools developed to study the free market system can be very successfully used for analyzing other systems too. Besides, a lot of public enterprises do indeed work in an environment of free enterprise if not just as private enterprise. Further, as a public policy maker you have to know the ins and outs of a free enterprise system to be able to make a fair evaluation of the best way to control it, supplement it or, maybe, to supplant it.

[1] The term "public managers" is supposed to include both public enterprise managers as well as those who make and manage public policy.

In the chapters that follow we will discover how a free enterprise system solves the three central problems through a system of freely determined prices. However, to put everything in perspective let us take a bird's-eye view of the price mechanism and briefly examine how the three central problems are solved by the free enterprise system.

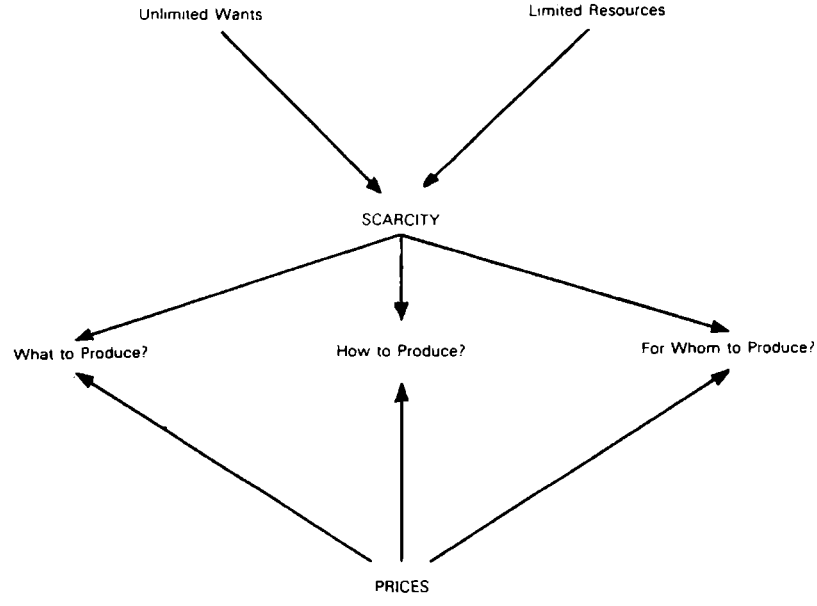


Figure 1.1: Three Fundamental Problems of an Economy

1. **WHAT** things will be produced is determined by the dollar votes of the consumers—not every two or four years at the polls, but every day in their decision to purchase this and not that item. The item they prefer receives more dollar votes, i.e., more is spent on it, and so its price goes up relative to other goods. This relatively higher price and consequently higher profit attracts new producers to produce this good and the old producers increase their production. It is in this way that prices of various goods determine what will be produced and how much will be produced.

2. **HOW** things are produced is determined by the competition between different producers. The only way for the producers to compete effectively and maximize profits is to keep costs at a minimum by adopting the most efficient methods. Thus, the method that is cheapest at any one time, because of both technical as well as cost efficiency, will displace a more costly method. Suppose, as a result of consumer votes, it has been decided that automobiles will be produced. So we have answered WHAT will be produced and now the question is HOW will it be produced. Obviously, there are many ways of producing an automobile ranging from highly labor-intensive ones to very sophisticated and computerized assembly lines. The choice of a method will depend on the relative prices of labor and capital. If labor is very cheap it may make sense to use a labor-intensive method and *vice versa*. Once again, prices determine how a thing will be produced.

3. **FOR WHOM** things are produced, that is, who gets to use the things produced, depends on who can afford to pay for them. Whether one can afford to pay for something depends on one's income. Now, people's incomes depend on the wage rates, land rents, interest rates and profits, all of which go to make up each person's income — relative to everyone else's and relative to the whole. A moment's reflection will

show that wages, rents, interest rates and profits are nothing but prices of various productive services provided by owners of these resources. Thus, the answer to the third central problem is also determined by prices in a free enterprise system.

PRODUCTION POSSIBILITIES CURVE

The problem of *scarcity* — and the need to make choices— can be illustrated with the help of a Production Possibilities Curve (PPC). This curve shows what can be produced with the existing quantity of land, labor and capital at our disposal as well as with our existing technology. Although our resources and our capacity to produce are limited, we have an option as to what sorts of goods and services we produce. We may decide to produce fewer cars and more bicycles and aircraft, or less wheat and more corn, or less butter and more guns.

In an economy with thousands of products, the choices before us are complex. In order to make the problem manageable we will simplify it by assuming that the economy produces only two goods—guns and butter. (More about the importance of assumptions later.)

Derivation of the PPC: Before we make use of the concept of PPC, let us see how we derive it. Suppose all resources of an economy are thrown into the production of butter. There will be a maximum amount of butter that can be produced per year. (The exact amount depends upon the quantitative and qualitative resources of the economy in question and the technological efficiency with which they are used.) Suppose five million pounds of butter is the maximum amount that can be produced with the existing technology and resources.

At the other extreme, imagine that 100 percent of society's resources had been devoted instead to the production of guns. Only some maximum number of guns could be produced: 15,000 guns of a certain description can perhaps be produced if we are really willing to produce no butter.

These are two extreme possibilities; in between, there are still others. If we are willing to give up some butter, we can have some guns. If we are willing to give up still more butter, we can have still more guns. A schedule of a number of possibilities is given in Table 1.1, F being the extreme possibility where all butter and no guns are produced and A being the opposite extreme, where all resources go into production of guns. In between, at E, D, C and B, butter is being given up increasingly in exchange for more guns. Butter is transformed into guns, not physically, but by diverting resources from one use to the other.

Table 1.1: Alternative Production Possibilities

Possibilities	Butter (in mil. of lbs)	Guns (thousands)
A	0	15
B	1	14
C	2	12
D	3	9
E	4	5
F	5	0

It is even more illuminating to represent this same "production possibilities schedule" graphically, as in Figure 1.2, by measuring butter along the horizontal axis and guns along the vertical. You should be able to graph the numerical table as is done in Figure 1.2; for F, by counting 5 butter units to the right and going up 0 gun units; for E, by going 4 butter units to the right and up 5 gun units; and finally, for A, by going over 0 butter units and up 15 gun units.

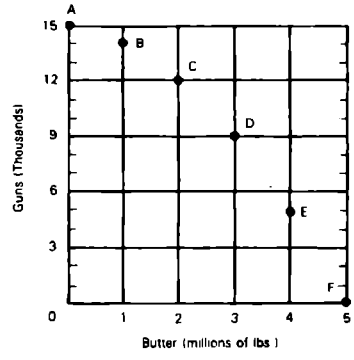


Figure 1.2: Possibilities of Transforming Butter into Guns

We can now fill in all intermediate positions with new dots, even those involving fractions of a thousand guns. This then will give us the production possibilities curve shown in Figure 1.3.

Some Uses of the PPC: This concept, represented as a simple curve, can help introduce many of the most basic concepts in economics.

(i) First, it provides a rigorous definition of *scarcity* as follows: Economic scarcity refers to the basic fact of life that there exists only a finite amount of human and non-human resources, which the best technical knowledge is capable of using to produce only a limited maximum amount of each and every good, as shown by the PPC. So far, nowhere on the globe is the supply of goods so plentiful or the tastes so limited that the average family can have more than enough of everything it might fancy.

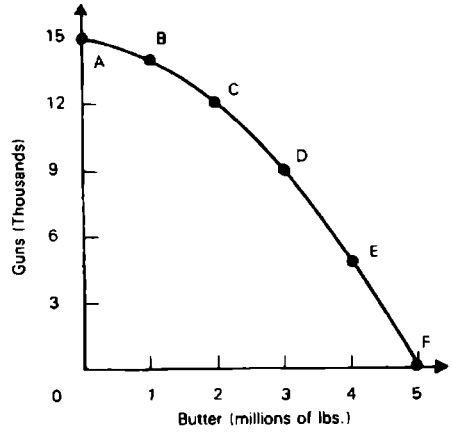


Figure 1.3: The Production Possibilities Curve

(ii) Second, it illustrates the concept of "opportunity cost". The opportunity cost of a product refers to the alternative products which must be given up to produce that product. In our guns and butter example, the opportunity cost of a unit of butter is the guns which must be given up when that unit of butter is produced. Thus, the opportunity cost of the first unit of butter is one unit of guns.

As we decide to produce more butter, we must use resources which are somewhat less suitable to produce butter. Thus, in order to get the second unit of butter we have to give up two units of guns. So we can say that the opportunity cost of the second unit of butter is two units of guns.

Further increases in the production of butter come at higher and higher opportunity cost. The reason for this is that our resources are not completely adaptable to alternative uses. Some resources are much more suitable for the production of butter than for that of guns, and others are very productive in producing guns. So when we produce the first unit of butter, we divert only those resources that are suitable for production of butter and not for guns. This way the loss of guns production is minimal as these resources were not contributing much to the gun production anyway. However, as we produce more and more butter we find that the supply of resources most suitable for butter is exhausted and we have to divert resources to butter which are more suitable for gun production. This results in a greater loss of gun production, compared to before. Thus, the increasing opportunity cost of butter is a reflection of specialized characteristics of our resources. **This then explains why the PPC is usually bowed outward** (this shape is called concave to origin). If the resources used for butter and guns were completely adaptable, then the PPC would be straight as follows.

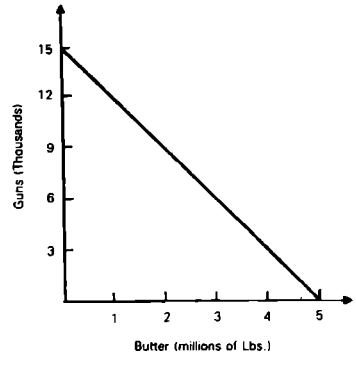


Figure 1.4: Production Possibilities Curve with Completely Adaptable Resources

(iii) Finally, the PPC can also help make clear the three central problems of an economy: *WHAT, HOW,*and *FOR WHOM.*

WHAT goods are produced and consumed can be depicted by the point that gets chosen on the PPC.

HOW goods are to be produced involves an efficient choice of methods and proper assignment of different amounts and kinds of limited resources to the various industries. What would happen if the men well-suited for machine tooling of guns ended up on farms, while at the same time, land well- suited for butter ended up being used for gun manufacture? We would be inside the PPC, not on it. What if government regulations caused the land most suitable for corn to be used for wheat production, and the land most suitable for wheat to be used for corn? We would end up with less of both corn and wheat, inside the production possibility frontier on a diagram whose axes were labeled corn and wheat. Being inside the PPC is a crime of economic inefficiency; but it need not involve any engineering inefficiency, since, on the wrongly allocated land, production might still be following the latest methods known to science.

FOR WHOM goods are produced cannot be discerned from the PPC diagram alone. Sometimes, though, you can make a guess from it. If you find a society on its PPC with many yachts and few compact cars, you are justified in suspecting that it enjoys considerable inequality of income and wealth among persons.

DISTINCTION BETWEEN MICROECONOMICS AND MACROECONOMICS

As mentioned above, because of scarcity we cannot have everything we want and hence we are faced with the problem of choice between alternatives. The major task of economics is in analyzing and evaluating alternatives and deciding which is the best alternative available. Economics is, therefore, a decision science concerned with the choices we have to make and the consequences of those choices for ourselves and others. In fact, the central focus of economics is on choice and decision making. However, economic decisions have to be made at two levels, at the individual level and at the national level. The branch of economics which focuses on individual decisions is referred to as **Microeconomics.** It asks questions like: How much should a firm produce and sell? What price will be charged for a product? How many workers will a firm hire? How much will a consumer buy at a particular price? The emphasis is on choices facing individuals, whether they be consumers or producers.

Macroeconomics, on the other hand, looks at choices facing the whole economy. Instead of asking how much an individual firm will sell, macroeconomics tries to determine how much the economy as a whole will produce. Where microeconomics is concerned with what determines the prices of individual products, macroeconomics is concerned with the general level of all prices and the causes of inflation. Where microeconomics is concerned with how many workers a firm will hire, macroeconomics is concerned with the level of national employment and unemployment. In short, while microeconomics is concerned with analyzing individual units of the economy, macroeconomics is concerned with analyzing the behaviour of the economy as a whole.

To Summarize

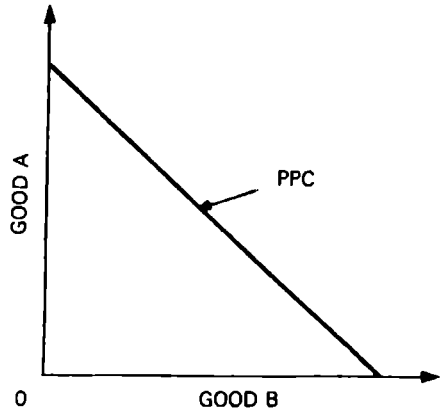
We have seen that the economists are in the business of finding solutions to economic problems like inflation, unemployment and budgetary deficits etc. However, these problems are merely manifestations of the fundamental problem of **SCARCITY.** Therefore, economists have to deal with the problem of scarcity and its consequences. Since scarcity implies that the society cannot have it all, it has to, therefore, make choices regarding what, how and for whom to produce. In market-oriented economies the answers to these questions are determined by the prices of goods and resources. Naturally, the next logical question is : What determines these prices? The answer to this question is provided in the next chapter.

Problems for Practice

1. Which statement is true of the basic economic problem?
   a. The problem will exist as long as resources are limited and desires are unlimited.
   b. The problem exists only in less developed countries.
   c. The problem will disappear as production expands.
   d. The advancement of technology will cause the problem to disappear.

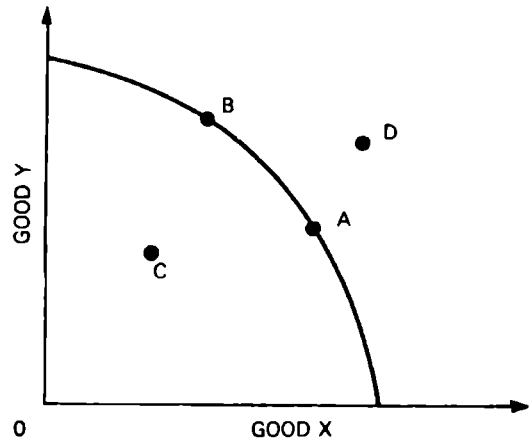
2. A shift in the production possibility curve will result from:
   a. a change in consumer preference.
   b. unemployment or underemployment.
   c. changes in production techniques.
   d. a change in the combination of goods produced.

3. If California were to slide into the Pacific Ocean:
   a. the production possibilities curve of the U.S. would shift to the left.
   b. the production possibilities curve of the U.S. would not be affected.
   c. the production possibilities curve would shift to the right.



4 Which is correct of the above production possibilities curve?
   a. The opportunity cost of A in terms of B is always the same.
   b. There are increasing costs for both goods A and B.
   c. The resources of this economy are not equally suited for the production of A or B.
   d. This is the way in which a production possibilities curve is usually drawn.

Answer questions 5 through 8 on the basis of the information given in the diagram below:



5. The curve illustrated is called:
   a. a demand curve.
   b. a supply curve.
   c. a marginal product curve.
   d. a production possibilities curve.

6. Point C represents:
   a. inflation.
   b. full employment.
   c. underemployment.
   d. an impossible output level.

7. Moving from A to B, the economy:
   a. increases the amount of X produced.
   b. gives up some X to produce more of Y.
   c. moves from full employment to unemployment.
   d. faces decreasing costs.

8. The economy:
   a. cannot produce A or B.
   b. cannot produce C.
   c. cannot produce D.
   d. none of the above.

CHAPTER TWO

PRICE DETERMINATION

CHAPTER TWO

PRICE DETERMINATION

In this chapter we acquire the first set of tools for economic analysis grouped under the title: EQUIPMENT SET #1. This equipment set consists of the following concepts:

1. Demand
2. Supply
3. Market equilibrium: Determination of Prices

Before we proceed any further let us justify our study of this equipment set. For we do not want to unnecessarily load our tool kit with tools we do not need.

Remember, in Chapter 1, we argued that in a free enterprise economy or even in a mixed economy the solution to the three central problems of WHAT, HOW and FOR WHOM is determined by a system of prices. The next logical step in explaining the solution to the three central problems, then, is the explanation of how prices are determined. In the previous chapter we merely assumed that goods and resources sell for certain given prices. This permitted us to sidestep the fundamental question to which we now turn: How are prices "set, " or determined, in a free market?

The answer is easy to state but a bit more difficult to understand. In short, prices are determined in a market by the interaction of supply and demand. Our immediate objective is to verify this answer and also examine what determines demand and supply.

Because supply and demand are the economist's basic tools, you will probably find these concepts to be among the most useful you study in this course. There is a strong element of truth in the quip, "Teach a parrot to say, 'Demand and Supply,' and you have an economist!" However, it would be a mistake for any reader to become enamored with tools for their own sake. It is the application of the tools to the richness of modern economic life that makes them exciting. This is precisely what we intend to do in Chapter 3, where we shall see how this Equipment Set #1 can be used to throw light on a number of interesting cases. But for now, let us begin the process of becoming familiar with our Equipment Set #1.

DEMAND SIDE OF THE MARKET

How much of some commodity will an individual be willing to buy per month? This amount is influenced

by a number of variables known as DETERMINANTS OF INDIVIDUAL DEMAND. The following are the most important ones.

1. The commodity's own price

Non-price determinants of demand

2. The price of related goods
3. Income of the individual
4. Tastes of the individual
5. Expectations

We can neither develop a simple theory nor understand the separate influence of each variable if we start by trying to consider what happens when everything changes at once. Fortunately, there is an easier way: we can consider the influence of the above variables one at a time. To do this, we hold all but one variable constant. Then we let that one selected variable vary and study how it affects the quantity demanded. We can do the same for each of the other variables in turn, and in this way we can come to understand the importance of each.

Holding all other influencing variables constant is often described by the words "other things being equal" or the equivalent Latin phrase, *ceteris paribus*. Of course, this does not imply that we are able to actually hold these variables constant. It is a conceptual exercise. So when economists speak of the influence of the price of wheat on the quantity demanded, *ceteris paribus*, they refer to what a change in the price of wheat would do conceptually to the quantity demanded if all other factors that influence the demand for wheat did not change.

We could, of course, begin by examining the effect of any of the five determinants on the quantity demanded. However, since our primary interest right now is to develop a theory of how commodities get priced, we shall thus focus on the influence on quantity demanded of each commodity's own price.

We begin by holding all other influences constant and asking: How do we expect the quantity of a commodity to vary as its own price varies?

A basic economic hypothesis is that the lower the price of a commodity, the larger the quantity that will be demanded, other things being equal. In short, there is an inverse relationship between price and quantity demanded. Economists have labeled this inverse relationship as the law of demand.

Why might this be so? Upon what foundation does this law rest? There are many levels on which an answer to the above question can be given, but it is sufficient for the present to give an answer based on common sense and simple observation.

Commodities are used to satisfy desires and needs, and there is almost always more than one commodity that will satisfy any given desire or need. Such commodities compete with one another for the purchaser's attention. Hunger may be satisfied by meat or vegetables, a desire for green vegetables by broccoli or spinach. The need to keep warm at night may be satisfied by several woollen blankets or one electric blanket, and so it goes. Name any general desire or need, and there will be at least two and often dozens of different commodities that will satisfy it.

We can now see what happens if we hold income, taste, price of all related goods and expectations constant and vary only the price of one commodity. As that price goes up, the commodity becomes an increasingly expensive way to satisfy a want. Some people will either buy less of it or stop buying it altogether. For example, as meat becomes more expensive, people may switch, to some extent, to vegetables. If the price of butter goes

up, consumers may substitute margarine for it and, therefore, purchase less butter at higher prices.

Demand Schedule and Demand Curve

How can this inverse relationship between product price and quantity demanded be portrayed? There are essentially two ways of portraying this relationship:

1. Demand Schedule, and
2. Demand Curve

Demand Schedule: This is a numerical tabulation showing the quantity that is demanded at selected prices. Table 2.1 is a hypothetical demand schedule for a single individual who is purchasing bottles of wine.

This tabular portrayal of demand reflects the relationship between the price of wine and the quantity that our mythical consumer would be willing and able to purchase at each of these prices. Note that we say willing and able, because willingness alone is not effective in the market. I may be willing to buy a Rolls-Royce, but if this willingness is not backed by the ability to buy, that is, by the necessary dollars, it will not be effective and, therefore, not reflected in the market. In Table 2.1, if the price per bottle is $5, our consumer would be willing and able to buy 10 bottles per month; if it were $4, he would be willing and able to buy 20 bottles per month; and so forth.

Table 2.1: An Individual Buyer's Demand for Wine (Hypothetical Data)

Price per bottle (dollars)	Bottles demanded per month
5	10
4	20
3	35
2	55
1	80

The demand schedule, in and of itself, does not tell us which of the five possible prices will actually exist in the wine market. As we have already said, this depends on demand and supply. A demand schedule, then, is simply a tabular statement of a buyer's plans, or intentions, with respect to the purchase of a product.

Note that to be meaningful, the quantities demanded at each price must relate to some specific time period — a day, a week, a month, or a year. To say "a consumer will buy 10 bottles of wine per month at $5 per bottle" is clear and meaningful, and thus makes a lot of sense.

Demand Curve: A second method of showing the relationship between quantity demanded and price is to draw a graph. The five price-quantity combinations shown in Table 2.1 are plotted on the graph shown in Figure 2.1, which has the price on the vertical axis and quantity on the horizontal axis. The smooth curve drawn through these

points is called the demand curve. It shows the quantity of wine that the purchaser would like to buy at each price. The curve slopes downwards to the right; this indicates that the quantity demanded increases as the price falls.

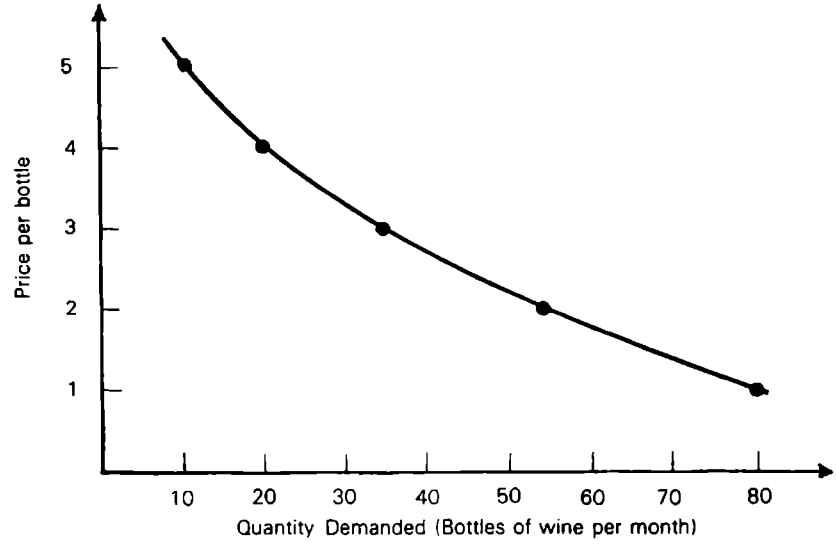


Figure 2.1: A Demand Curve

Distinction Between "Demand" and "Quantity Demanded"

The term *"demand"* refers to the entire relationship between price and quantity (as shown, for example, by the schedule in Table 2.1 or the curve in Figure 2.1). When economists speak of the conditions of demand in a particular market as being given or known, they are referring not just to the particular quantity demanded at the moment (i.e., not just to a particular point on the demand curve) but to the entire demand curve.

In contrast, a single point on a demand schedule or curve is the *"quantity demanded"* at that point. So when we say that demand has changed, we mean that the entire demand curve has shifted or moved. When we say that quantity demanded has changed, we mean that because price changed a different quantity is being bought and so we are on a different point on the same demand curve. This is also referred to as a movement along the demand curve.

To you this distinction may appear to be nit-picking over semantics but, believe me, it is rather crucial to prevent unnecessary confusion while analyzing problems. You will see what I mean when we start dealing with the cases.

Shifts in the Demand Curve

A demand curve is drawn on the assumption that everything except the commodity's own price is held constant. A change in any of the variables previously held constant will shift the demand curve to a new position. Let us then examine the effect of a change in each of the determinants of demand on the demand curve.

1. **Income**: If the income of the average individual increases, he can be expected to purchase more of most commodities even though commodity prices remain the same. In our example of a wine buyer, no matter what the price we pick, we can safely expect that more bottles of wine will be demanded at a higher income than were

previously demanded at the same price. This shift is illustrated in Table 2.2 and Figure 2.2.

Table 2.2: Effect of Change in Income on Quantity Demanded at Different Prices

Price per bottle (dollars)	Quantity demanded with an income of $20,000/year	Quantity demanded with an income of $25,000/year
5	10	22
4	20	30
3	35	45
2	55	67
1	80	91

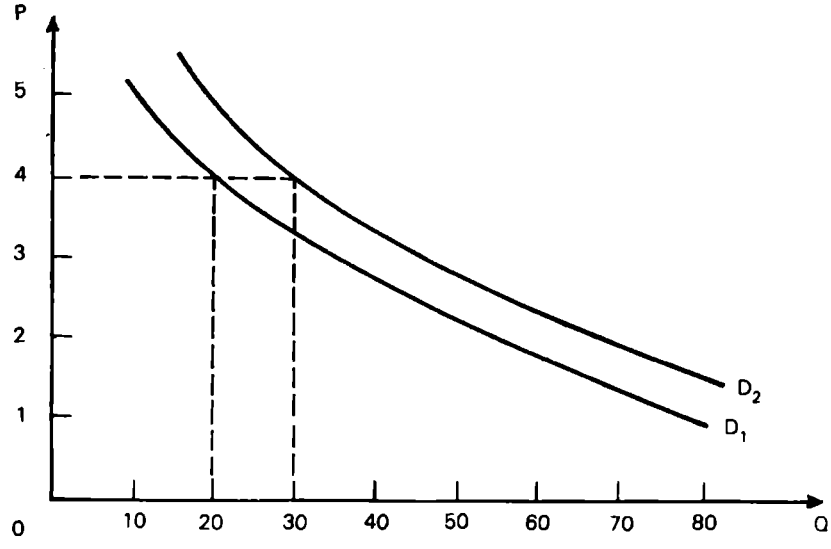


Figure 2.2: A Shift in the Demand Curve

Notice, we said that this will hold true for most goods. However, there are certain goods which prove to be exceptions to this general rule. As income increases beyond a certain point, the demand for these goods decreases. These goods are called *"inferior goods"* and the usual examples of such goods are potatoes, bread and cabbage. As income increases, people may want to switch from such products to products with a high protein content such as dairy products and meat. All other goods beside inferior goods are called *"normal goods."*

2. **Tastes**: A change in consumer tastes favorable to a product — possibly prompted by advertising or fashion changes — will mean that more of it will be demanded at each price; that is, demand will increase. An unfavorable change in consumer preferences will cause demand to decrease, shifting the curves to the left.

3. **Price of related goods**: Goods can be related to each other in two ways. They can be either ***substitutes*** or ***complements***. For example, butter and margarine are substitute goods. When the price of butter rises, consumers

will purchase a smaller amount of butter, and this will cause the demand for margarine to increase. Conversely, as the price of butter falls, consumers will buy larger quantities of butter, causing the demand for margarine to decrease. To generalize: *When two products are substitutes, the price of one good and the demand for other are directly related.* A rise in the price of a substitute for a commodity shifts the demand curve for the commodity to the right. More will be purchased at each price. So it is with tea and coffee, sugar and saccharin, and so forth.

Another class of goods is called *"complementary goods."* These are commodities that tend to be used jointly. Cars and gasoline are complements. So are golf clubs and golf balls, cameras and rolls of film, and so forth. Since complements tend to be consumed together, a fall in the price of either will increase the demand for both. A fall in the price of a complementary commodity will shift a commodity's demand curve to the right. More will be purchased at each price.

4. **Expectations**: Consumer expectations of higher future prices may prompt them to buy now in order to "beat" the anticipated price rises, and, similarly, the expectations of rising incomes may induce consumers to be less tight-fisted in their current spending. Conversely, expectations of falling prices and income will tend to decrease the current demand for products.

Individual and Market Demand

Until now we have been dealing in terms of just one consumer. To study a market we must consider a situation in which there are a number of buyers. The transition from an individual to a market demand schedule can be accomplished easily by the process of summing the quantities demanded by each consumer at various possible prices. If we suppose that there were just three buyers in the market, as is shown in Table 2.3, it would be an easy chore to determine the total quantities demanded at each price. Figure 2.3 shows the same summing procedure graphically, using only the $3 price to illustrate the adding-up process. Note that we are simply summing up the three individual demand curves horizontally to derive the total demand curve.

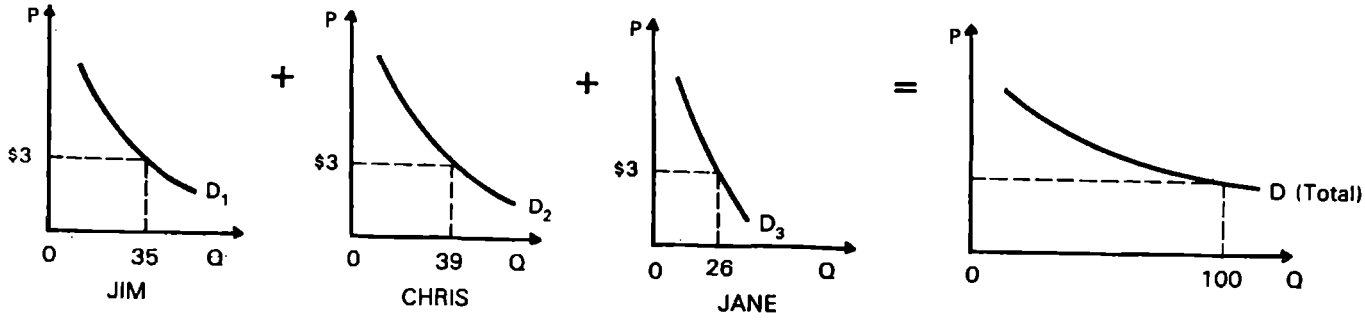


Figure 2.3: Derivation of a Market Demand Curve

Thus, as far as the market demand curve is concerned it has an extra determinant, i.e., the number of consumers. If the number of consumers increases then the demand curve will shift out and *vice versa.*

Table 2.3: Adding Individual Demand Curves

Price per bottle (dollars)	Quantity demanded by			Total Quantity demanded per month
	JIM	CHRIS	JANE	
5	10	+12	+8	= 30
4	20	+23	+17	= 60
3	35	+39	+26	= 100
2	55	+60	+39	= 154
1	80	+87	+54	= 221

Two Ways of Looking at the Demand Curve

There are two ways of looking at the demand curve. For instance, the market demand curve in Figure 2.3 tells us two things:

1. At $3 the maximum amount that would be demanded will be 100. This can be generalized to say that the demand curve tells us the maximum quantity that would be demanded at a given price.

2. It also tells us the maximum price obtainable when selling 100 units. This can be generalized to say that the demand curve tells us the maximum price obtainable for a given quantity.

These are two alternative definitions of the demand curve. In future, I will refer to them as Definition 1 and Definition 2.

SUPPLY SIDE OF THE MARKET

The basic question here is: What determines the quantities of commodities that a firm will produce and offer for sale? The amount of a commodity that a firm wishes to sell is the *quantity supplied* of the commodity. This is the amount that the firm is willing to offer for sale; it is not necessarily the amount it succeeds in selling. The terms *quantity actually* sold and *quantity exchanged* indicate what it actually succeeds in selling, which as we shall see soon depends on the interaction of both demand and supply. Further, quantity supplied is a flow; it is so much per unit of time, per day, per week, or per year.

The amount of a commodity the firm will be willing to produce and offer for sale depends on a number of factors. The following are the most important ones:

1. The commodity's own price

Non-price determinants of supply:

2. The prices of other (related) commodities
3. The price of resources
4. Price expectations
5. The goals of the firm
6. The state of technology
7. Taxes and subsidies
8. Weather (mostly for agricultural products)

The situation is the same here as it is on the demand side. The list of influencing variables is long, and we will not get far if we try to discover what happens when they all change at the same time. So once again, we use the very convenient *ceteris paribus* technique to study the influence of the variables one at a time.

Quantity Supplied and Price

Since we want to develop a theory of how commodities get priced, we are necessarily interested in the influence on quantity supplied of a commodity's own price. We start by holding all other influences constant and asking, how do we expect the quantity of a commodity supplied to vary with its own price?

The basic economic hypothesis is that for many commodities the higher their price, the larger the quantity that will be supplied, other things being equal.

Why might this be so? Well, the full answer to this question will be provided in one of the chapters later on. However, let's try to see the common sense behind it. This direct relationship between price and quantity supplied can be explained on the basis of substitutability. In many instances, the resources used by a supplier are readily adaptable to a variety of products. A farmer's land and capital, for example, may be of about equal efficiency in producing corn, wheat, soybeans and so forth. As the market price of one of these products, say corn rises, the farmer will shift his resources from other commodities to corn because it pays him to produce more corn when the price goes up. In practice, this substitution may be more complex and time consuming than our example implies, yet the basic conclusion still holds true.

The Supply Schedule and the Supply Curve

This general relationship between quantity supplied and price can be depicted in two ways:

1. Supply Schedule, and
2. Supply Curve.

Supply Schedule: This is a numerical tabulation showing the quantities that a producer would wish to sell at alternative prices of the commodity. A supply schedule is analogous to a demand schedule: the latter shows what amounts a consumer would be willing to buy at alternative prices of the commodity. Table 2.4 presents a hypothetical supply schedule for a producer of wine.

Table 2.4: A Supply Schedule

Price per bottle (dollars)	Quantity supplied per month
5	60
4	50
3	35
2	20
1	5

Supply Curve : This is the graphic representation of the supply schedule and is illustrated in Figure 2.4.

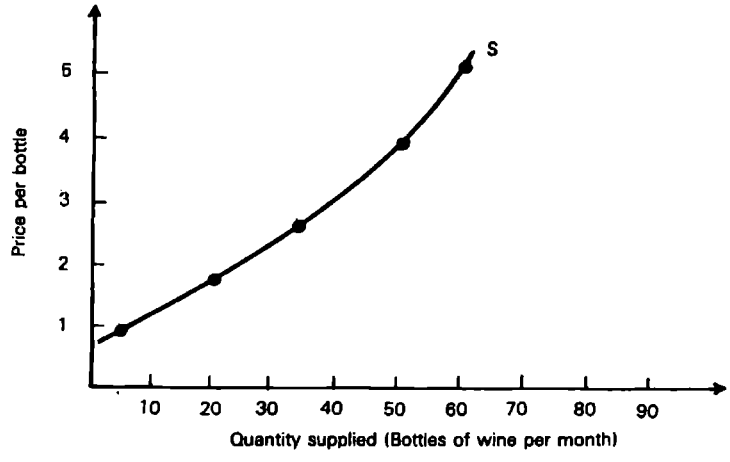


Figure 2.4: A Supply Curve

Distinction between "Supply" and "Quantity Supplied"

Just as in the case of demand, supply refers to the entire relation between supply and price. A single point on the schedule or curve refers to the quantity supplied at that price.

Shifts in the Supply Curve

A change in any of the variables (other than the commodity's own price) that affects the amount of a commodity that a firm is willing to produce and offer for sale will shift the whole supply curve for that commodity.

A *change in supply* is involved when the entire supply curve shifts. A *change in quantity supplied*, on the other hand, refers to the movement from one point to another point on a stable supply curve. The cause of such a movement is a change in the price of a specific product under consideration.

(IMPORTANT NOTE: These distinctions between "a change in supply" and "a change in quantity supplied" and "a change in demand" and "a change in quantity demanded" are of crucial importance. Please make sure you understand them before you proceed any further.)

Let us now consider the effect of changes in each of these non-price determinants on supply.

1. **Other prices**: Just as commodities can be substitutes or complements in consumption, so can they be substitutes or complements in production.

Corn and soybeans are substitutes in production. If the price of corn increases, farmers will be encouraged to switch their lands out of the production of soybeans and into the production of corn. The amount of soybeans they are willing to supply at any given price will decrease; the supply curve for soybeans will shift to the left. In general, substitutes in production refer to those commodities that can be *produced instead of each other*. Notice the difference between this and substitutes in consumption discussed in connection with the demand curves. They refer to those commodities which could be *consumed instead of each other*, like tea and coffee.

Beef and hides are complements in production, or joint products. When more cattle are slaughtered for beef, more hides are automatically produced in the process. An increase in the price of beef will cause an increase in beef production, which will cause a rightward shift of the supply curve of hides. In general, complements in productions refer to those commodities which are *produced together*. Complements in consumption refer to those goods that are *used together*, like film and cameras.

2. **Resource prices**: The price paid for a resource is a cost to a firm that uses it. A change in resource prices changes the quantity that producers will be willing to offer for sale because it changes costs and, hence, profits. Just as profits are increased by an increase in the commodity's price, resource prices remaining constant, so are they increased by a fall in resource prices, the commodity's own price remaining constant. A rise in resource prices reduces the profitability of a commodity at any given price of that commodity. The initial profitability can be restored only if the price of the commodity rises.

Thus a rise in the resource price shifts to the left the supply curve of a commodity that uses that resource or factor of production, indicating that less will be supplied at any given price.

3. **Price expectation**: Expectation concerning the future price of a product can also affect a producer's current willingness to supply that product. It is difficult, however, to generalize the way the expectations of, say, higher prices will affect the present supply curve of a product. Farmers might withhold some of their current corn harvest from the market, anticipating a higher corn price in the future. This will cause a decrease in the current supply of corn. On the other hand, in many types of manufacturing, expected price increase may induce firms to

expand production immediately, causing supply to increase.

4. **The goals of the firm**: In most elementary economic theory books, the firm is assumed to have the single goal of profit maximization. Firms might, however, have other goals either in addition to or as substitutes for profit maximization. If the firm worries about risk, it will pursue safer lines of activity even though they promise lower probable profits. This possibility of goals other than profit maximization is especially relevant for public enterprises.

A change in the importance that firms give to other goals will shift their supply curve one way or the other, indicating a changed willingness to supply the quantity at any given price and hence a changed level of profitability.

5. **Technology**: Any technological change that decreases production costs will increase the profits that can be earned at any given price of the commodity. Since increased profitability tends to lead to increased production, this change will shift the supply curve to the right, indicating an increased willingness to produce the commodity and offer it for sale at each possible price.

6. **Taxes and subsidies**: Finally, we will discover later that certain taxes, such as sales taxes, add to production costs and therefore reduce supply. Conversely, subsidies lower costs and increase supply.

Individual and Market Supply

As is the case for demand, the market supply curve is obtained by a horizontal summation of all the supply curves of each individual supplier.

So once again when we are talking about the determinants of the market supply we have to add the "number of suppliers" as another determinant besides all the others which affect a firm's supply.

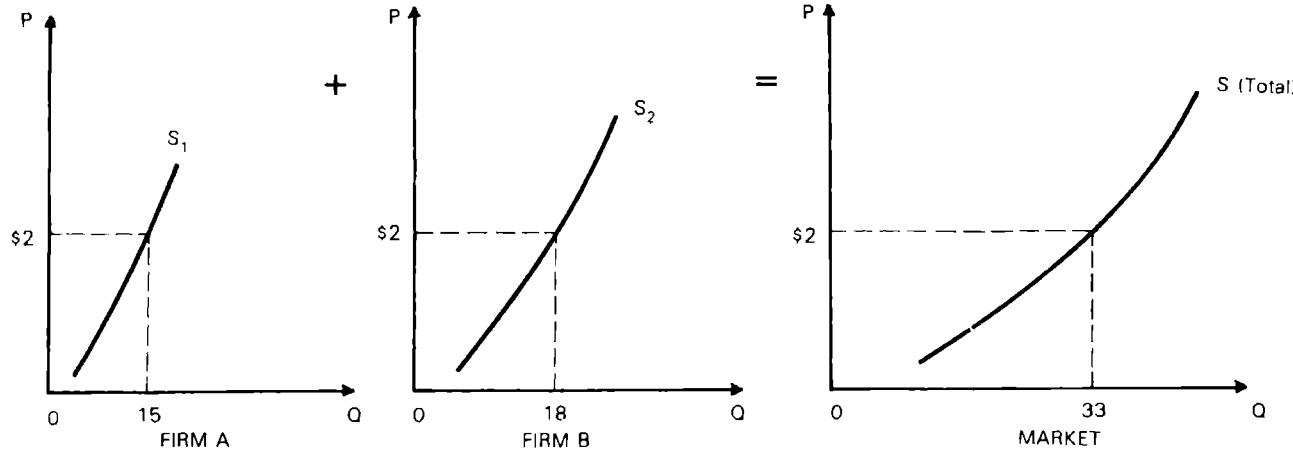


Figure 2.5: Derivation of a Market Supply Curve

Two Ways of Looking at the Supply Curve

Just as in the case of the demand curve, there are two ways of looking at the supply curve also. For instance, the market supply curve in Figure 2.5 tells us two things:

(1) At $2 the maximum amount the suppliers are willing to supply is 33 units. To generalize, we can say that the supply curve shows the maximum quantity suppliers are willing to supply at a given price.

A complete explanation of this will follow later but for the present let me show this heuristically. The reason why the suppliers will not supply more than 33 units at $2 is that it is simply not worth the time and effort involved in producing beyond 33 units at $2.

(2) The market supply curve of Figure 2.5 also tells us that $2 is the minimum price acceptable to the suppliers for them to supply 33 units. Generally, for any given quantity, the supply curve tells us the minimum acceptable price.

The reason for this is not very hard to find. To supply 33 units the suppliers need $2 per unit to cover their costs (the costs, of course, include the opportunity cost of their time). If they received less than $2, they would make a loss and so it would not be worth their time and effort. However, notice that $2 is the minimum price and not the maximum price acceptable to suppliers. They would be more than glad to have more than $2 per unit and make a profit but would not accept a penny less than $2.

We will call these two ways of looking at the supply curve Definition 1 and Definition 2, respectively.

THE DETERMINATION OF PRICE BY DEMAND AND SUPPLY

So far demand and supply have been considered separately. The next question is, how do the two forces interact to determine price in a competitive market? The theory that answers this question is called the price theory.

In developing this theory we shall continue, until the final section of this chapter, with the simplifying assumption that all forces that might influence demand or supply, other than the commodity's own price, are held constant.

In Table 2.5, we show the supply and demand situation in a hypothetical market for wine. Column 1 shows the various prices and columns 2 and 3 show the total quantity supplied and demanded at these prices.

These figures for total quantities demanded and supplied are based on the assumption that there are 200 buyers and sellers of wine in this market and they have identical demand and supply curves as depicted in Table 2.3 and Table 2.4.

Now the question to be faced is, of the five possible prices at which the wine might sell in the market, which will actually prevail as the market price for wine? Let us derive our answer through the simple process of trial and error. For no particular reason, we shall start with an examination of $5. Could this be the prevailing market price for wine? The answer is no, for the simple reason that producers are willing to produce and supply to the market some 12,000 bottles of wine at this price. While buyers, on the other hand, are willing to take only 2,000 off the market at this price. In other words, the relatively high price of $5 encourages producers to produce

a great deal of wine, but the same high price discourages consumers from taking the product off the market. This surplus, shown in column 4, is the excess of quantity supplied over quantity demanded at the price of $5. Practically put, wine producers would find themselves with unwanted inventories of output.

Table 2.5: Market Supply and Demand for Wine

Price per bottle (dollars)	Total quantity supplied per month	Total quantity demanded per month	Surplus or shortage
5	12,000	2,000	+10,000
4	10,000	4,000	+6,000
3	7,000	7,000	0
2	4,000	11,000	-7,000
1	1,000	16,000	-15,000

Could a price of $5 — even if it existed temporarily in the wine market — persist over a period of time? Certainly not. The very large surplus of wine would prompt competing sellers to bid down the price in order to encourage buyers to take this surplus off their hands. Suppose the price comes down to $4 per bottle. Now the situation has changed considerably. The lower price has encouraged buyers to take more of this product off the market and at the same time, has induced the wine producers to use a smaller amount of resources in producing wine. The surplus, as a result, has diminished to 6,000 bottles. However, a surplus still exists and competition among the sellers will once again bid down the price of wine. We can conclude, then, that prices of $5 and $4 will be unstable because they are "too high." The market price for wine must be something less than $4.

To avoid letting the cat out of the bag before we fully appreciate how supply and demand determine product price, let us now jump to the other end of our price column and examine $1 as the possible market price for wine. It is evident that at this price, quantity demanded is in excess of quantity supplied by 15,000 units. This relatively low price discourages producers from devoting their resources to wine production: the same low price encourages consumers to attempt to buy more wine than would otherwise be the case. Wine is a "good buy" when its price is relatively low. In short, there is a shortage in wine of 15,000 bottles. Can this price of $1 persist as the market price? No. Competition among buyers will bid up the price to something greater than $1. In other words, at a price of $1, many consumers who are willing and able to buy at this price will obviously be left out in the cold. Many potential consumers, in order to ensure that they will not have to do without, will express a willingness to pay a price in excess of $1 to ensure getting some of the available wine.

Suppose this competitive bidding up of price by buyers boosts the price of wine to $2. This higher price obviously has reduced, but not eliminated, the shortage of wine. For $2 producers are willing to devote more resources to wine production, and some buyers who were willing to pay $1 for a bottle of wine will choose not to buy at a price of $2, deciding to use their incomes to buy other products or maybe to save more of their income. But a shortage of 7,000 bottles still exists at a price of $2. We can conclude that competitive bidding

among buyers will push the market price to some figure greater than $2.

By trial and error, we have eliminated every price but $3. So let us now examine it. At a price of $3, and only at this price, the quantity which producers are willing to produce and supply is identical to the amount consumers are willing to buy. As a result, there is neither a shortage nor a surplus of wine at this price. We have already seen that a surplus causes prices to decline and a shortage causes prices to rise. With neither a shortage nor a surplus at $3, there is no reason for the actual price of wine to move away from this price. The economists call this price the equilibrium price. (Equilibrium is a very commonly used term in economics. It means "in balance" or "at rest." An equilibrium situation is a situation where there is no tendency to change. Thus, an equilibrium represents a situation which can persist.) At $3, quantity supplied and quantity demanded are in balance; hence, $3 is the only stable price of wine under the supply and demand situation shown in Table 2.5. Stated differently, the price of wine will be established where the supply decisions of producers and demand decisions of buyers are mutually consistent. Such decisions are consistent with one another only at a price of $3.

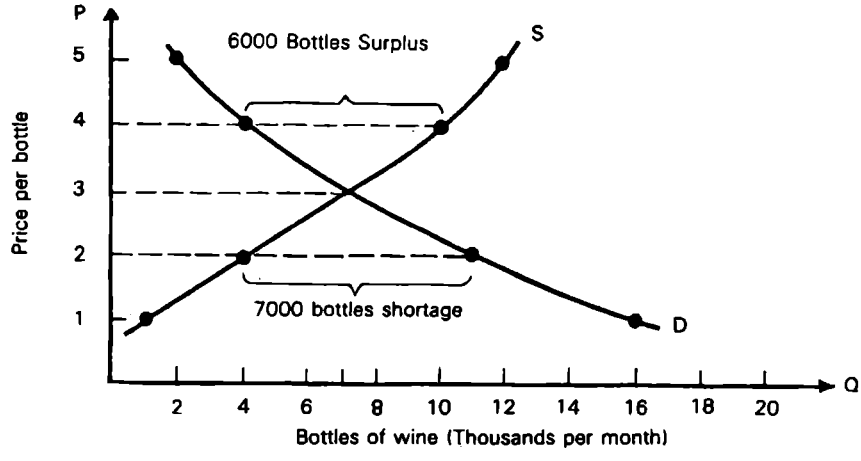


Figure 2.6: Determination of Equilibrium Price

A graphic analysis of supply and demand should yield the same conclusion. Figure 2.6 puts the market supply and market demand curves for wine on the same graph, the horizontal axis now reflecting both quantity demanded and quantity supplied. Graphically, the interaction of the supply curve and the demand curve for the product will indicate the equilibrium point. In this case, as we know, equilibrium price and quantity are $3 and 7,000 bottles.

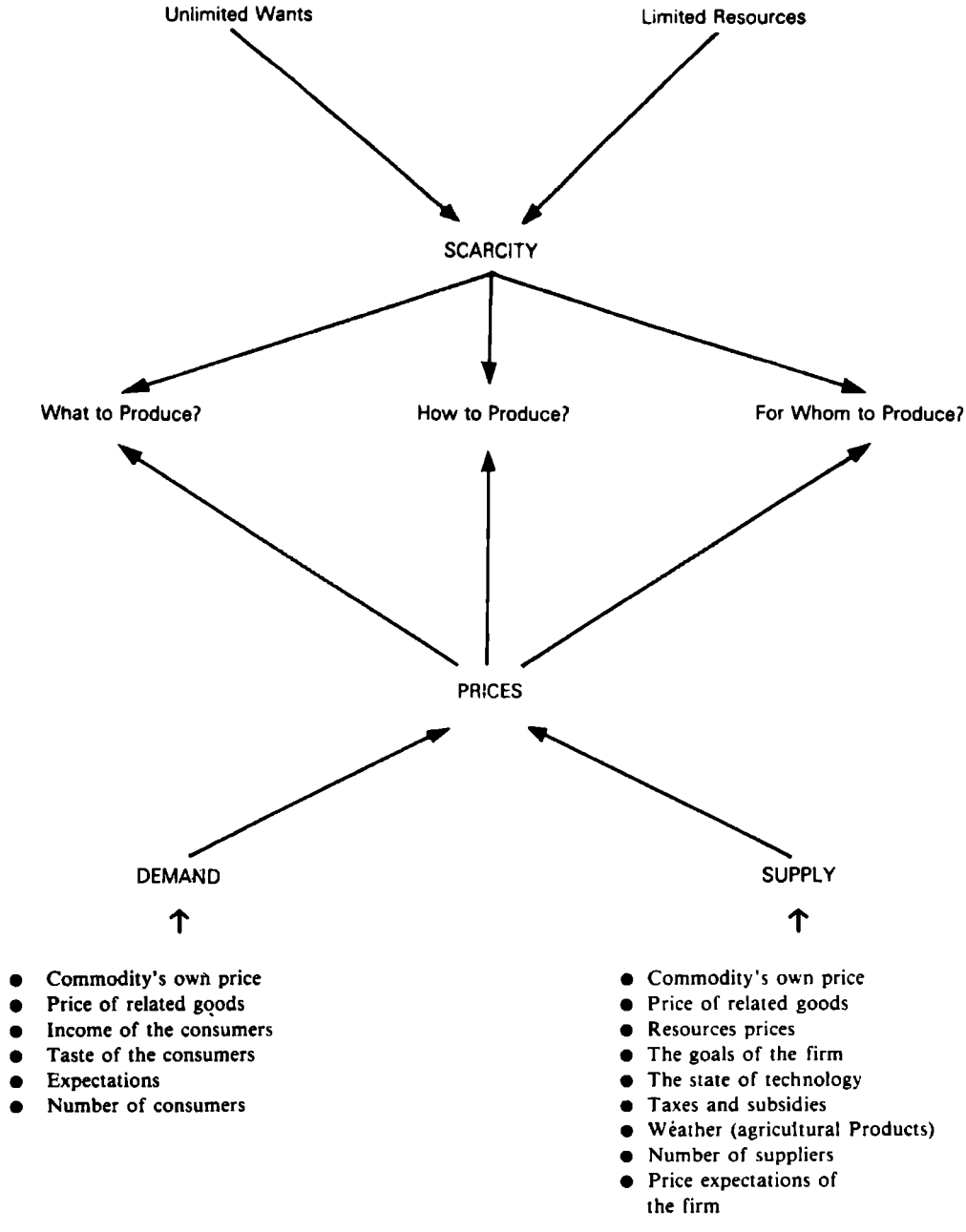


Figure 2.7: Solving the Three Fundamental Problems of an Economy through Price Mechanism.

Problems for Practice

1. A table listing the various quantities of a product that the individual is willing and able to buy at each possible price in a specific period of time is a:
   a. demand curve.
   b. supply curve.
   c. supply schedule.
   d. demand schedule.

2. Which of the following statements is correct?
   a. The law of demand states that there is a direct relationship between price and the quantity of a product demanded.
   b. A demand curve normally slopes downward to the right.
   c. A demand curve normally slopes upward to the right.
   d. A demand curve is usually stationary.

3. The market demand curve for a given product is:
   a. flatter than the sum of all individual demand curves.
   b. precisely the sum of all individual demand curves.
   c. steeper than the sum of all individual demand curves.
   d. unchanged if the consumers' expectations change.

4. Suppose that income rises. You would expect the demand for most goods to:
   a. rise.
   b. fall.
   c. remain the same.
   d. be impossible to predict.

5. What would happen to the demand for a particular product if the price of a complementary good were to rise?
   a. There would be no change in the demand curve.
   b. There would be a shift to the right
   c. There would be a shift to the left.
   d. There would be a shift upward.

6. Which of these is not a determinant of demand for a particular good?
   a. income
   b. the prices of substitutes
   c. the number of suppliers
   d. tastes of consumers

7. All of the following statements are correct **except:**
   a. The demand curve illustrates a relationship.
   b. The demand curve will have a different shape for different goods.
   c. The demand curve can shift its position over time.
   d. The demand curve slopes downward and to the left.

8. Which of the following is held constant while drawing a demand curve?
   a. price of the product
   b. quantity demanded of the product
   c. prices of other goods
   d. all of these

9. If demand varies directly with income:
   a. the good is an inferior good.
   b. the demand curve is vertical.
   c. the law of demand is violated.
   d. the good is a normal good.

10. Supply
    a. indicates the total quantities produced.
    b. exhibits an inverse relationship between price and quantity.
    c. refers to how much will be sold at the existing market price.
    d. is a relationship between the price and quantity offered for sale.

11. An increase in the quantity supplied is caused by:
    a. a drop in production costs.
    b. a change in the producer's expectations.
    c. an increase in price.
    d. all of these.

12. Which of the following will not change supply?
    a. an increase in the wage paid to workers
    b. an advance in technology
    c. a change in the price of another product the seller could produce
    d. a change in the price of the product being sold

13. If a supplier expects prices to fall in the future, there will be a tendency to:
    a. offer most of his stock for sale now.
    b. offer none or little of his stock for sale now.
    c. ignore the expected change.
    d. none of these.

14. Shortages and surpluses of a good:
    a. cannot exist.
    b. cause demand and supply curves to shift.
    c. create forces which tend to move the price of the good to another level.
    d. none of these.

15. If there is a surplus of a particular good, you know that:
    a. the price is too low.
    b. the price is at equilibrium.
    c. the price is above the equilibrium price.
    d. retailers are not doing enough advertising.

CHAPTER THREE

DEMAND AND SUPPLY IN ACTION

CHAPTER THREE

DEMAND AND SUPPLY IN ACTION

In the previous chapter, we equipped ourselves with the first set of tools for economic analysis — Equipment Set #1. In this chapter we will make use of these tools to study various economic phenomena. We will see how we can get some useful insights about the workings of various markets and the economy.

The conclusion that will emerge from this chapter is that while our Equipment Set #1 does help us to analyze some very interesting situations, however, it fails, to answer certain questions which are very important to a public policy maker. Since many of you are likely to be interested in the design and implementation of public policies, you would no doubt like to know the answers to all such relevant questions. Thus, the need for you to acquire more tools such as Equipment Set #2, #3 and so on.

For the present, however, let us get on with the job of using Equipment Set #1. We will proceed by analyzing a number of cases. Each case represents a general class of problems. In the beginning, we have some rather straight-forward cases, but they do become a little more demanding later on.

CASE I: Effect of Technological Change on the Market for Color TV

What would be the effect of a major technological breakthrough on the equilibrium price and quantity of the color TV market?

Analysis

The proper way to analyze this simple case is as follows:

(i) First draw a diagram showing the color TV market in equilibrium. It is very important to note that unless otherwise mentioned, always assume the relevant market is in equilibrium as shown in Figure 3.1. P_0 is the

equilibrium price and Q_0 is the equilibrium quantity demanded.

(ii) Next, one has to see which side of this market is being affected by the change mentioned in the question. Remember, technology was one of the non-price determinants of supply, so the supply curve will definitely be affected. What about the demand curve? The question does not provide any clue. If we believe that technological change brings about only a reduction in cost but no improvement in quality, then perhaps the demand curve should remain constant. However, if one believes that the technological breakthrough improves the quality of the color TV and thus stimulates demand, then both curves would be affected.

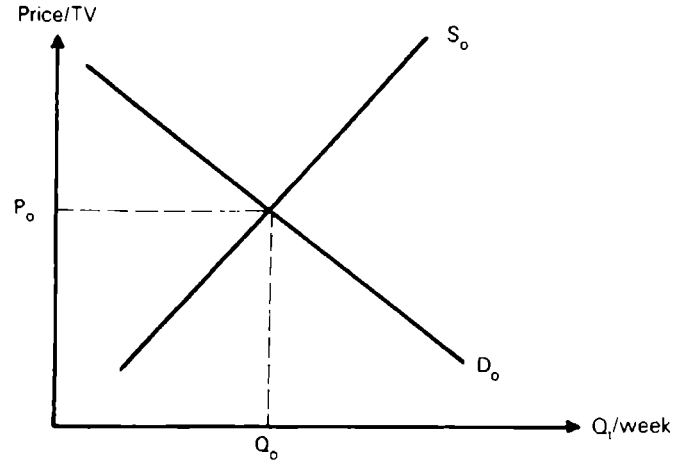


Figure 3.1: Market for Color TV

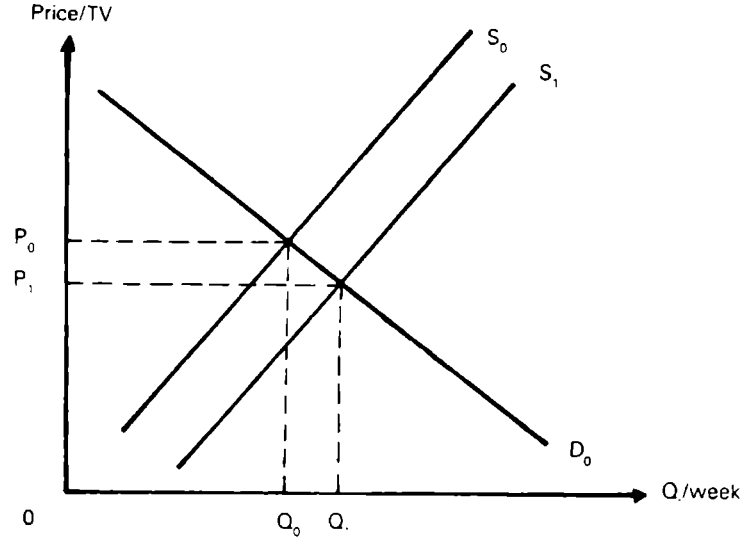


Figure 3.2: Impact of Technological Change on the Market for Color TV

Since the question is silent on this issue, we can assume whichever scenario we prefer. Let us, for the sake of simplicity, assume no effect on the demand side. In that case, the supply curve will have to be shifted to the right as in Figure 3.2.

(iii) After making the appropriate shift of the curve, we are now in a position to answer the question asked in this case. Since we know that in a free market the competition between buyers and sellers ensures that the equilibrium price is at the intersection of the demand and supply curves, it is easy to predict that the equilibrium price would be lower and the equilibrium quantity would be greater. This is the answer we are seeking.

Please note that in this case though *demand* has not changed, the *quantity demanded* has increased from Q_0 to Q_1.

CASE II: Effect of Bad Weather on the Market for Tea in Columbia

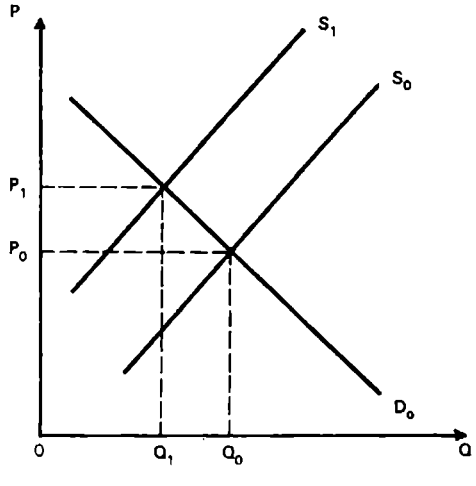
What would be the effect on the equilibrium price and quantity of the tea market in Columbia, if bad weather were to destroy a large part of the coffee crop in a particular year?

Analysis

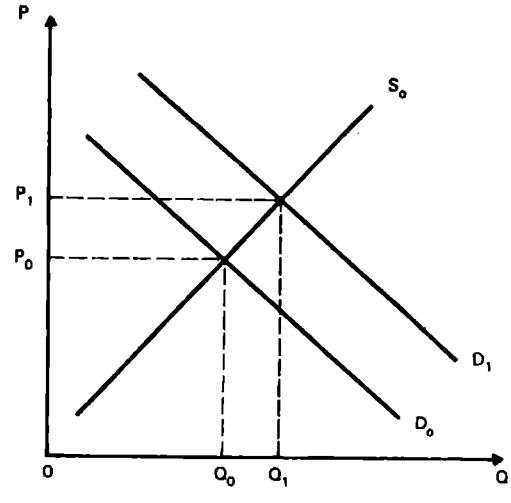
(i) Unlike the first case, this one involves two inter-dependent markets. Hence, the first step is to draw the diagram for the two markets — tea and coffee markets. Once again, we assume both of them to be in equilibrium to start with.

As a useful rule of thumb, draw as many diagrams as the number of products involved. Sometimes you may have to draw three or four diagrams to solve a particular problem.

(ii) Next, we find out the effect on the coffee market of bad weather in a particular year. Bad weather basically affects the supply of coffee as it decreases the supply. This is shown by a leftward shift of the supply curve for coffee to S_1. The result of this shift is a rise in the equilibrium price of coffee and a decrease in its equilibrium quantity. However, we are not interested in the changes in the coffee market *per se*, but only in how these changes affect the tea market.



Market for Coffee



Market for Tea

Figure 3.3

(iii) The question we have to answer first is: how are these two markets related? I think it would be reasonable to say that tea and coffee are substitute commodities. In that case, if the price of coffee goes up, the demand for tea will go up. This is so because the price of a related good is a non-price determinant of demand. We show this change by a rightward shift of the demand curve for tea.

(iv) Having made the appropriate shifts of the curves, we can now state the final outcome. The equilibrium price and quantity of tea have increased.

Notice that nothing has happened to change the supply of tea and so the supply curve for tea is unaffected. However, the quantity supplied of tea has increased from Q_0 to Q_1. In other words, there has been a movement along the supply curve, not a shift of the curve.

CASE III: Combined Impact of Several Factors on the Market for Wine

What would be the effect of the following two factors on the equilibrium price and quantity in the wine market:

a. A drought destroys the grape crop.
b. The minimum drinking age is lowered from 20 to 18.

Analysis

This case introduces another new feature. Unlike the previous two cases, where either the demand or supply was affected in a particular market, in this case we find that both demand and supply are affected in the market for wine.

(i) The first step is to draw the two markets for wine and grapes. Figure 3.4 shows these two markets. We start with both markets in equilibrium.

(ii) The drought affects the supply of grapes. The supply curve for grapes shifts to the left and thus the equilibrium price of grapes goes up.

(iii) How are grapes related to wine? Well, grapes are the most important raw material for making most wines. Since one of the non-price determinants of supply happens to be the price of resources or raw materials, the effect of higher grape prices would be to shift the supply curve of wine to the left.

(iv) Next, we examine the effect of the lower legal age for drinking. By lowering the minimum age, the number of consumers of wine would increase in the market. This will shift the demand curve for wine to the right to D_1.

(v) We are now in a position to say something about the final outcome in the market for wine. According to Figure 3.4, we see that the final price, determined by where the new supply curve intersects the new demand curve, is higher and that equilibrium quantity remains more or less the same.

(vi) So is it correct to say that, starting from an equilibrium situation, whenever the supply decreases (i.e.,

the supply curve shifts to the left) and demand increases (i.e., the demand curve shifts to the right) the equilibrium price will always increase while the equilibrium quantity will always remain constant?

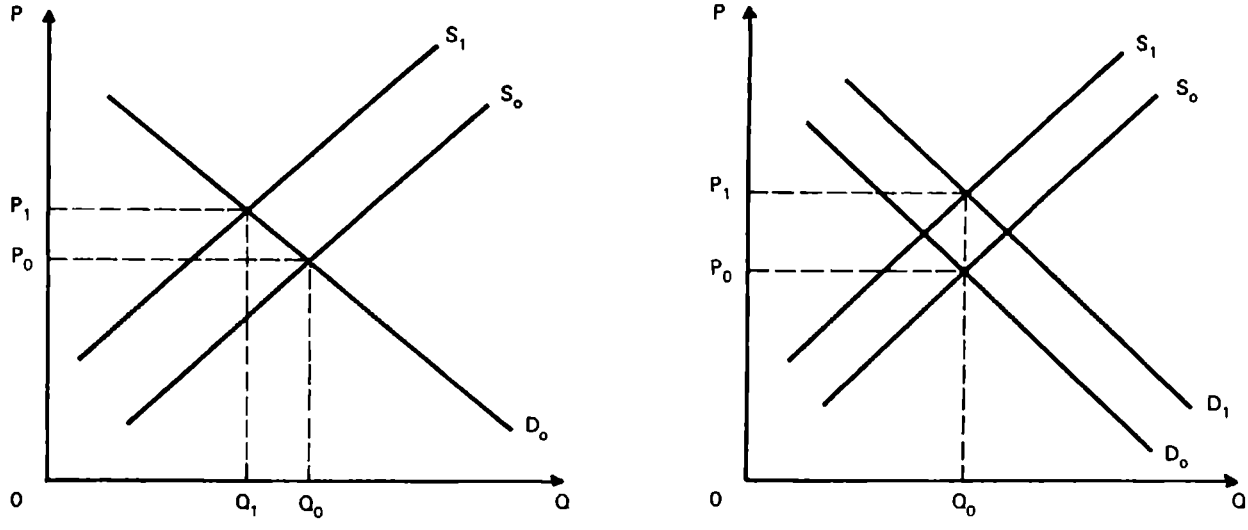


Figure 3.4

The answer is that it is only partially correct to say so. The first part is correct, that is the equilibrium price will always go up under these circumstances. However, the second part, that the equilibrium quantity will remain constant, is not necessarily always correct. To see what I mean let us examine Figure 3.5 showing the market for wine.

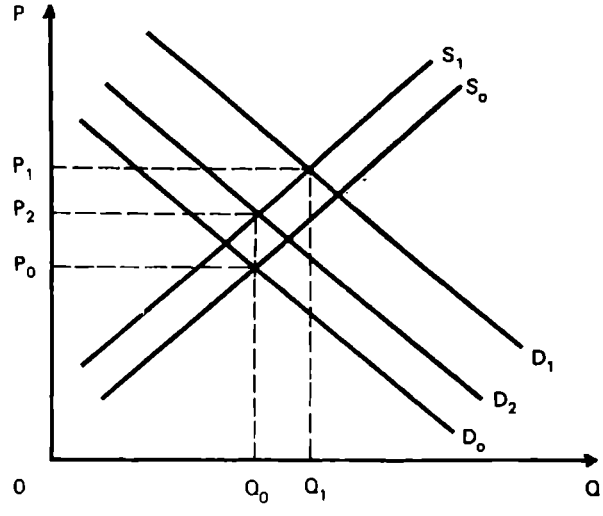


Figure 3.5: Market for Wine

Starting from the equilibrium position of P_0 Q_0, we have shifted the supply and the demand curve in the same direction as in Figure 3.4. However, the final outcome is quite different in this case. The equilibrium price is higher but the equilibrium quantity is greater too. What explains this difference?

The answer is simple. The question only indicates the direction of the changes, not the exact amounts. For instance, the question says that the legal drinking age is lowered. We know this will bring extra consumers into the market. But how many? The case is silent on this and so obviously we can make any assumption. To see more clearly, the difference made by our assumption in regards to the exact amount of the shift, let us go back to Figure 3.5.

Suppose we had assumed that the demand does not shift all the way to D_1 but only to D_2; then, our outcome would again be just the same as in Figure 3.4. Similarly, the degree of shift of the supply curve can also affect the final outcome. However, no matter how much you shift these curves the final outcome as to the price is always the same. Thus, for the price in this case only the direction of the shift is important, not the degree of the shift. This does not mean that price can be predicted under all circumstances. In fact, in the next case we have a situation where the change in equilibrium quantity can be predicted but the change in price cannot be predicted.

CASE IV: Combined Impact of Several Factors on the Market for Margarine

What would be the effect on the equilibrium price and quantity of the market for margarine of the following two factors:

a. A new tax on the butter industry.
b. A technological breakthrough in the production of margarine.

Analysis

(i) We start by drawing two diagrams showing the markets for butter and margarine in equilibrium.

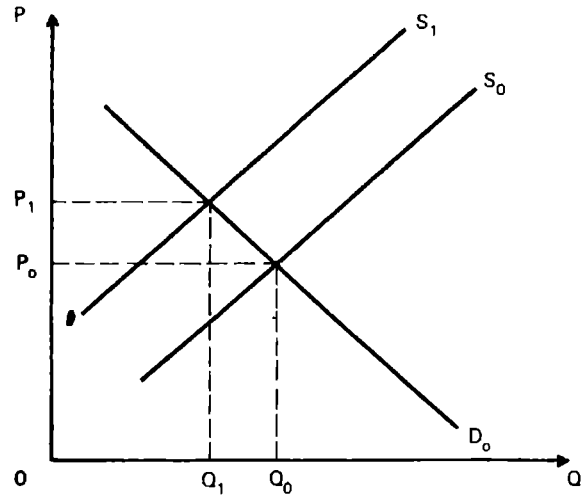
(ii) Next, we examine the effect of tax on the butter industry. Since taxes and subsidies are non-price determinants of supply, this tax will shift the supply curve for butter to the left. This results in a higher price for butter.

(iii) Since butter and margarine are substitute commodities and price of related goods is a non-price determinant of demand, the demand curve for margarine will shift to the right.

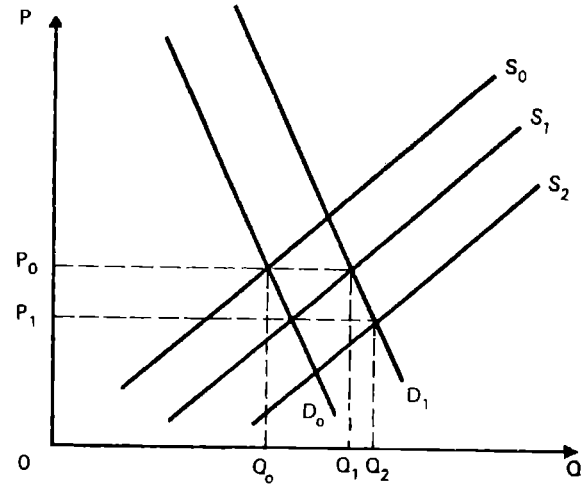
(iv) But this is not all, The technological breakthrough will also shift the supply curve of margarine to the right to S_1, because technology is a non-price determinant of supply.

(v) The combined effect of these two shifts in the curves is shown in Figure 3.6. We find the equilibrium price remains at P_0 and the equilibrium quantity increases to Q_1. However, there is nothing in the question which suggests that the supply curve should shift from S_0 to exactly where we have shown S_1. If the supply had shifted to, say S_2, the equilibrium price would have fallen. If the supply curve had shifted less than S_1, then the equilibrium price would have been higher. But no matter what the degree of the shift is, the equilibrium quantity always seems to increase.

So the answer to the original question posed in the case is that we can predict the increase in equilibrium quantity with certainty but we cannot predict whether the equilibrium price will be higher, lower or remain constant. The level of price depends on the degree to which the supply and demand curves shift.



Market for Butter



Market for Margarine

Figure 3.6

Method in Madness

The previous two cases must seem pretty confusing to you. You must be wondering, why study this analytical technique which comes up with uncertain answers? And, is there any method in this madness? Before we proceed any further let us settle these issues.

First, what is the use of these analytical tools if they can't predict the outcome with certainty? Well, this is precisely their contribution. Not all outcomes in life are certain and it is much better to know that the outcome is uncertain when it is in fact uncertain. It is not a deficiency of our analytical tools but rather a strength that we can figure out in advance if the outcome will be certain or not, and also what we have to know to get a definite answer.

Next, what about there being a method in all this madness? Are there any general principles or is the outcome of each case random? Sure there is a method in all this madness, and with a little practice in shifting these curves the underlying method will become clear. Following is an attempt to expose the underlying method.

First, as soon as you find that both curves, demand and supply, are shifting, you can be absolutely sure that you would be able to predict either the new equilibrium price or the new equilibrium quantity.

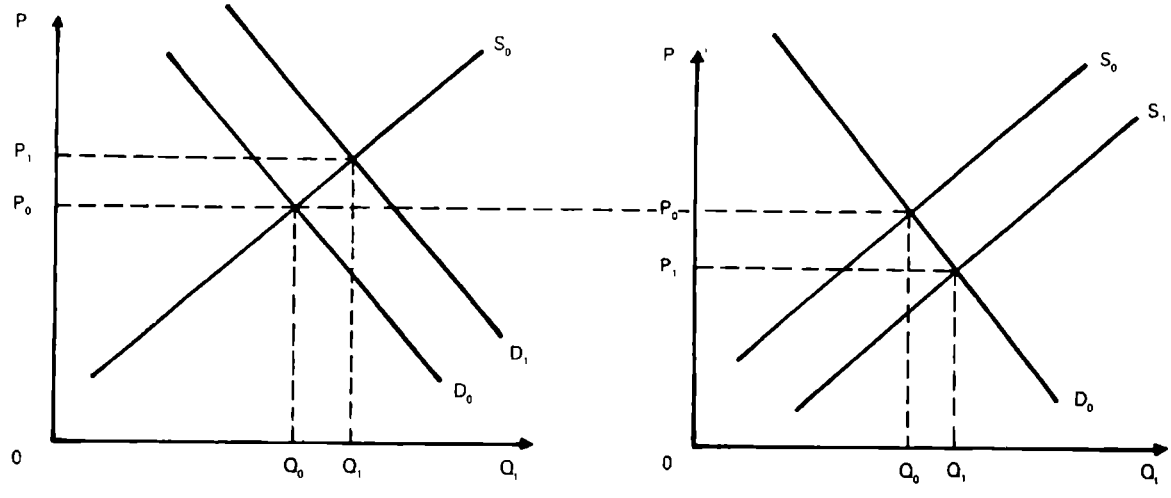
Second, the surest way to know whether it is the equilibrium price or equilibrium quantity that can or cannot be predicted is by actually shifting the curves. A useful tip for this is to first move one of the curves and then move the other curve by different amounts. You will notice that either the equilibrium price or the equilibrium quantity will remain constant and the other will change.

However, you can also know the outcome of changes in demand and supply without drawing any diagram. In the short run your brain will be taxed more under this approach, but in the long run you will be a much better economist. To illustrate this approach let us go back to the market for margarine in CASE IV. Essentially we have to find out what would be the final outcome in the margarine market of an increased demand combined with an increased supply.

Before we go to the combined effect let us see what would be the effects of either an increase in demand only or an increase in supply only. We know that if only the demand were to increase, then the equilibrium price would rise and equilibrium quantity would also increase, as shown in Figure 3.7(A).

However, if only the supply were to increase, then the equilibrium price would decrease to P_1 and equilibrium quantity would still increase, as shown in Figure 3.7(B).

So, what do we have here? The equilibrium quantity increases in both cases, but the equilibrium price increases in one case and decreases in the other. Obviously, if we were to consider the combined effect then the changes in equilibrium quantity, being in the same direction, will be reinforced whereas the changes in the equilibrium price will counter each other. The final outcome of equilibrium price, quite naturally, depends on which effect dominates. If the increase in supply dominates the increase in demand, then the price will fall and *vice versa*.



Effect of Increase in Demand (A)

Effect of Increase in Supply (B)

Figure 3.7

Another way of expressing the above analysis of Case IV is as follows:

(i) Effect that higher tax on butter has on the market for margarine [Figure 3.7(A)]: P↑ Q↑
(ii) Effect of technological breakthrough on the market for margarine [Figure 3.7(B)]: P↓ Q↑

COMBINED EFFECT OF BOTH FACTORS: P? Q↑

To see that this method works in all cases, please practise on a few cases and confirm your results using the chart in Figure 3.8.

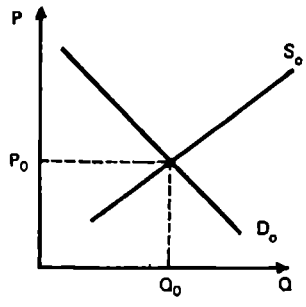
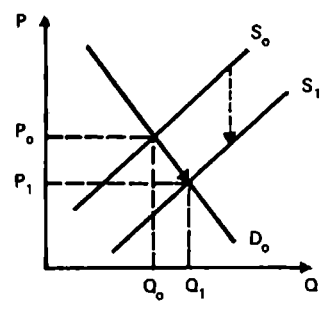
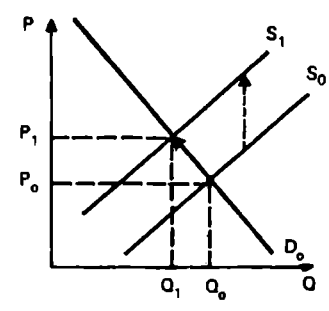
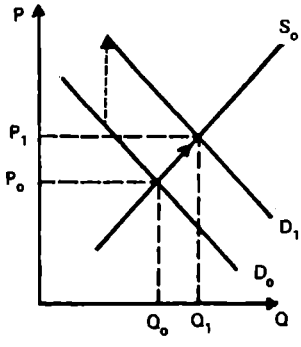
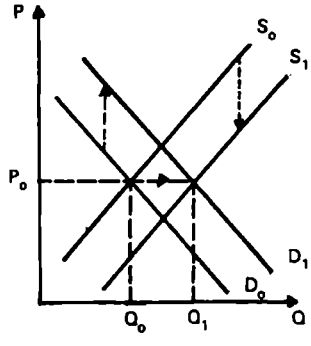
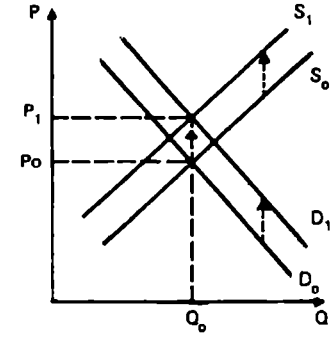
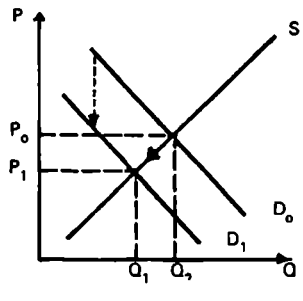
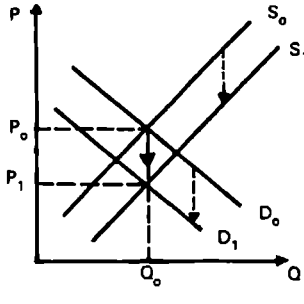
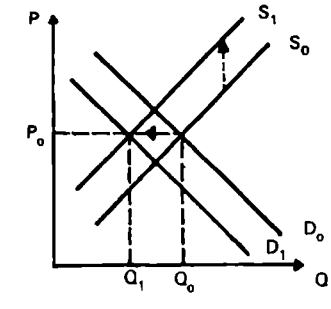
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DEMAND INCREASES			
	P↑ Q↑	P? Q↑	P↑ Q?
DEMAND DECREASES			
	P↓ Q↓	P↓ Q?	P? Q↓

Figure 3.8: Combined Effect of Changes in Demand and Changes in Supply

CASE V: Impact of Price Ceilings

In the country of Oilistan, the booming prosperity, due to the recent oil discoveries, is shifting the demand for milk to the right so that it has become very expensive. On the one hand, the rapidly rising price of milk is contributing to inflation and, on the other hand, it is pushing out of the milk market those families whose money incomes are not keeping pace with the soaring cost of living. Hence, to help stop inflation and to keep milk on the poor man's table, the government imposes a ceiling price of P^*. What will be the effects of this ceiling price?

Analysis

(i) Let P_0 in Figure 3.9 represent the equilibrium price in the market for milk in Oilistan before the government imposes a legal price ceiling, and let P^* be the legal price ceiling imposed by the government.

(ii) The working of the free market is rendered ineffective. At the ceiling price there will be persistent shortage of milk. That is, the quantity of milk demanded at P^* is Q_d and the quantity supplied is only Q_s. Hence, a persistent shortage in the amount Q_s Q_d occurs. Stated differently, the legal price P^* prevents the usual market adjustment wherein competition among buyers would bid up the price, thereby simultaneously inducing more production and rationing some buyers out of the market until the shortage disappears at the equilibrium price and quantity P_0 Q_0.

Now, by preventing this free market adjustment process from occurring, the ceiling price poses problems borne of the market disequilibrium. First, how is the available supply Q_s to be apportioned among buyers who want the amount Q_d? Should the supply be distributed on a first-come first-serve basis, that is, to those who are able and willing to stand in queue the longest? Should the grocer distribute milk on the basis of favoritism? The point is that an unregulated shortage is hardly conducive to the equitable distribution of milk.

In the absence of a formal system of rationing, which distributes equitably the available supply of Q_s among buyers, chances are a black market will develop. A black market is one in which goods are sold (illegally) at a price above the legal maximum price. It exists because there are people who are willing to pay more than the ceiling price. The price directly above the quantity Q_s in Figure 3.9, P_b, shows the maximum price people are willing to pay for this quantity. The black market price would be in the neighborhood of P_b.

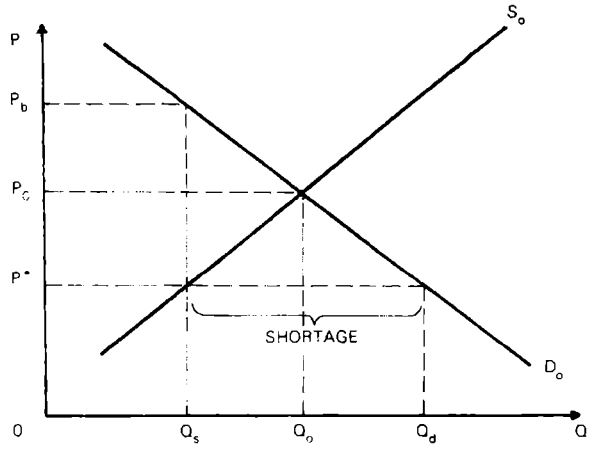


Figure 3.9: Market for Milk

Thus the result of this policy is that there is less to go around than if there were no controls, and the available quantities will tend to go to those with the most money and the least social conscience.

Before I get accused of taking sides in the debate between the free enterprise and planned economies, let me modify this bleak conclusion.

Sometimes price ceilings work fine. If the goal of the government is to restrict production of commodities in order, perhaps, to release resources for war production, then price ceilings may help achieve this goal.

Finally, a lot really depends on how effectively they are implemented and what the cost of this policy is, compared to the benefits it is supposed to bring about. It may well turn out that instead of interfering with the price mechanism a better policy would be to subsidize the low-income users of milk. Whether one policy is better than the other in a particular context is an empirical matter. The purposes of these cases is not to provide cook-book recipes to public policy issues but to provide tools to enable individuals to explore the issues that interest them on their own.

CASE VI: Impact of Price Floors

The country of Happyland has had two consecutive bumper corn crops and as a result the price of corn has plummeted to a record low level. Everybody is happy except for the farmers of Happyland, whose incomes have also become very low. The government of this country decides to lend a helping hand by establishing a legal support price of P_s per bushel. What will be the effects of such a policy decision?

Analysis

(i) Let the price of P_0 in Figure 3.10 represent the low equilibrium price before the price support. Let P_s represent the support price imposed by the government. This price is also referred to as a "price floor" since the Government guarantees that the price of corn will not go below this price.

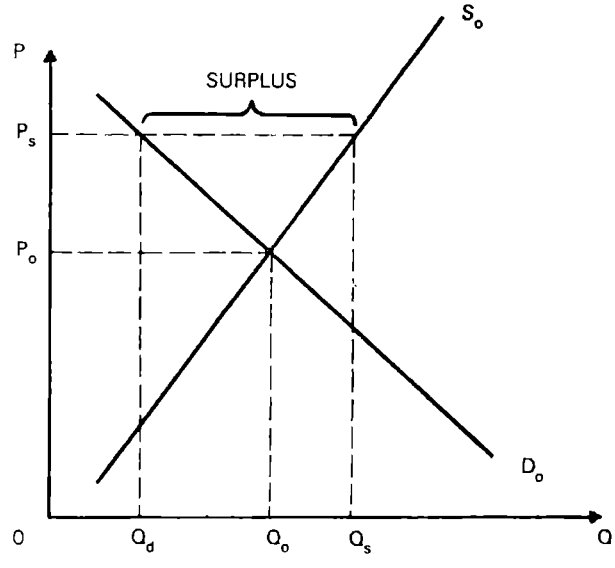


Figure 3.10: Market for Corn

(ii) At any price above the equilibrium price, the quantity supplied will obviously exceed the quantity demanded; there will be a persistent surplus of corn. Farmers will be willing to produce and offer for sale Q_s, which is more than private buyers are willing to purchase, Q_d, at the supported price. As is the case with a ceiling price, the rationing ability of the free market obviously has been disrupted by the imposition of legal prices. The surplus entailed is measured by the excess of Q_s over Q_d.

(iii) The government inherits the task of coping with this surplus which the supported price creates. There are two general approaches open to the government for dealing with this problem: (a) It might invoke certain programs to restrict supply (for example, acreage allotments), or to increase demand (for example, research on new uses for agricultural products) in order to reduce the difference between equilibrium price and the supported price, and thereby, the size of the resulting surplus. (b) If these efforts are not wholly successful, then government must purchase the surplus output and store or, otherwise, dispose it off. We will have more to say about the problem of agricultural surplus in the next chapter and so I will not pursue it any more in this chapter.

However, I would like you to remember that although legal prices involve knotty problems for the government by upsetting the rationing and allocation functions of the market mechanism, one must be careful not to pre-judge price ceilings or price supports as undesirable. Legal prices are designed to correct alleged inequities which free market prices sometimes entail.

Let us discuss one more case to show how better understanding of the impact of the price ceiling on the market can save a policy maker from some inadvertent blunders.

CASE VII: Unintended Effects of Price Controls

Several years ago the commander of a U.S. military base, overseas, became worried that his troops were drinking bootleg whiskey and consequently many soldiers were too ill to perform their duties. The bars around the base were licensed and inspected by the military. The whiskey sold in these bars was inspected and would not cause sickness — if not consumed in too large quantities.

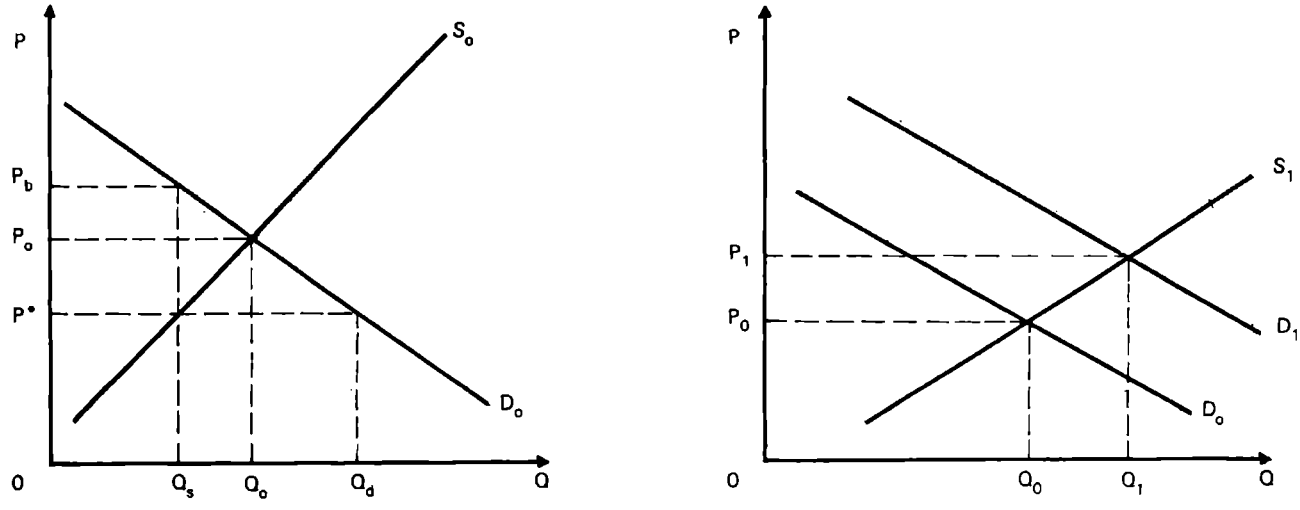
The base commander reasoned that if he forced the licensed bars to lower their prices, most soldiers would stop buying bootleg whiskey and would patronize the bars instead, but just the opposite actually happened. More soldiers than ever before became ill with bootleg whiskey after the price control went into effect at the bars. Give a simple economic explanation for the failure of the base commander's policy.

Analysis

(i) The two types of whiskeys are really two different products. So, we start by drawing a diagram showing the two markets in equilibrium before the ceiling goes into effect.

(ii) Once the ceiling is imposed and the price of bar whiskey is fixed at P^* two things happen. First, the quantity demanded increases to Q_d as at that price a lot of soldiers find it worthwhile to switch to good whiskey. This is what the commander had expected.

However, something else also happened. At the lower price of P^* less whiskey is supplied than before (remember the definition 1 of the supply curve on page 26). This is what the base commander did not anticipate (obviously because of his poor training in economics).



Bar whiskey **Bootleg whiskey**

Figure 3.11

The resulting shortage leads to a black market price of P_b in Figure 3.11. Since the bar whiskey and the bootleg whiskey are substitutes, a higher price for the bar whiskey obviously leads to an increase in demand for the bootleg whiskey. This means a higher equilibrium price and quantity of bootleg whiskey in the market. And since Q_1' soldiers are now drinking Q_1 amount of bootleg whiskey compared to Q_0 soldiers before the ceiling was imposed, no wonder more of them are falling sick.

CASE VIII: Impact of Free Trade and Imports on the Domestic Market

Ten years ago the Government of India imposed a trade ban on woollens. This was done because the price of woollens in India at that time was very high compared to the price in the rest of the world and India could not compete in the world market. The Government decided to give the woollen industry some breathing time to grow and become competitive.

Ten years later, nothing has changed. The price of woollens in India continues to be very high compared to the rest of the world. The Indian Government, tired of nurturing this industry, is considering lifting the trade ban and allowing free trade. What will be the effects of such a policy?

Analysis

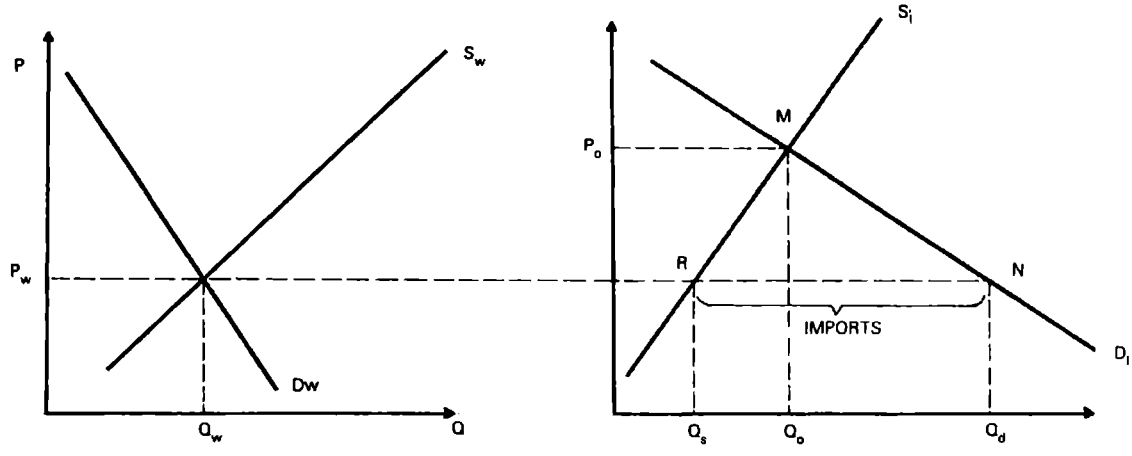
(i) In Figure 3.12 we show the world market and also the Indian market for woollens.

The price in the world market, P_w, is much lower than the domestic price in India, P_0, when there is no trade. The Indian market is really a very small market compared to the world market. Do not let the diagram confuse you. Even though Q_0, the equilibrium quantity in the Indian market, seems bigger than Q_w, the equilibrium quantity in the world market, it is not true. The reason is we are using different units in the two markets. In the

world market everything may be in millions of tons whereas in the Indian market, the quantity is being measured, perhaps, in thousands of tons.

(ii) Now, suppose the trade is opened and the Indian consumers and producers are allowed to buy and sell anywhere in the world. Naturally, both the markets will be affected.

Theoretically speaking, India's addition to the World market should affect both the demand and supply curves in the world market. The World market demand curve will shift to the right because there are a larger number of consumers. The World supply curve will, similarly, shift because there are a larger number of producers. However, for all practical purposes these shifts would have no impact on the world price because the Indian market is very small compared to the world market. You would need a microscope to detect these shifts.



World Market **Indian Market**

Figure 3.12

(iii) What about the market for woollens in India? Common sense suggests that no consumer in India will be willing to pay a price higher than the world market price because consumers can now easily purchase from the world market. Nor, would the Indian producers accept a price lower than the world price because they also have the option of selling abroad. Notice that the only price acceptable to both is the world price. Thus, the price in the Indian woollen market will settle down at the world price level.

(iv) At this lower price, Indian consumers increase their purchases. Specifically, they move down their demand curve from M to N, increasing their consumption from Q_0 to Q_d. At the same time, Indian producers respond to the lower price P_w by moving down their supply curve from M to R, thus reducing quantity supplied from Q_0 to Q_s. In short, Q_s is now produced in India, while Q_d is consumed; the difference, Q_d Q_s, is the amount imported.

Thus, the effects of allowing free trade are:

a. Consumers buy more at a lower price.
b. Producers produce less and get lower prices for it.
c. Because producers produce less they employ fewer people and thus create unemployment.

As an economist, would you recommend lifting the trade ban or not? Well, quite frankly, it is difficult to give a complete answer as yet; we have to acquire some more tools and only then we will be able to answer this vital public policy question. (Notice that I have already started my sales pitch to sell you Equipment Set #2).

CASE IX: Impact of Free Trade and Exports on the Domestic Market

Once upon a time, the American government banned all international trade in wheat. The result was that even though the world price of wheat was very high the domestic wheat price in America remained very low.

However, this situation did not last too long. The powerful farm lobby, chagrined at the missed opportunities to sell wheat at a much higher price abroad, lobbied intensively and in time prevailed upon the then administration. The trade restrictions were removed and free buying and selling of wheat was allowed. What are the economic effects of such a policy of free trade under these circumstances?

Analysis

(i) Figure 3.13 shows the world trade market for wheat as well as the American market for wheat. Without trade, equilibrium in the domestic market is price P_0, where American supply and demand curves for wheat intersect. At the same time, the price in the rest of the world is at the higher level P_w, reflecting the higher costs of producing wheat in other countries.

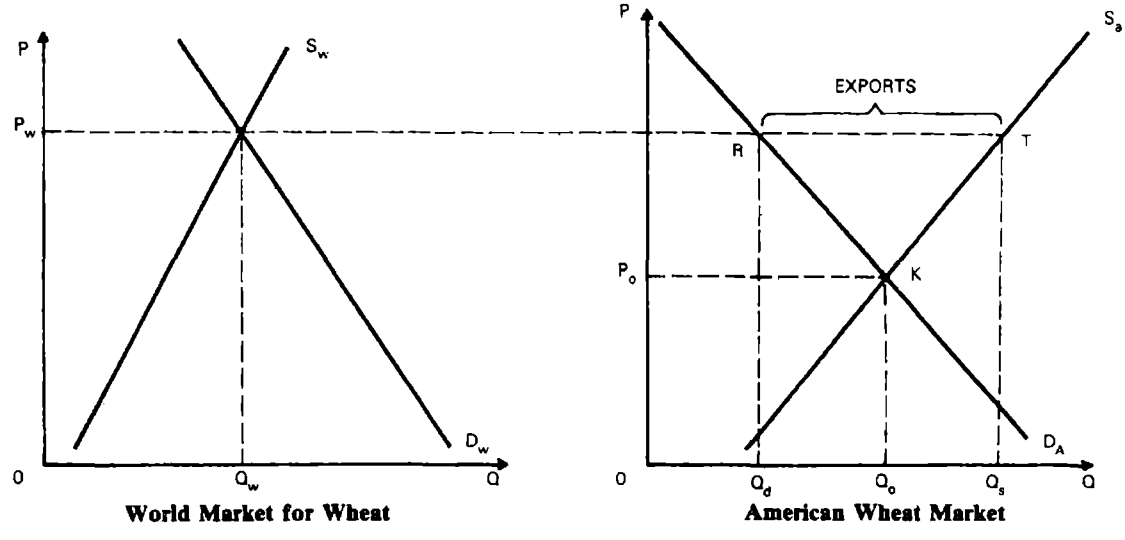


Figure 3.13

(ii) When trade is opened, producers in the United States discover that they can sell abroad at this higher price P_w, and they begin to do so. Moreover, since they can sell at P_w abroad, they will be unwilling to sell at any lower price in the home market. Thus, the domestic price rises to the world level P_w. (In a more realistic situation, the American price rises to the foreign price, less transportation costs. However, in this simple illustration we assume, once again, that transportation costs and other similar complications do not exist or are negligible.)

American producers, facing this more attractive price, expand their output. Specifically, they move up their supply curve from K to T, increasing their output from Q_0 to Q_s. Of course, consumers view this higher price quite differently. They move up the demand curve from K to R, thus reducing their consumption from Q_0 to Q_d. In short, Q_s is now produced in the United States, and Q_d is consumed. The difference, Q_d Q_s, is the amount the United States exports. Thus, these exports come partly from increased production and partly from reduced domestic consumption.

We can summarize the effects of allowing free trade in this case by saying:

a. Consumers lose as they are buying smaller quantities at higher prices.
b. Producers gain as they are selling greater quantities at higher prices.
c. Since the overall production is higher, obviously the level of employment has increased.

Once again we find one group (producers and workers) in the society gains and another group (consumers) in the society loses and Equipment Set #1 is not enough to tell us whether the net effect of this free trade is beneficial or harmful.

CASE X: Public Policies to Reduce Imports

Suppose the Government of India, after having allowed free trade (see CASE VIII), realizes that a lot of precious foreign exchange is being used up in importing woollens. It decides to adopt a policy of reducing the import of woollens and saving foreign exchange, which is desperately needed for other developmental projects.

The Indian government has the option of adopting one of the following three policies:

a. Tariff on imported woollens.
b. Subsidies to domestic producers.
c. A system of quotas.

As an economist, briefly analyze the pros and cons of each of these policy measures.

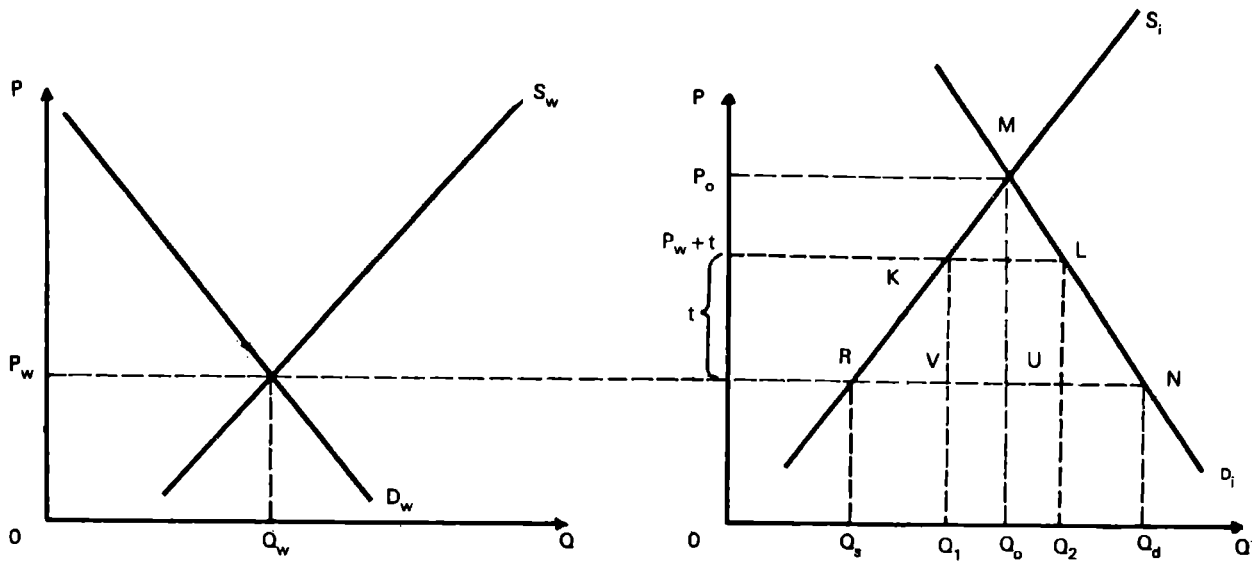
Analysis

a. Tariff on Imported Woollens

Tariff is a tax on imports collected by the government on each unit imported (it can also be collected on the value of imports). Suppose the world price of woollens, P_w, is equal to \$5 per unit, i.e., consumers can buy as many units of woollens as they desire for \$5 per unit. Now if the government decides to impose a tariff, t, equal to \$1 per unit, then the price to consumers of imported woollens becomes \$6 per unit.

(i) To see the effects of this kind of tariff we begin by reproducing Figure 3.12 showing the pre-tariff situation as Figure 3.14.

The domestic price, P_0, in the absence of trade is higher than the world price, P_w, and the distance RN represents the amount of imports with free trade.



World Market **Indian Market**

Figure 3.14

(ii) The effect of increasing a tariff, *t*, is to increase the price at which consumers can buy woollens from outside to $P_w + t$. The domestic price thus rises to $P_w + t$, and at this price the amount of imports is equal to KL (or Q_1Q_2).

(iii) Notice that government is now getting a tariff revenue equal to KLUV.

(iv) To summarize the effects of a tariff we can say:

1. Consumers lose as they pay a higher price and buy less.

2. Domestic producers benefit as they get a higher price compared to the free trade situation and are able to produce and sell more.

3. Government gains as it is able to reduce the level of imports and also raise some revenue from import tariffs for the government coffers.

4. Also, since more is being produced domestically, Q_1 compared to Q_s, domestic employment also increases.

b. Subsidies to Domestic Producers

(i) To see the effect of subsidies we once again begin by reproducing Figure 3.12 as Figure 3.15.

(ii) We know from Chapter #2 that subsidies and taxes are non-price determinants of supply. A per unit subsidy means that the government undertakes to pay a fixed amount for each unit produced. The effect of a subsidy is to thus reduce the cost of production and increase the supply as shown by the curve S_i + Subsidy in Figure 3.15.

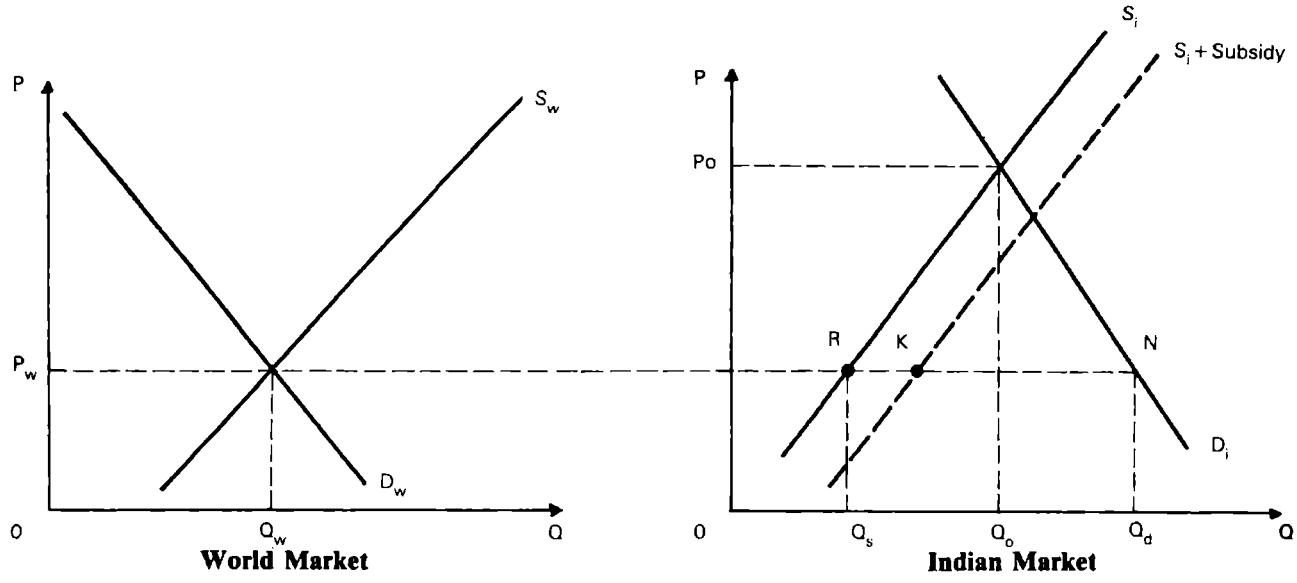


Figure 3.15

(iii) Now at the world price, P_w, the quantity supplied by the domestic suppliers has increased. This results in a decrease of imports from RN to KN and also an increase in domestic employment.

(iv) In summary:

1. Consumers of wool are unaffected by this policy as it leaves the domestic price and quantity demanded unaffected. But other consumers are worse off as they have to pay higher taxes to pay off the subsidy.

2. Producers gain as they are able to produce more with a subsidy than they can without it.

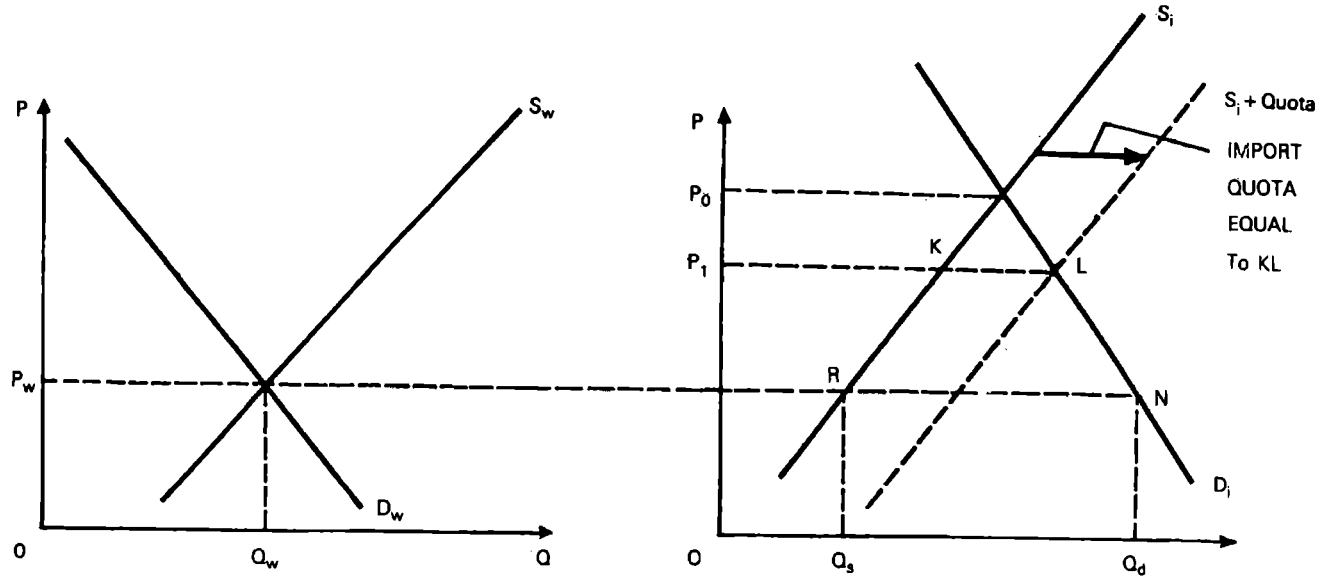
3. Government loses and also gains. It succeeds in curbing imports and thus saving valuable foreign exchange, but it has to bear the cost of the subsidy program. It is up to the government to decide whether the benefit of saving this much foreign exchange is worth the revenues spent on the subsidy program.

4. Compared to the free trade and no subsidy situation, employment is higher.

c. A System of Quotas

(i) Imports may be restricted by a tariff or by a non-tariff barrier (NTB) like a quota system. Such a restriction limits the number of units of a good that can be imported, and has many effects similar to a tariff. To analyze these effects we begin by reproducing Figure 3.12, showing the free trade situation as Figure 3.16.

(ii) In the case of a tariff we saw that a tariff t raised the price in the Indian market from P_w to $P_w + t$, and thus reduced imports from RN to KL. An equivalent, even more direct way of reducing imports by the same amount would be simply to ban any imports above and beyond KL; in other words, to impose a quota limitation of KL.



World Market **Indian Market**

Figure 3.16

If we do this, the new equilibrium will again be at the same point L, just as it was with a tariff. The reason for this is clear. By allowing a fixed quota of KL, the government really shifts the domestic supply curve to the right at all points above world price P_w. The reason why the domestic supply curve does not shift below P_w is that at all such prices the supply from the world would not be forthcoming even if the government allowed imports equal to KL.

Some of you may be wondering that a "quota" is a restrictive policy, yet we have said that it leads to an increase in the supply curve. This apparent confusion will disappear if you ask yourself the most important question in public policy: Compared to what? Thus quota is a restrictive policy "compared" to a policy of free trade but it is a more liberal policy compared to a trade ban.The rightward shift of the supply curve to S_i + Quota in Figure 3.16 is in comparison to a domestic supply curve with a trade ban (S_i).

Once the domestic supply curve shifts to S_i + Quota (KL), the new equilibrium price will be determined where it intersects the demand curve. This equilibrium price P_1 is exactly equal to the world price, $P_w + t$. Therefore, a quota of KL is sometimes referred to as the "quota equivalent of tariff."

(iii) Let me summarize who loses and who gains if this policy is implemented.

1. The consumers lose as they pay a higher price and buy less.

2. Domestic producers gain compared to the free trade situation as they sell more at a higher price.

3. Government does achieve its goal of restricting imports, but loses revenues which would have accrued if this result were achieved using a tariff.

4. Another group also benefits. People who manage to acquire the rights to imports through licenses have windfall incomes. They buy at the world price and sell at the higher domestic price P_1.

CASE XI: Impact of Sales Tax on Producers and Consumers

The country of Neverland is having budgetary problems. To raise some extra revenue the government decides to impose a \$1 per bottle sales tax on the wine industry. What will be the effect of such a tax? Who actually pays this tax — producers or consumers?

Analysis

(i) Let the pre-tax equilibrium in the wine industry of Neverland be depicted by Figure 3.17.

The equilibrium price is \$3 per bottle and the equilibrium quantity is 7,000 bottles per week.

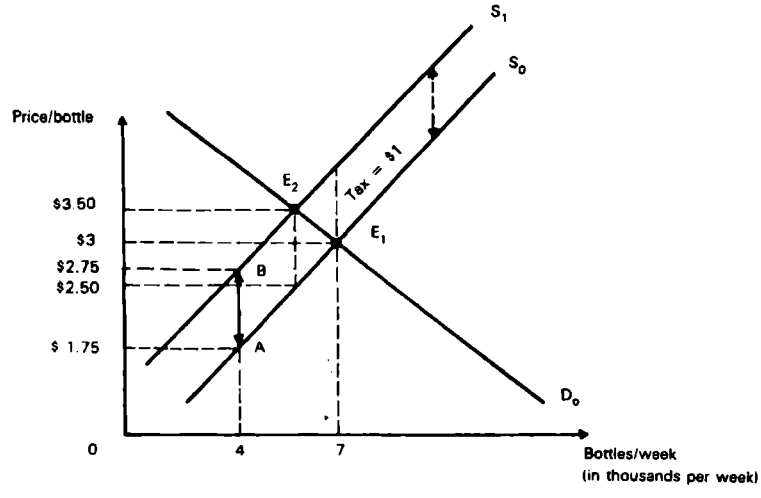


Figure 3.17: Neverland Wine Market

(ii) Now, suppose that the government imposes a sales tax of \$1 per bottle, which it collects from sellers. The effect of this tax, levied on sellers, is to shift the supply curve upwards from S_0 to S_1 by the full \$1 amount of tax. To confirm this, consider any quantity supplied, say 4,000 bottles. Point A on the supply curve S_0 tells us that before the tax, sellers would have to receive \$1.75 per bottle to induce them to sell 4,000 bottles per week (Definition 1 of the supply curve). This means that after the tax, they must receive \$2.75 (at point B) in order to enable them to pay the government the \$1 and still have the \$1.75 left. Thus, point B is on the new supply curve, i.e. on the after tax supply curve S_1. No matter what point we consider on S_0, the corresponding point on S_1 is always \$1 higher. Thus the entire supply curve shifts upward by the amount of the tax from S_0 to S_1.

As a result of the tax, the equilibrium moves from E_1 to E_2, and the price rises from \$3.00 to \$3.50. Thus buyers bear 50 cents of the burden; they pay 50 cents more. Sellers bear the remaining 50 cents of the burden. Their selling price has risen by 50 cents — from \$3 to \$3.50 — as a result of the tax, but \$1 goes to the government. Thus the tax causes the return to the seller to fall from \$3.00 to \$2.50.

Table 3.1

	Before tax	After tax
Price paid by consumers	\$3	\$3.50
Price received by sellers	\$3	\$2.50

The next question which arises in our mind is whether a tax always imposes an equal burden on consumers and sellers. If not, then what determines who bears how much of the total burden? Unfortunately, Equipment Set #1 is not enough to answer these questions. And if we want to know the answers to these questions, as we must do to make sensible policy decisions, we have to equip ourselves with further tools. This is precisely what we do in Chapter 4, where we acquire Equipment Set #2.

Questions for Class Discussion

Question 1

Following are the excerpts from a speech delivered by the representatives of the island nation of Malandia at the recent general session of the United Nations Conference on Trade and Development (UNCTAD):

"When we look around we find that, in many industrialized developed countries, seemingly very low nominal tariff rates on such processes as making cocoa, butter, instant coffee and aspirins provide domestic producers with extremely high effective protection. This protection makes it impossible for producers in less developed nations to enter such industries and sell their output in the protected markets of the industrialized countries. On the other hand, the very complicated tariff structures of developing countries have been found to provide extremely low or in some instances even negative effective protection for some industries...

This concept of effective protection is based on the important fact that tariffs on intermediate products increase prices of these products for domestic users, thus, raising the costs of manufacture and reducing what otherwise would have been the production-increasing effect of a tariff on a manufacturer's final output. From the point of view of the user of any intermediate input, a tariff on it is equivalent to a tax on production...

The time has come for negotiating all tariff changes in terms of effective protection rather than the traditional nominal tariff rates..."

Do you agree with the speaker? Illustrate the arguments made in the speech with graphs.

Question 2

Mr. Wanchal Radeesri is a deputy minister in the Ministry of Finance in Bangkok, Thailand. One evening, at an official reception for a visiting foreign dignitary, he happened to meet Mr. Kitti Ghooprasert, who had just returned after successfully completing the MPA program at Harvard's Kennedy School of Government (KSG).

Mr. Ghooprasert was all excited about the various tools and techniques he had acquired at KSG. After listening to his achievements for a few minutes Mr. Radeesri told him to calm down and proceeded to give this speech.

"All theories that you have acquired are just that: THEORIES, Don't get too carried away! They are not likely to be very useful in the real world. For instance, even the most basic concept of the Law of Demand is 'bunkum.' It tells you that as price rises the quantity demanded drops. But look at gold. Over the past few years the price of gold has risen significantly from about $400 an ounce to around $800 an ounce. Yet during this time that the price was rising, the amount of gold being sold also rose substantially. So you see, even the law of demand does not work in the real world. Therefore, we have to be pragmatic and not theoretical..."

(a) Do you agree with the Deputy Minister? (Give a precise response and don't hedge.)

(b) How do you suppose Mr. Ghooprasert would (should) have responded? (Please use a diagram to illustrate your answer).

Question 3

While vacationing in the beautiful island state of Ruritania, I came across the following story in the local paper called **The Ruritania Gazette**:

"Due to a fishermen's strike, the price of fish has risen. Economic analysis tells us that when prices rise, however, there is a fall in demand. This fall in demand should lower prices again. Therefore, during the strike there will be a temporary rise in prices."

Do you agree? Explain your answer using a diagram.

Question 4

Importania is a small developing nation in Southeast Asia. The steel industry of Importania is dominated by the so-called "mini steel plants." The ruling socialist government (of the Fabian variety) has actively discouraged the setting up of large scale integrated steel plants. It is fearful that big plants will ultimately push the small ones out of business and will indulge in **oligopolistic** exploitation. The consequence of this "equity-minded" policy is a steel industry that is **inefficient** by world standards.

In 1981 there was a ban on trade with the rest of the world in this market and consequently the domestic price was P^* as compared to P_w in the world as shown in Figure 1. In 1984, to meet the IMF conditionalities, Importania allowed free trade in the steel market.

At the beginning of 1985 it was clear that something had to be done. The imports were very high and valuable foreign exchange was being used up at an alarming rate. The unemployment created was causing political trouble because trade unions are the major supporters of the ruling government.

Three options were considered by the experts in consultations with the World Bank and IMF: (a) tariffs, (b) quota, (c) subsidy. As a result of various forces, such as, rational economic analysis, political lobbying by vested interests, arm-twisting, ideological posturing, demagoguery, etc., the government has opted for the policy of giving subsidies to the producer.

How would you (as a trained professional not easily influenced by subjective factors) answer the following questions:

(a) What would be the effect of this subsidy on:

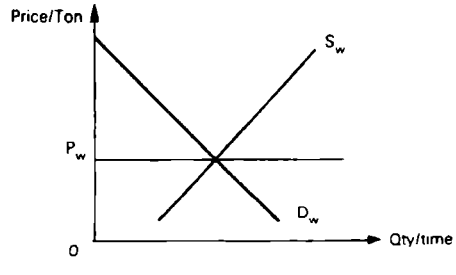
1. the level of steel imports
2. the domestic price of steel
3. the level of employment in the industry.

(b) Who will benefit and who will lose as a result of this public policy?

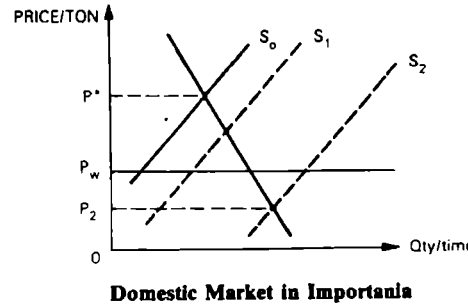
(c) What could happen if the government miscalculates the subsidy required and "over-subsidizes?" (The Under-Secretary in charge of calculating this subsidy has a sister who is married to the son of the current President of the Steel Manufacturers' Association)

Please show the impact of over-subsidy on the level of imports and the domestic price of steel.

(d) What would happen if the government decides to ban all international trading in steel but keep the high levels of subsidies? Can you think of a reason why such a decision may be taken. Who would benefit from this situation?



World Market for Steel



Domestic Market in Importania

S_0 – Original supply curve
S_1 – Supply curve including "normal" subsidy
S_2 – Supply curve including "too much" subsidy

Figure 1

Problems for Practice

1. "In 1979, the demand for gasoline fell as the price rose." What is wrong with this statement?
   a. Nothing, it is correct.
   b. It violates the law of demand.
   c. If prices rise within one time period, the quantity demanded will fall, not demand.
   d. It implies that gasoline is an inferior good.

2. The law of demand stated that:
   a. price and quantity demanded are directly related.
   b. the larger the number of buyers in a market, the lower will be the product price.
   c. price and quantity demanded are inversely related.
   d. if price falls, the demand increases.

3. Last month, Acme Yoyo Company sold 2000 yoyos at $1.00 each; this month it sold 4000 at $1.50 each. Evidently:
   a. there is a direct relationship between price and quantity demanded.
   b. there was an increase in quantity demanded.
   c. there was an increase in demand.
   d. none of these.

4. A production possibilities curve will shift outward if:
   a. technology advances.
   b. people are willing to work less.
   c. people wish to reduce the number of resources used.
   d. none of these.

5. Which statement is true of the curves in figure a?
   a. Price A is an equilibrium curve.
   b. Price A will result in shortages of the product.
   c. At Price A, suppliers will compete for the few buyers by lowering their prices.
   d. None of these.

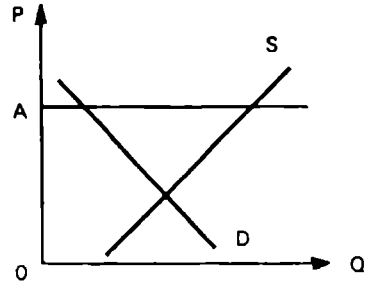


Figure a

6. Last month, the Acme Yoyo Company was willing to sell 1000 units at $2 each; now it will sell 1000 units at $3. Acme has experienced:
   a. a decrease in supply.
   b. an increase in supply.
   c. a decrease in quantity supplied.
   d. an increase in quantity supplied.

7. Which statement is true of the curves in figure b?
   a. Price B is an equilibrium price.
   b. Price B will result in shortages of the product.
   c. Suppliers will compete for the few buyers by lowering their prices.
   d. None of these.

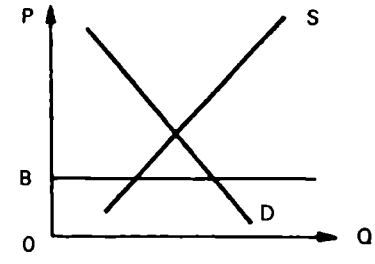


Figure b

8. Which will not shift the demand curve for oranges?
   a. a change in the price of tangerines.
   b. an increase in population.
   c. a decrease in the income of consumers.
   d. a change in the price of oranges.

9. Which of these are complementary goods?
   a. cheese and crackers
   b. automobiles and clothing
   c. apples and rifles
   d. none of these

10. Which of these statements is correct?
    a. An inferior good is any product of low quality.
    b. The demand for inferior goods drops as income rises.
    c. Neutral goods are those goods that offer no additional utility to the consumer.
    d. None of these.

11. What would happen to the demand for a particular product if the price of a substitute were to rise?
    a. There would be no change in the demand curve.
    b. There would be a shift to the right.
    c. There would be a shift to the left.
    d. There would be a shift downward.

12. Which of the following statements is not correct?
    a. The demand schedule shows various prices and quantities demanded.
    b. The demand schedule reflects an inverse relationship.
    c. The demand schedule tells what the actual market price will be.
    d. The demand schedule indicates a range of possibilities.

13. If the demand for good X increases after the price of good Y falls, X and Y are:
    a. inferior goods.
    b. substitute goods.
    c. complementary goods.
    d. none of these.

14. Shortly after a rise in the price of beef, the price of pork, chicken and fish increase a little. This is because:
    a. The income of buyers has increased.
    b. the goods are all substitutes.
    c. the goods are all complementary.
    d. there is no good explanation.

15. Suppose the price of automobiles rises drastically. You might expect the demand for cycles or scooters to:
    a. rise.
    b. fall.
    c. remain the same.
    d. be impossible to predict.

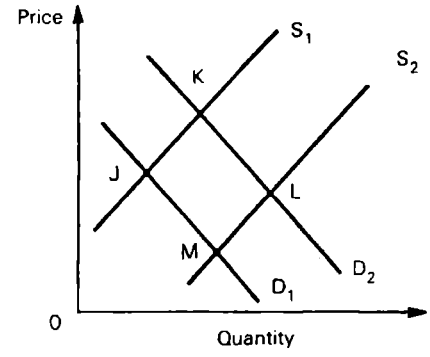
16. Which of the following statements is correct?
    a. The expectation of a price rise increases demand now.
    b. The expectation of an income drop increases demand now.
    c. The expectation of a surplus increases demand now.
    d. All of these are correct.

17. A few years ago, a freeze in the coffee producing areas was reported by the news media. In response to this, people stocked up on coffee. This is an example of:
    a. price increases reducing the quantity demand.
    b. an increase in demand resulting from an increse in income.
    c. an increase in demand now resulting from the expectation of a future price rise.

18. Assuming competitive markets with typical demand and supply curves, which of the following statements is correct?
    a. An increase in demand with no change in supply will result in a decline in sales.
    b. An increase in demand with no change in supply will result in an increase in sales.
    c. An increase in supply with no change in demand will result in a decline in sales.
    d. An increase in supply with no change in demand will result in an increase in price.
    e. An increase a in supply with a decrease in demand will result in an increase in price.

In the following figure, S_1 and D_1 represent the original supply and demand curves, and S_2 and D_2 the new curves.

Answer questions 19 through 22 on the basis of this diagram.



19. In this market:
    a. supply has increased, and equilibrium price has increased.
    b. demand has increased, and equilibrium price has increased.
    c. demand has decreased, and equilibrium price has decreased.
    d. demand has increased, and equilibrium price has decreased.
    e. supply has decreased, and equilibrium price has increased.

20. In this market:
    a. point M shows the new equilibrium position.
    b. the new equilibrium price and quantity are both greater than originally.
    c. an increase in demand has been more than offset by an increase in supply.
    d. the equilibrium position has shifted from M to K.

21. In this market, the indicated shift in supply may have been caused by:
    a. an increase in consumer incomes.
    b. this product becoming less fashionable.
    c. the development of more efficient machinery for producing this commodity.
    d. an increase in the wages paid to workers producing this good.

22. In this market, the indicated shift in demand may have been caused by:
    a. a decline in the number of buyers in the market.
    b. a decline in the price of a substitute good.
    c. a decrease in incomes if the product is a normal good.
    d. an increase in the incomes if the product is an inferior good.
    e. none of the above.

23. A price support means that:
    a. government is imposing a legal price which is greater than the equilibrium price.
    b. government is imposing a legal price which is less than the equilibrium price.
    c. monopolistic sellers are artifically restricting supply in order to raise price.
    d. inflation is severe in this particular market.

24. A price ceiling means that:
    a. government is imposing a legal price which is greater than the equilibrium price.
    b. government wants to stop a deflationary spiral.
    c. government is imposing a legal price which is less than the equilibrium price.
    d. the relevant product is currently available in excess supply.

25. What will be the impact of the following factors on the market for fur coats made from tiger skin?

    i) A major crack-down on poachers and illegal smuggling of tiger skins by the governments of Asia and Africa.
    ii) A sudden fad for such coats due to an advertising blitz.

    a. Equilibrium quantity must decrease, but equilibrium price may rise, fall or remain unchanged.
    b. Equilibrium price and equilibrium quantity must both decline.
    c. Equilibrium price and equilibrium quantity must both increase.
    d. Equilibrium price must rise, but equilibrium quantity may rise, fall or remain unchanged.

CHAPTER FOUR

CONCEPT OF ELASTICITY

CHAPTER FOUR

CONCEPT OF ELASTICITY

I hope, by now, you are convinced of the immense analytical strength of the simple demand and supply apparatus. It would only be a healthy sign, if along with its strengths you have come to appreciate its deficiencies too.

At a number of places in Chapter 3, I tried to point out vital policy questions which could not be answered using Equipment Set #1. To focus on this aspect and justify the acquisition of Equipment Set #2 let us pursue, further, CASE XI of Chapter 3.

Once again let us consider the effect of $1 per bottle tax on the wine industry, just as in CASE XI, but **under different conditions of demand and supply**. For our purposes, it will suffice to study two extreme cases.

Situation A:

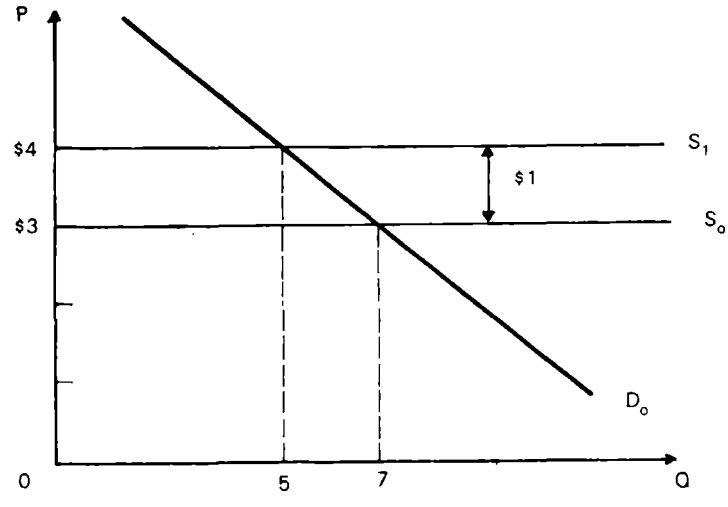


Figure 4.1: Market for Wine

The incidence of tax, when the demand and the supply curve look like the ones shown in Figure 4.1, is summarized below:

Table 4.1

	Before tax	After tax
Price paid by consumers	\$3	\$4
Price received by sellers	\$3	\$3

It is obvious from the above table that the entire burden of the tax is passed on to the consumers, who pay a dollar more than before the tax while the price received by the seller is unchanged at \$3. You may be wondering about the perfectly horizontal shape of the supply curve. For a complete explanation of the determinants of the shape of the supply curve we will have to wait till Chapter Seven. However, a tentative clue is provided towards the end of this chapter when we discuss the determinants of the elasticity of supply. For the present, it is enough to know that this supply curve implies that producers are willing to supply an unlimited amount of wine at a price of \$3. Now consider another situation.

Situation B:

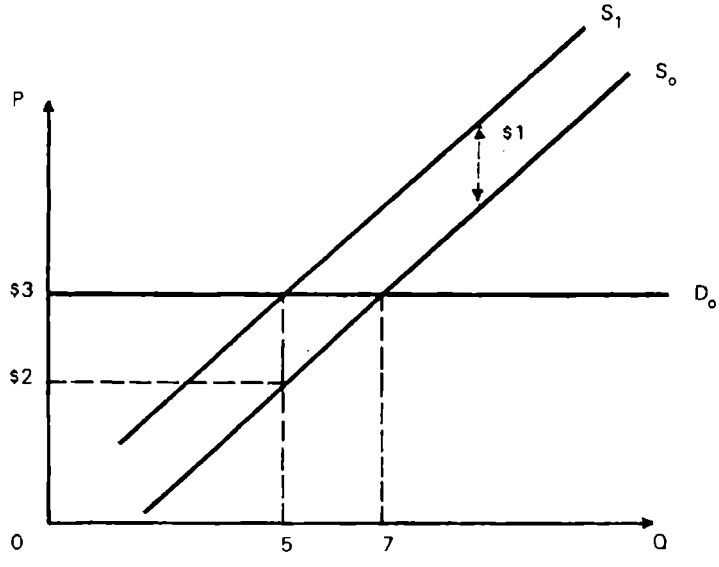


Figure 4.2: Market for Wine

The following table summarizes the impact of \$1 per bottle tax, on consumers and sellers, under the supply and demand conditions given by Figure 4.2.

Table 4.2

	Before tax	After tax
Price paid by consumers	$3	$3
Price received by sellers	$3	$2

Just the opposite of situation A happens this time. The entire burden of the tax is being borne by the suppliers. Notice that even though the equilibrium price is unchanged and sellers are still receiving $3 per bottle from the consumers, they are left with $2 per bottle. From the $3 per bottle collections, the government takes away a dollar, thus leaving them with only $2 per bottle.

Now, as policy makers, it is extremely important for you to know before you impose a tax whether you are dealing with situation A or B. Suppose you want to protect the consumers but you impose a sales tax to be collected from sellers under circumstances similar to situation A. Your policy would backfire on you by hurting consumers, the group you want to protect.

So, as a policy maker you want to know, before you make a tax policy decision, whether you face a situation similar to A or B or some intermediate situation. That is, you would like to know the shape of demand and supply curves in the market relevant for your tax policy. And the concept which describes the demand and supply in a particular market is the concept of **ELASTICITY**.

If a policy maker has an idea of elasticities of demand and supply in a particular market, he can predict the incidence of a sales tax in advance. However, this is not the only area in which it is useful. The knowledge of the shape of the demand and supply curves is of vital significance for many policy questions as we shall see in the cases below.

So without wasting time, let us get on with the job of becoming familiar with Equipment Set #2 and use it to see if we can get additional insights into various economic problems.

Equipment Set #2 essentially consists of the following concepts:

1. Elasticity of demand.
2. Elasticity of supply.

ELASTICITY OF DEMAND

The law of demand tells us that consumers will respond to a price decline by buying more of a product. The law of demand does not, however, tell us anything about the degree of responsiveness of consumers to a price change. The contribution of the concept of elasticity lies in the fact that it not only tells us that consumers' demand responds to price changes but also the degree of responsiveness of consumers' demand.

Figure 4.3 shows two demand curves. Let D_a be the demand for cheese in Switzerland and D_b be the demand for cheese in England.

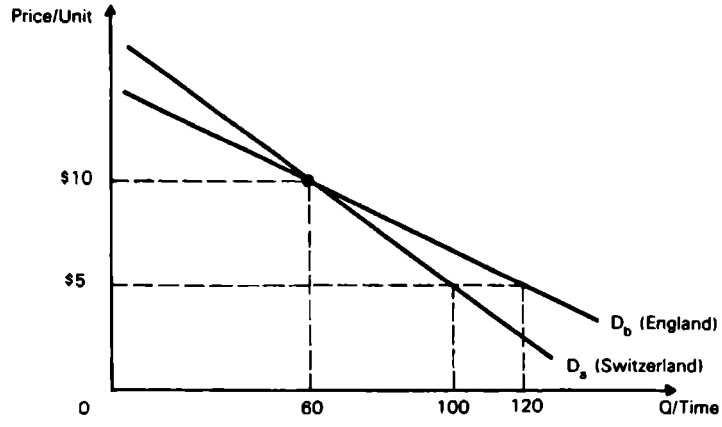


Figure 4.3

At a price of $10, the quantity demanded in both countries is 60. When the price falls from $10 to $5, the quantity of cheese demanded increases in both. However, for the same change in price, from $10 to $5, the change in quantity demanded is more in England compared to Switzerland. In other words, for the same decrease in price in the two countries, the quantity demanded responds more in England than in Switzerland.

As economists we would describe the above situation by saying that the demand for cheese is more elastic in England than in Switzerland. Elasticity, then, is just another word for ***responsiveness***. Whenever you feel confused about a demand curve being more elastic or less elastic, just substitute the word "responsiveness" for "elasticity" in your mind and you will find the right answer.

Elasticity of demand is important primarily as an **indicator of how total revenue changes when a change in P induces changes in Q along the demand curve**. The total revenues of the firm will equal the price charged times the quantity sold (TR = P x Q). Naturally, total revenues received by firms are equal to total spending by consumers. If consumers buy 50 units at $10 each, then the total revenue will be $500. By simple multiplication, total revenue can always be calculated for each point in a demand schedule or diagram.

Classification of Demand Curves According to Their Elasticities

Depending on how the total revenue changes, when price changes, we can classify all demand curves in the following five categories:

1. Perfectly inelastic demand curves.
2. Inelastic demand curves.
3. Unitary elastic demand curves.
4. Elastic demand curves.
5. Perfectly elastic demand curves.

Figure 4.4 helps us to explain what these five categories imply about the relationship between changes in total revenue and changes in price. It shows three different types of demand curves, each having a different

implication for total revenue when price is reduced from \$10 to \$5.

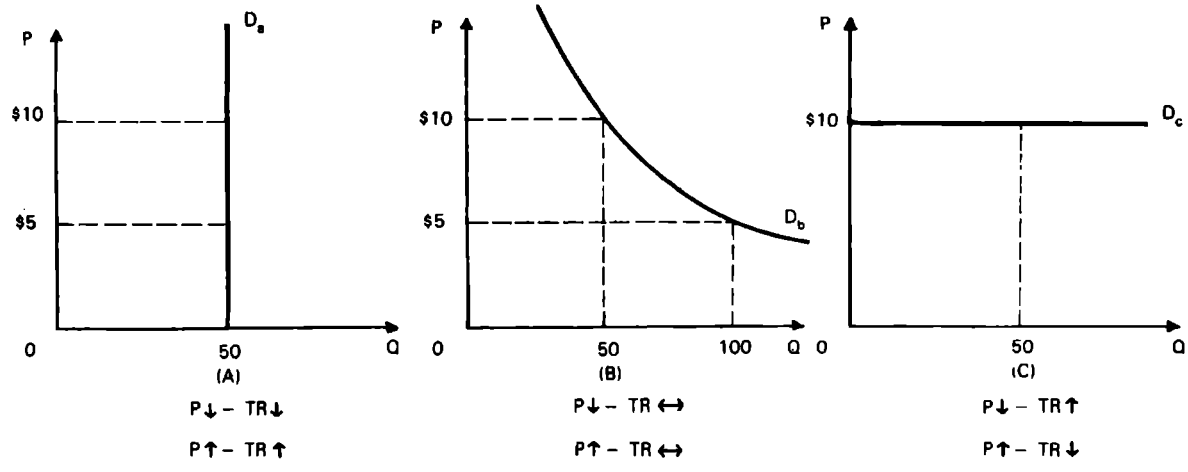


Figure 4.4

(i) In the case of demand curve D_a in Figure 4.4(A), when the price is \$10 total revenue is \$500 (= 10 x 50). When the price changes to \$5, the quantity demanded does not respond at all and remains at 50. The total revenue when the price is \$5 is \$250. In other words, when price decreases, total revenue decreases as well.

All such demand curves where quantity demanded is totally unresponsive to changes in price are called **PERFECTLY INELASTIC DEMAND CURVES.**

Further, such demand curves imply that **when price decreases the total revenue decreases and *vice versa*.**

Finally, all such demand curves are supposed to have an **elasticity coefficient**, E_d, equal to 0. Elasticity coefficient is a number describing the elasticity of a demand curve. For instance, if someone were to tell me that the elasticity coefficient for a product was zero, then immediately I would know that the quantity demanded of this product is totally unresponsive to price changes and thus the demand curve for this product can be called perfectly inelastic. (In actuality, such an extreme does not occur. We are using a vertical demand curve simply to aid in your understanding of elasticity).

Life saving drugs are most likely to have demand curves which resemble perfectly inelastic demand curves. For example, a diabetic would be willing to pay almost any price to get the required amount of insulin.

(ii) Demand curve D_c in Figure 4.4(C) represents another extreme case, a perfectly horizontal demand curve. When the price is \$10, 50 units are being sold and the total revenue is \$500. When the price falls to \$5, the quantity demanded increases infinitely ana so does the total revenue. On the other hand, when price rises above \$10 the quantity demanded falls to zero and total revenue also falls to zero.

(**Note**: Before we proceed any further let us make sure we understand why quantity demanded falls to zero when the price rises above \$10 and why quantity demanded increases to infinity when price falls below \$10.)

To understand this, refer to Definition 2 of the demand curve. According to this definition, the demand curve shows the maximum amount a person is willing to pay for a given quantity. Thus the demand curve D_c in Figure 4.4(C) implies that consumers are willing to pay a maximum of \$10 for all levels of quantity demanded. Naturally, if you try to charge them more than \$10, they will stop buying. The commodity is obviously worth \$10 to them and so why should they pay more than that? However, if you charge them less than \$10 then they would like to buy as much as possible, because the commodity is worth \$10 to them but they are getting it for less.)

Such horizontal demand curves, where quantity demanded is infinitely responsive to price changes, are called **PERFECTLY ELASTIC DEMAND CURVES.**

These perfectly elastic demand curves have a property that **when price decreases total revenue increases, and *vice versa*.**

The elasticity coefficient, E_d, is equal to infinity ($E_d = \infty$).

(iii) The demand curve D_b in Figure 4.4(B) represents the midpoint of a spectrum whose extremes are represented by the demand curves D_a and D_c.

In the case of D_b when price decreases from \$10 to \$5, the total revenue remains unaffected at \$500. Such a demand curve is said to be **UNITARILY ELASTIC** and has the property that when price increases or decreases, the total revenue remains constant. The elasticity coefficient for such demand curves is equal to one. Examples of unitarily elastic demand curves occur when a person budgets a certain amount of money for, say, meat or magazines, and will not deviate from that figure regardless of price. However, such cases are also unusual in that few demand curves have constant unitary elasticity.

Besides the three types of demand curves we have discussed, there are two more types of demand curves.

Demand curves which have an elasticity coefficient between 0 and 1 are called **RELATIVELY INELASTIC** or simply **INELASTIC**. When the price falls, the quantity demanded expands but total revenue still decreases. Figure 4.5(A) shows D_a as an example of a relatively inelastic curve.

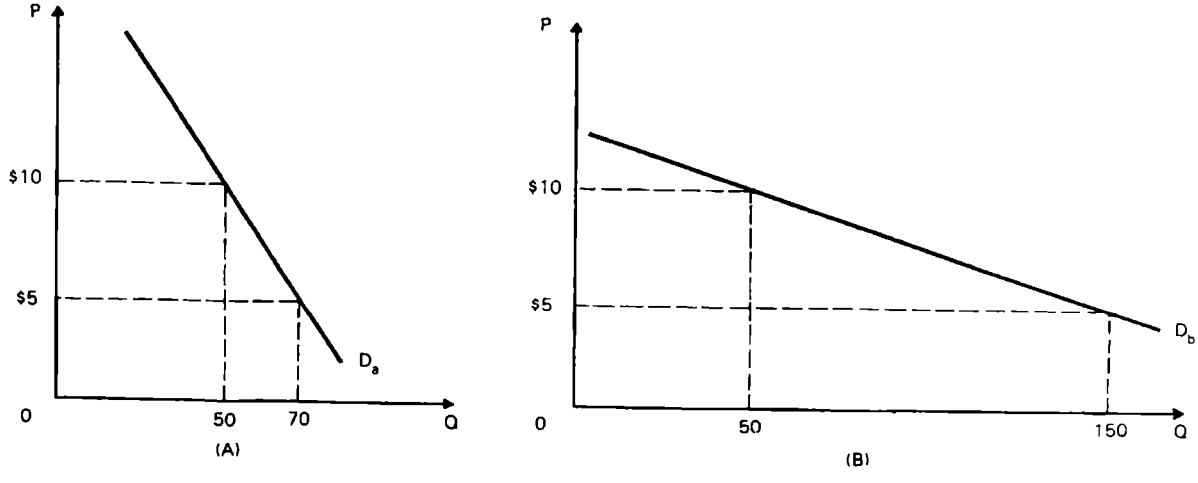


Figure 4.5

Finally, demand curve D_b in Figure 4.5(B) is an example of a **RELATIVELY ELASTIC** or simply **ELASTIC DEMAND CURVE**. Such demand curves have an elasticity coefficient between 1 and ∞ and have the property that when price decreases total revenue increases and *vice versa*.

Believe it or not, in the real world, 99.99 percent of the demand curves are either relatively elastic or relatively inelastic. Therefore, naturally, you must be wondering (if not somewhat irritated) why we spent time on the rare species of perfectly elastic and perfectly inelastic demand curves? The main reason for doing these extreme cases was the fact that it is easy to remember their properties. You don't have to memorize the relationship between price changes and changes in total revenue because you can derive it after a moment's reflection. Once you know, for example, the relationship between price change and revenue change for a perfectly elastic demand curve, you also know that the same basic relationship holds true for a relatively elastic demand curve.

Table 4.3 summarizes the discussion we have had so far. It tells us how the firm's total revenues (and the consumers' total expenditures) for a product will change as prices are raised or lowered.

The Importance of Knowing the Elasticity of Demand Coefficient

All throughout our discussion in the previous section of this chapter, I have been talking about the value of the elasticity coefficients. As shown in Table 4.3, the value of the elasticity coefficient, E_d, can be anything from zero to infinity and each value can immediately tell us the elasticity of the demand curve at the relevant price. For instance, if a demand curve has an elasticity coefficient of 0.5 at a given price, then we know that this is an inelastic demand curve at that price.

Table 4.3

Price Elasticity of Demand (E_d)		How Total Revenues or Expenditures are Affected by Price Changes	
E_d Value	Term for Elasticity of demand	Price increases	Price decreases
Zero	Perfectly inelastic	Increase proportionally with price	Decrease proportionally with price
$0<E_d<1$	Relatively inelastic	Increase less than proportionally with price	Decrease less than proportionally with price
$E_d = 1$	Unitarily elastic	UNAFFECTED BY PRICE CHANGES	
$\infty>E_d>1$	Relatively elastic	Decrease, but less than proportionally	Increase, but less than proportionally
∞	Perfectly elastic	Total revenue falls to zero	Increase more than proportionally

The question is, why do we need the value of an elasticity coefficient? The answer is that, except for the two extreme cases of perfectly elastic and perfectly inelastic curves, it is very difficult to determine the elasticity of demand by visual inspection.

The reason for this is that the slope is not the same thing as elasticity. In Figure 4.6 we have two curves giving exactly the same information. When the price falls from \$10 to \$5, the quantity demanded increases from 50 to 150 in both cases. Since for an equal price decrease the quantity responds equally in both cases, the curves can be said to have the same responsiveness and thus, the same elasticity. However, since we have used a different scale to represent the quantity demanded in the two cases, we get two demand curves that appear to have different elasticities.

Thus, you can see that it is essential to know the elasticity coefficient because visual inference may be misleading. The next logical step, then, is to find out how the value of the elasticity coefficient is calculated.

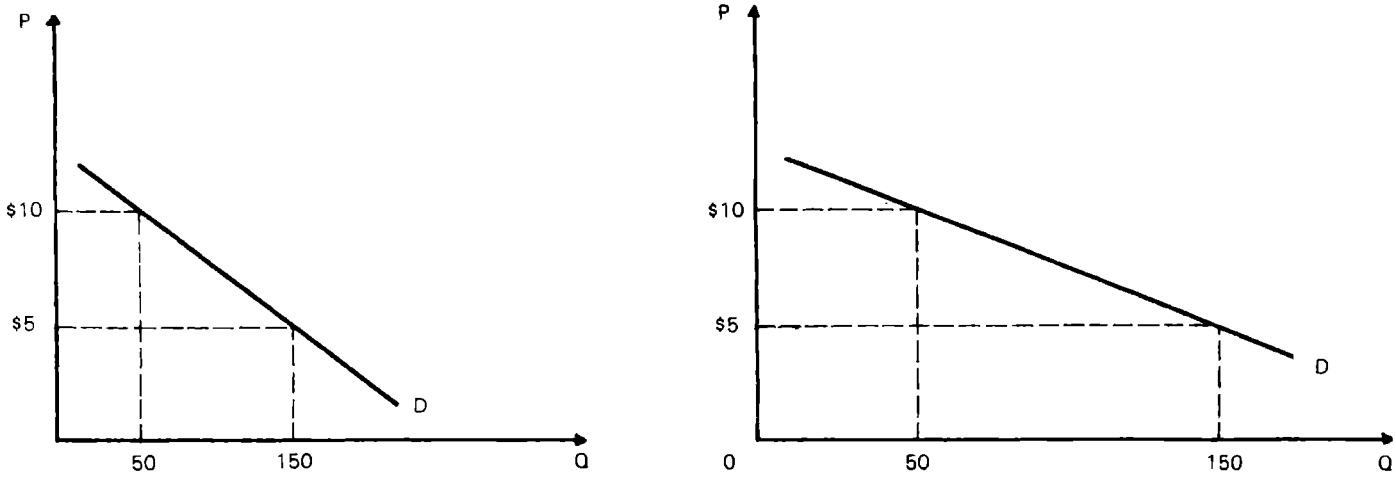


Figure 4.6

But, before spending time and effort in understanding how the elasticity coefficient of demand, E_d, is calculated, I would like to make sure that you are convinced about its usefulness. To that end, let us first consider a case and then go on to the problem of measurement of the elasticity coefficient.

CASE I: Importance of Elasticity in Designing Public Policies

Several years ago a mayor of a large city was faced with a rapidly rising rate of theft, mugging and armed robbery by persons addicted to drugs. Since those who needed drugs were unable to earn enough money to purchase sufficient amounts of drugs, they were turning to crime.

The mayor said that he seriously intended to reduce drug – related crime — mugging, theft, etc. The policy he adopted to solve this problem was to crack down heavily on the drug traffic. He arrested the drug dealers and reduced the amount of drugs on the street; but the rate of crime increased instead of decreasing. What economic explanation can you offer for the failure of the mayor's policy?

Analysis

(i) Figure 4.7 shows the drug market of this large city with P_0 and Q_0 as the equilibrium price and quantity.

(ii) The effect of the crackdown on the drug dealers is to reduce the drug supply. Remember the number of sellers is a non – price determinant of supply. With some of them going behind bars the supply is bound to decrease.

(iii) This decrease in supply leads to an increase in the price of drugs. Since it is reasonable to assume that the demand for drugs is inelastic, the outcome of increased prices is increased total revenues (or total expenditure by addicts).

To get extra money to finance their increased expenditure, the addicts have to commit more crimes.

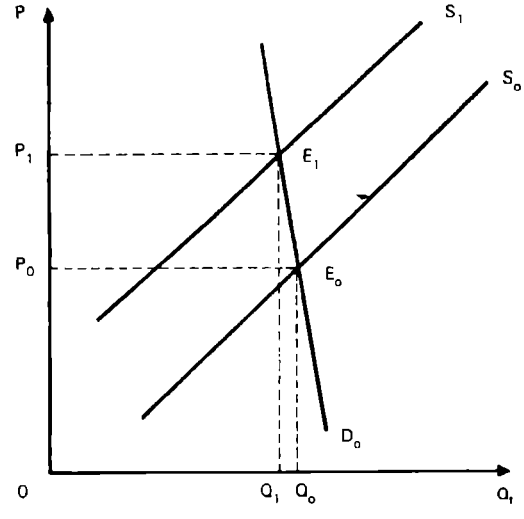


Figure 4.7 : Market for Illegal Drugs

Notice that it is not enough to say that higher prices of drugs are causing the problem. It is the combination of increased prices and inelastic demand which is at the root of the failure of the mayor's policy. If the demand for drugs was elastic, then higher prices would have led to a decrease in expenditure on drugs and, hence, less crime. If the mayor had known the elasticity of demand for drugs (plus some more economics) he could have avoided this policy mishap. All he had to do was to ask his economic advisor what the value of the elasticity coefficient is. His advisor would have given a figure like 0.5 or 0.4, or some other number less than 1.

Some of the hard-core skeptics amongst you may think that the case just analyzed is really a hypothetical one and that the concept of elasticity of demand is merely a theoretical notion designed to confuse unwary students. For them I would like to mention another real-world case to show that elasticity is indeed a notion of great practical significance.

The United Automobile Workers (U.A.W.) in the U.S., once contended that automobile manufacturers should raise wages and simultaneously cut automobile prices. Arguing that the elasticity of demand for automobiles was about 4, the U.A.W. concluded that a price cut would help check inflation, boost the total receipts of manufacturers, and preserve or even increase the profits of producers. A spokesman for the Ford

Motor Company, however, claimed that the available studies suggest that the elasticity of demand for automobiles is in the 0.5 to 1.5 range. He held that price cuts would, therefore, shrink profits or result in losses for manufacturers. In this case, the elasticity of demand for automobiles was a strategic factor in labor – management relations and wage bargaining.

Having seen the usefulness of knowing the numerical value of the elasticity coefficient, we want to now see how it is derived.

Numerical Measurement of Elasticity

What does it mean to say that the elasticity of demand is 0.5? 0.4? 2.3? To answer this question, we have to examine the following definition for elasticity coefficient, E_d.

$$\text{Elasticity Coefficient } (E_d) = \frac{\text{Percentage Change in Quantity Demanded}}{\text{Percentage Change in Price}}$$

One calculates these percentage changes, of course, by dividing the change in price by the original price and the consequent change in quantity demanded by the original quantity demanded. Thus we can restate our formula as:

$$E_d = \frac{\dfrac{\text{Change in Quantity Demanded}}{\text{Original Quantity Demanded}} \times 100}{\dfrac{\text{Change in Price}}{\text{Original price}} \times 100}$$

This formula can also be written as:

$$E_d = \frac{\dfrac{Q_1 - Q_0}{Q_0} \times 100}{\dfrac{P_1 - P_0}{P_0} \times 100}$$

where, P_0 = original price, P_1 = new price,
Q_0 = original quantity demanded, Q_1 = new quantity demanded.

Sometimes you may also find this written as:

$$E_d = \frac{\dfrac{\Delta Q}{Q}}{\dfrac{\Delta P}{P}}$$

where Δ, pronounced delta, is a notation used to denote change.

Before we use this formula to calculate elasticity of demand for a curve, let us answer a basic question about this formula: **Why use percentages rather than absolute amounts in measuring consumer responsiveness?** The answer is that if we use absolute changes, our impression of buyer responsiveness will be arbitrarily affected by the choice of units. To illustrate: If the price of product X falls from $3 to $2 and consumers, as a result, increase their purchases from 60 to 100 pounds, we get the impression that consumers are quite sensitive to price changes and therefore that demand is elastic. After all, a price change of "one" has caused a change in the amount demanded of "forty." But by changing the monetary units from dollars to pennies (why not?),

we find a price change of "one hundred" causes a quantity change of "forty," giving the impression of inelasticity. The use of percentage changes avoids this problem. The given price decline is 33 percent whether measured in terms of dollars ($1 ÷ $3) or in terms of pennies (100 ÷ 300). Thus, the use of percentages gives us the nice property that the units in which the money or goods are measured —bushels or tons of wheat, dollars or cents or rupees — do not affect elasticity.

(**Note:** Since demand curves are negatively sloped, price elasticity of demand will always be negative — if price is increased, quantity demanded falls, and *vice versa*. Since the elasticity coefficient thus calculated will always have a negative value, economists have adopted a convention to use absolute values of elasticity coefficients. This eliminates the need to deal with negative numbers.)

Interpreting the formula: Now let us interpret our formula. Demand is **elastic** if a given percentage change in price results in a larger percentage change in quantity demanded. For example, if a 2 percent decline in price results in a 4 percent increase in quantity demanded, demand is then said to be elastic. If a given percentage change in price is accompanied by a relatively smaller change in the quantity demanded, demand is inelastic. For example, if a 3 percent change in price gives rise to a 1 percent increase in the amount demanded, demand is then said to be inelastic. The borderline case of unitary elasticity, which separates elastic and inelastic demands, occurs where a percentage change in price and accompanying percentage change in quantity demanded happen to be equal.

Using the Formula: Let us calculate the elasticities of demand for the two demand curves given in Figure 4.3 (page 64), when price changes from $10 to $5.

(i) Elasticity of demand for demand curve D_a:

$$E_{da} = \frac{\dfrac{Q_1 - Q_0}{Q_0}}{\dfrac{P_1 - P_0}{P_0}} = \frac{\dfrac{100 - 60}{60}}{\dfrac{5 - 10}{10}} = 1.33$$

Note: There is no need to write '100' in the numerator and denominator while calculating as they cancel out.

(ii) Elasticity of demand for demand curve D_b:

$$E_{db} = \frac{\dfrac{Q_1 - Q_0}{Q_0}}{\dfrac{P_1 - P_0}{P_0}} = \frac{\dfrac{120 - 60}{60}}{\dfrac{5 - 10}{10}} = 2.00$$

Thus, we find that demand curve D_b is more elastic than D_a. This just confirms what we had suspected all along.

Refining the Formula: An annoying problem arises in applying the elasticity formula, however. The problem is that for the same demand curve, over the same price range, this formula gives us two values of elasticities. Let us calculate the elasticity of demand for curve D_a in Figure 4.3 when price changes from $5 to $10 instead of the other way around.

$$E_{da} = \frac{\dfrac{60 - 100}{100}}{\dfrac{10 - 5}{5}} = 0.4$$

This means that in the same range the demand curve can be elastic or inelastic depending on the direction of change. This is ridiculous! Since the "responsiveness" of the curve does not change by the direction of change, the elasticity also should not be affected by the direction of the change. For a change in price equal to $5 in either direction the quantity changes by 40 units and, therefore, common sense suggests that the elasticity ought to be the same in both directions.

Economists have reached a workable compromise to this problem by using the averages of the two prices and the two quantities under consideration. The modified formula is as follows:

$$E_d = \frac{\dfrac{Q_1 - Q_0}{\dfrac{Q_1 + Q_0}{2}} \times 100}{\dfrac{P_1 - P_0}{\dfrac{P_1 + P_0}{2}} \times 100}$$

Using this formula, the elasticity of demand of D_a will come to 0.75, no matter what the direction of change happens to be. This is also in line with our statements regarding the relation between change in price and its effect on revenue. Since a decrease in price from $5 to $10 leads to a decrease in revenue we know that this is a relatively inelastic demand curve. This is exactly what an $E_d = 0.75$ implies.

In future, you must always use the mid – point formula for all your work. You would be justified in being irritated at having wasted some time on the simple formula. My experience shows that unless you take people through the simple formula and show the problems with it, they never get convinced about the mid – point formula.

Unfortunately even the mid – point formula is an approximation. Economists make a distinction between "arc" elasticity as calculated by the mid – point formula and "point" elasticity using elementary calculus. As you know, in calculus we deal with infinitely small changes. Thus, elasticity is still defined as before but the change in price and the change in quantity are used by taking the concept of dP and dQ. The latter imply infinitely small changes in P and Q.

For small changes in price and quantity one does not have to worry about the difference in the *arc elasticity* and *point elasticity* but for large changes the two can differ. This divergence between the two arises because the elasticity of demand varies along the demand curve. Contrary to impressions that you might have developed, slope of a straight line demand curve and its elasticity are not synonymous. This point is important enough to deserve a more detailed explanation.

SLOPE IS NOT THE ELASTICITY

We know that elasticity is defined as

$$E_d = \frac{\text{percentage change in quantity demanded}}{\text{percentage change in price}}$$

This can be written as:

$$= \frac{\text{change in quantity}}{\text{original quantity}} \div \frac{\text{change in price}}{\text{original price}}$$

$$= \frac{\text{original price}}{\text{original quantity}} \times \frac{\text{change in quantity}}{\text{change in price}}$$

$$= \frac{\text{original price}}{\text{original quantity}} \times \frac{1}{\text{slope of the demand curve}}$$

Now even if you had a straight line demand curve the only constant factor would be the slope. The elasticity would vary along the demand curve as shown in Figure 4.8 depending on the starting point.

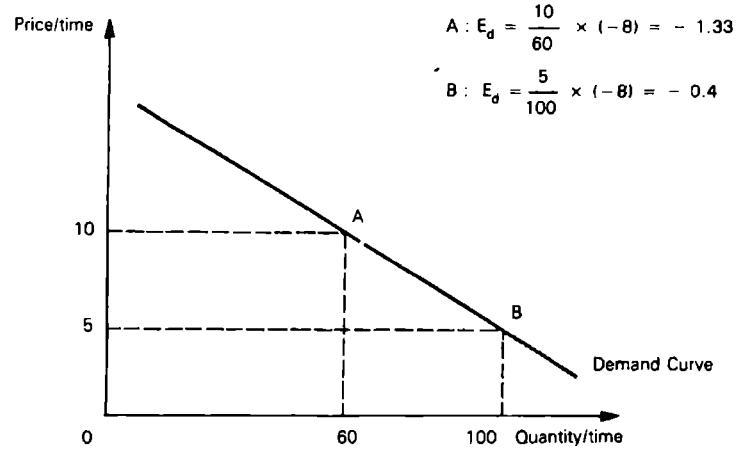


Figure 4.8

Thus the elasticity of demand is − 1.33 at point A and − 0.4 at point B. The arc elasticity of demand in a sense gives us an average elasticity over this range.

Before we move on to discuss the elasticity of supply, let us examine some of the factors that determine the elasticity of demand for a commodity.

Determinants of Elasticity of Demand

There are no iron-clad, exceptionless generalizations concerning the determinants of the elasticity of demand. The following points, however, are usually accepted as valid and helpful.

1. Luxuries Versus Necessities. Luxuries tend to have an elastic demand, necessities an inelastic demand. For example, luxuries like hats, French cognac and emeralds have an elastic demand because purchasers can back away from the market and stop buying them if their prices rise. But essentials such as electrical power or salt, have an inelastic demand because purchasers cannot avoid buying them, or can do so only with substantial inconvenience.

2. Percentage of Income. Big items in a budget tend to have a more elastic demand than small items. To cite an extreme example, the demand for houses is more elastic than the demand for pencils. Purchasers may spend a week trying to negotiate a 1 percent lower price on a new house, but they will not even notice a 20 percent increase in the price of pencils. For such small items, consumers become very insensitive to price.

3. Substitutability. Items that have good substitutes tend to have a more elastic demand than those that do not. To illustrate, consider sugar and salt, items which are alike in many respects. Both are necessities

and both are small items in any budget. Yet sugar has a more elastic demand than salt because it has substitutes (such as honey), but salt does not. (Thus, salt has a low elasticity for the first three reasons.)

4. Time. Generally speaking, the demand for a product tends to be more elastic the longer the time period under consideration. One aspect of this generalization has to do with the fact that many consumers are creatures of habit. When the price of a product rises, it takes time to seek out and experiment with other products to see if they are acceptable to us. A wine drinker may not immediately reduce his purchases to any significant degree when the price of wine rises by, say, 10 percent. But given time, he may shift his affections to scotch or vodka, for which he has now "developed a taste."

Other Elasticities of Demand

Most people doing economics for the first time end up with the impression that the demand curve always implies a relationship between price and the quantity demanded. In fact, in economic theory, this is only one of the many different kinds of demand curves. It is possible to plot the effect on quantity demand of any one of the non-price determinants of demand, holding all others constant.

For example, if you plot the relationship between "quantity demanded" and "income," then you get the so-called "income demand curve" as opposed to the "price demand curve" we have been dealing with thus far. For a normal good it would have a positive slope and for an inferior good, it will have a negative slope (Figure 4.9). The elasticity of such a demand curve is called "income elasticity of demand" as opposed to the "price elasticity of demand" and is defined as:

$$E_i = \frac{\text{percentage in quantity demanded}}{\text{percentage change in income}}$$

Similarly, it is possible to plot the relationship between the price of a related good and the quantity demanded. As shown in Figure 4.9, this "cross demand curve" will have a positive slope for substitutes and a negative slope for complements. The elasticity of these demand curves is referred to as the "cross elasticity" of demand and is defined as:

$$E_c^{xy} = \frac{\text{percentage change in the quantity demanded of good X}}{\text{percentage change in the price of good Y}}$$

ELASTICITY OF SUPPLY

The concept of price elasticity can also be applied to supply. If producers are responsive to price changes, supply is elastic. If they are relatively insensitive to price changes, supply is inelastic. Supply elasticity is a useful concept but not quite so useful a concept as demand elasticity, for the reason that the elasticity of demand has the major additional function of telling us what is happening to total revenue.

The formula for computing the price elasticity of supply is similar to the one used for computing demand price-elasticity. The only obvious alteration is the substitution of "percentage change in quantity supplied" for "percentage change in quantity demanded."

Thus elasticity coefficient for supply, Es, is calculated as follows:

$$E_s = \frac{\text{Percentage Change in Quantity Supplied}}{\text{Percentage change in Price}}$$

$$= \frac{\dfrac{Q_1 - Q_0}{\dfrac{Q_1 + Q_0}{2}}}{\dfrac{P_1 - P_0}{\dfrac{P_1 + P_0}{2}}}$$

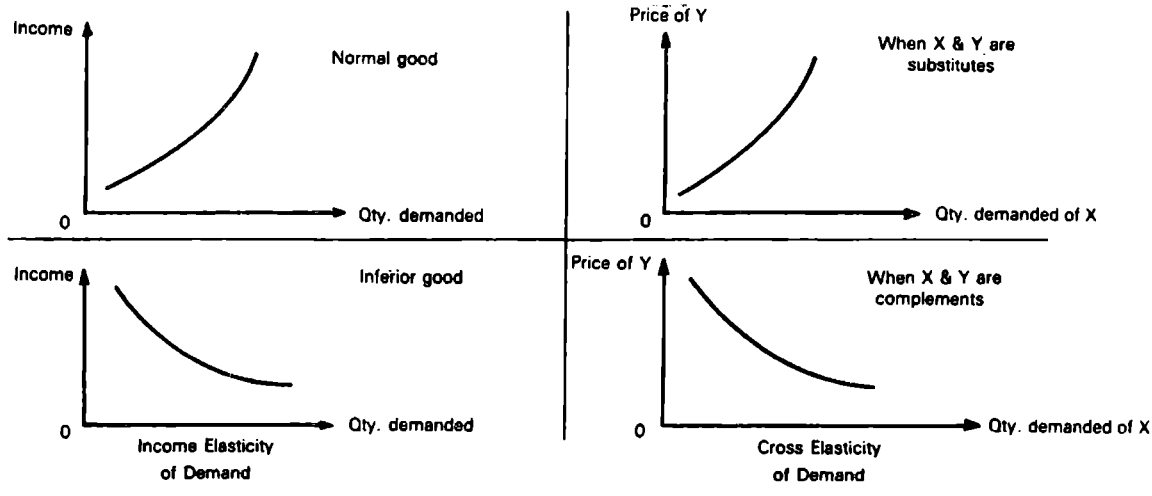


Figure 4.9

Figure 4.10 shows three straight – line supply curves: At point A, the line going through the origin has an elasticity of exactly 1.0, the steeper curve with the intercept on the Q axis is inelastic, with an elasticity of supply coefficient less than 1; and the flatter curve is elastic, with an elasticity coefficient greater than 1. (Also, for a supply curve with curvature, one can reckon its elasticity at a point B by drawing a straight line with a tangential ruler and seeing which curve of Figure 4.10 it resembles.)

Determinants of Elasticity of Supply

The main determinant of the elasticity of supply is the amount of time which a producer has to respond to a given change in product price. Generally speaking, we can expect a greater output response — and therefore greater elasticity of supply — the longer the amount of time a producer has to adjust to a given price change. Why? Because a producer's response to an increase in the price of product X depends upon his ability to shift resources from the production of other products to the production of X. And the shifting of resources takes time; the greater the time, the greater the resource "shiftability." Hence, the greater will be the output response and the elasticity of supply.

In analyzing the impact of time upon the elasticity of supply, economists find it useful to distinguish between the immediate market period, the short run, and the long run.

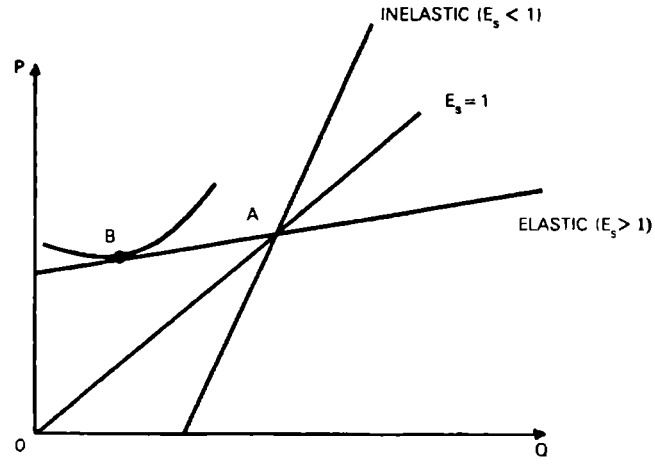


Figure 4.10

1. The Market Period. The immediate market period is so short a time that producers cannot respond to a change in demand and price. Let us imagine that the demand for a perishable good, such as fish that cannot be preserved, increases from D_0 to D_1. With the amount of fish supplied unchanged, the stronger demand will sharply bid up the monetary price of fish. This is shown in Figure 4.11(A), where the fixed supply curve S_m cuts the new demand curve D_1 to determine the new, sharply higher momentary equilibrium price shown at E_1. The price has had to rise so much in order to ration the limited supply of fish among the now eager demanders.

2. The Short Run. In the short run, the plant capacity of individual producers and of the industry is presumed to be fixed. But firms do have time to use their plants more or less intensively. Thus, in the short run, due to the high price prevailing in the fish market, skippers of the fishing boats will be motivated to hire more men and use more nets. Even if they do not have the time to get new boats built, they will, in the short run, begin to bring to the market a greater supply of fish than they did at the old market period equilibrium. Figure 4.11(B) shows the new short – run supply curve, S_s, and shows that it intersects the new demand curve at E_2, the point of short run equilibrium. Note that this equilibrium price is a little lower than the momentary E_1 price. Why? Because of the extra supply of fish produced in the short run by more intensive use of the same number of boats.

3. The Long Run. The long run is a time period sufficiently long so that the firms or suppliers can make all desired resource adjustments; individual firms can expand (or contract) their plant capacities, and new firms can enter (or existing firms can leave) the industry. Figure 4.11(C) shows the final long – run equilibrium. The higher prices that have long prevailed in our fish market have coaxed out more ship building and attracted more trained sailors into the industry. Where the long – run supply curve S_l intersects the demand curve D_1 at E_3 the final equilibrium is reached after all economic conditions (including number of ships and shipyards) have adjusted to the new level of demand. With this we end our discussion of elasticity of supply. The brevity of this discussion reflects two main facts. First, much of the treatment of demand elasticity carries over to the case of supply and does not need repeating. Second, there will be more about the determinants of supply elasticity in Chapters 6 and 7.

Having familiarized ourselves with the essentials of Equipment Set #2, let us begin the job of using it for additional insights. CASE I of this chapter, which was meant to generate and sustain your interest through the subsequent dry but extremely crucial details of the concept of elasticity of demand, gave us a preview of the immense potential of this equipment set.

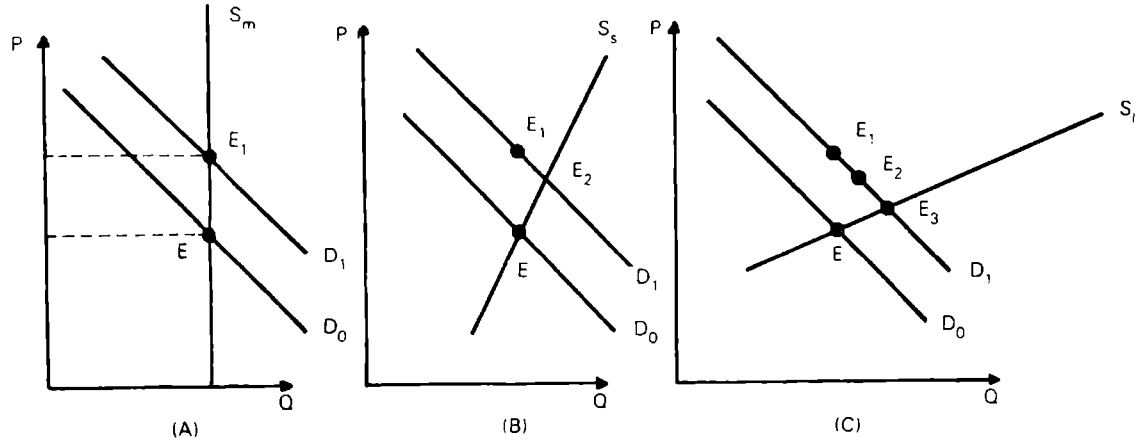


Figure 4.11

We begin the examination of the usefulness of Equipment Set #2 by considering how it can give added insight into the economic problems discussed in various cases presented in Chapter 3.

While discussing the additional contributions of Equipment Set #2, we will also realize its limitations. Certain interesting and crucial questions will remain unanswered. Hopefully, when we finish this chapter, you will want to know the answers to these important questions and, thus will be eager to acquire Equipment Set #3.

Usefulness of Equipment Set #2

(I) In CASE XI of Chapter 3 we had raised the question: Who bears the burden of the tax? In Chapter 3, our conclusion was that both the consumer and the producer bear the burden of the tax.

At the beginning of this chapter, we examined two situations in which either the demand or the supply curve was perfectly elastic. We saw that when the demand curve was perfectly elastic the tax burden was borne entirely by the suppliers, and that when the supply curve was perfectly elastic the tax burden impinged entirely upon the consumers.

If we look at the tax incidence when either the demand or the supply curve is perfectly inelastic, then we reach a different conclusion. I will not work out the details in this chapter, and will leave it up to you to confirm the following conclusion. If the demand curve for a commodity is perfectly inelastic, then the consumers bear the entire burden and if the supply is perfectly inelastic, then the suppliers bear the entire burden.

What general principles emerge from these examples of tax incidence that I have been giving? Obviously, by now we know that elasticities of demand and supply play a great role in deciding who bears the burden of the tax, but now let us try to get the precise relationship between elasticities and distribution of the burden.

(a) First, we know that elasticities of demand reflect the buyers' desperation for particular products because of the availability or unavailability of substitutes. Similarly, supply curves reflect the urgency of sellers for customers because of availability factors or lack of good alternative uses for their resources. Thus, obviously, the more desperate buyers or sellers are, the easier it is to stick them with the burden of taxes.

(b) The entire burden of the taxes will be borne by consumers if either (1) demand is perfectly inelastic or, (2) supply is perfectly elastic as in Figure 4.1. Taxes will be shifted completely to the supplier if either (1) supply is perfectly inelastic or, (2) demand is perfectly elastic as in Figure 4.2.

(c) You must be saying by now that this is fine for all these extreme cases but what about when demand and supply curves are not perfectly elastic or inelastic? Well, our results do suggest a general principle which works fairly well. The greater the elasticity of demand is relative to the elasticity of supply, the greater will be the shifting of the burden of the tax to the suppliers. The smaller the elasticity of demand the greater will be the burden borne by the consumers.

We have just seen that when a tax is imposed, both the consumers and producers lose while the government benefits as it gets the tax revenue. The magnitude of the burden and its distribution depends on the elasticities of demand and supply. However, one question still remains to be answered. If the money which the consumers and producers lose goes into the pockets of government, which in turn spends it back on consumers and producers, then is the society better off or worse off on balance? Or does it matter? To get the answer to this question we need to acquire some more economic tools, which is the object of the next chapter.

(II) In Chapter 3, while dealing with CASES V and VI, we pointed out that price ceilings and price supports create shortages and surpluses. Now, if a government is planning to fix a minimum or a maximum price, then it would be in its interest to know in advance the magnitude of shortage or surplus it would have to live with. The knowledge of the elasticity of demand and supply can easily give this information.

To see how elasticities determine the magnitude of surplus, consider Figure 4.12.

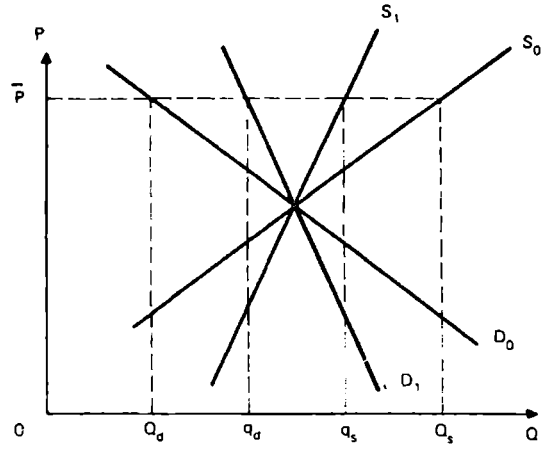


Figure 4.12

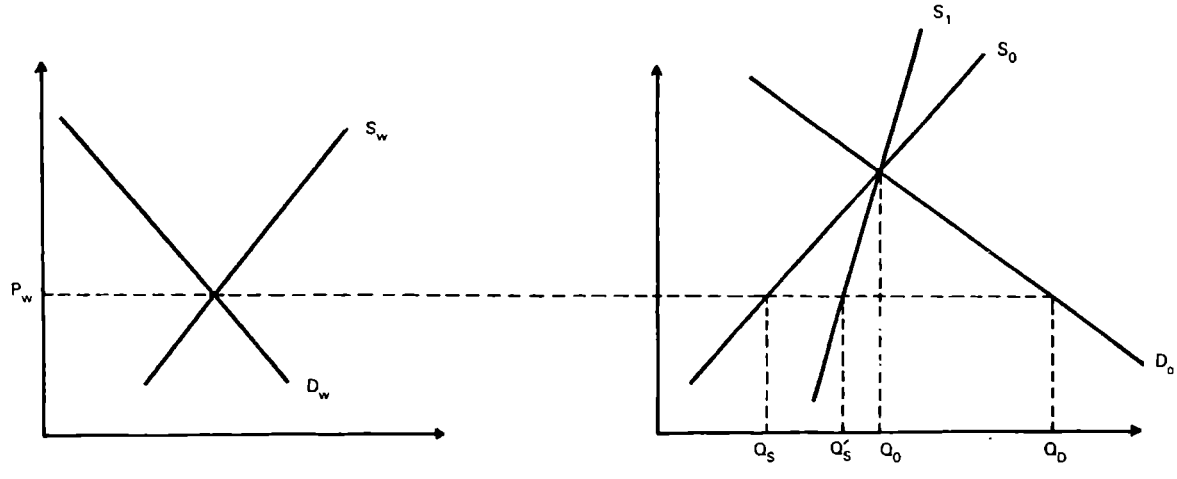
The surplus created as a result of instituting a price support program in the market for wheat in Figure 4.12 depends on the elasticities of demand and supply. With more elastic demand and supply curves, D_0S_0, the surplus is Q_dQ_s, which is more than q_dq_s, the surplus created when we have less elastic demand and supply curves, D_1 and S_1. Similarly, you can check that shortages created by having ceiling prices also depend on the elasticities of demand and supply.

We now know that a price support program benefits suppliers, but hurts consumers and also the

government, and that the extent of these benefits and costs depends on elasticity. However, we still do not know whether on the balance this price support program is good or bad for the society. For this answer we need Equipment Set #3.

(III) We saw in CASES VIII and IX of Chapter 3 that whenever a trade ban was lifted, one of the parties benefitted at the cost of the other. For instance, in the case of imports, consumers benefitted while producers lost. The opposite was true in the case of exports.

We are now in a position to also know the degree to which producers and consumers benefit or get hurt. As an example, let us see how the degree of unemployment created in the domestic country as a result of imports depends on the elasticity of supply. In Figure 4.13 we show the unemployment created under two different assumptions about the domestic supply curve. With the more inelastic supply curve we find that less unemployment is created. With supply curve S_0 the amount of unemployment created when world trade is allowed is Q_sQ_o. This is greater that $Q_s\acute{Q}_o$, the unemployment created when the supply curve is less elastic.



World Market **Domestic Market**

Figure 4.13

Once again we know that having free international trade hurts one group in the society while it benefits the other. The respective gains and losses to consumers and producers depend on the elasticities of demand and supply. However, we are still not in a position to say whether on balance the gains of one group in the society are more or less than the losses of the other group. For this we need Equipment Set #3.

Before we go to Chapter 5 and develop Equipment Set #3, let us consider one more case. This case brings out the importance of elasticity of supply and deals with a problem which a lot of people with interest in public policies will find interesting.

CASE II: Consequences of Rent Control in Aruba

In the city of Aruba, the rents have skyrocketed to unprecedented levels. The mayor is thinking of imposing rent control to prevent this situation from getting out of hand. His arch enemy in the city council,

Mr. Wise, has gone to the press with the following statement: "Next to bombing, rent control seems, in many cases, to be the most efficient technique so far known for destroying cities." Evaluate Mr. Wise's position using the economic tools you have acquired so far.

Analysis

(i) The early effects of the imposition of rent controls are illustrated in Figure 4.14(A). The maximum price which can legally be charged is set at P, below the free – market price of P_0. As a result, the quantity of housing services demanded exceeds the quantity supplied; there is a shortage of AB units. As a consequence, it becomes difficult to find an apartment for rent. When a tenant moves out, there is a scramble to get the vacant apartment and transactions are conducted in the black market. The basic conclusion — that it will be hard to find an apartment if rents are controlled — is important.

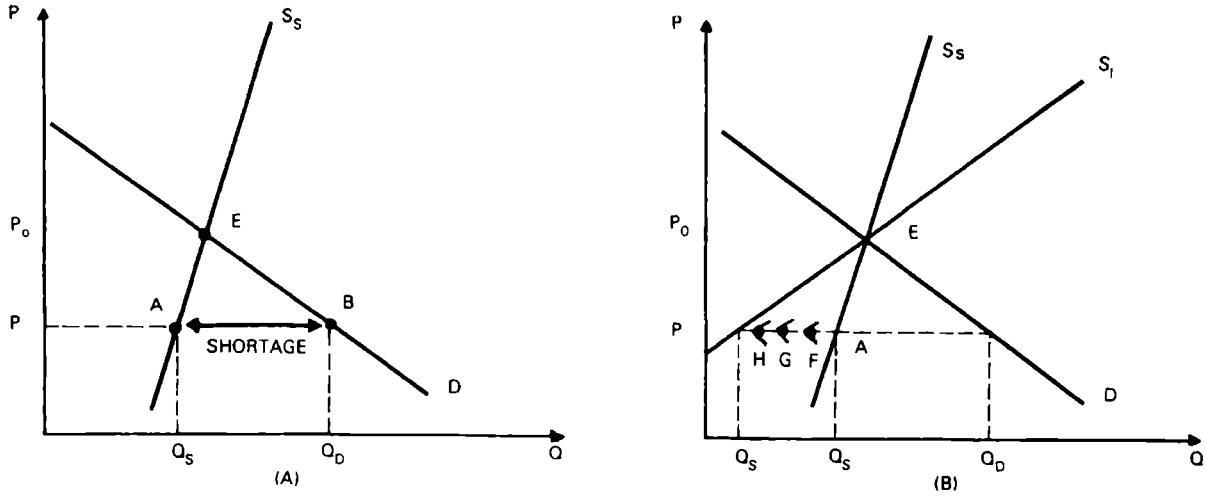


Figure 4.14

But even bigger difficulties show up as time passes. Rent controls reduce the construction of new apartment buildings because they reduce the rental income which owners can hope to receive. Furthermore, if rent ceilings are fixed at low levels, owners may let their buildings go without repair. When the buildings eventually deteriorate to the point where they cannot be rented, owners will abandon them. This is probably the bombing effect Mr. Wise was talking about.

This longer – run effect is shown in Figure 4.14(B), where the demand curve and the short – run supply S_s are copied from the left panel. During the first year of rent control, the quantity of apartments supplied is reduced to A, on the short – run supply curve, S_s. With the rent ceiling continuing at P, the effects become more serious as time passes. Because few new buildings are constructed and owners skimp on maintenance and abandon older buildings, the quantity of housing services available declines. After a few years, the number of apartments falls to F, and then to G. Finally, it approaches point H on the long – run supply curve. (The long – run supply curve, S_l, shows the ultimate effect of a permanent change in rents.)

This illustrates the difficulties which can be created if rent controls are maintained over a long period. Over the short – term, most tenants benefit from the control. Observe that tenants pay a lower price, and they get about the same amount of housing at A as at the free – market equilibrium E. (Nothing much happens to the

quantity of apartments supplied in the first year of rent control.) Over the long run, however, it is very doubtful that tenants benefit much. While they still pay a lower price, they have less housing at H than at E. It is very hard for newcomers to find a place to live. Furthermore, and this does not show up on the diagram, the housing that still can be rented at H may be shabby and run – down.

The owners also lose, because their rental income has fallen. Since both sides lose one may feel compelled to agree with Mr. Wise.

(This was a simple case of rent controls. Can you think of other policies that may improve the performance of rent controls?)

The next two cases show how simple calculations can provide important information regarding the functioning of markets and public policies. If you get a feel for the calculations involved in the following two cases, you will be able to handle most simple problems relating to elasticities.

CASE III: Limits to Price Increases by a Monopoly

The State owned Matushi Electronics Corporation (MEC) is the sole producer of ceiling fans in Ruritania. In order to raise more money for the exchequer, the company was directed to raise the price of each fan it produces from $40 to $60. Unfortunately, the outcome was exactly the opposite of the original intentions behind the price rise. MEC found that its total revenues fell sharply from $12,000 to $9,000.

The under secretary responsible for this decision is puzzled and can't understand how a monopoly could end up losing money as a result of a price increase. Please calculate the elasticity of demand for ceiling fans in Ruritania and explain to the under secretary what is going on in the market.

Analysis

(i) In all such questions, you should start by drawing the necessary diagram with all the information mentioned in the case.

(ii) To calculate the elasticity of demand we need P_1 P_0 Q_1 & Q_0. However, the last two are missing but they can be calculated easily from the information given in the case.

We know the total revenues when prices are $40 and $60, and hence we can find out Q and Q_1 also.

We know, $P_0 Q_0 = 40 \times Q_0 = 12{,}000$

Therefore, $Q_0 = 12000/40 = 300$

Similarly, we know: $P_1 Q_1 = 60 \times Q_1 = 9000$

Therefore: $Q_1 = 9000/60 = 150$

(iii) To calculate elasticity, we have to now substitute all the information that we have in the mid – point formula.

$$E_d = \frac{\dfrac{(Q_1 - Q_0)}{(Q_1 + Q_0)} \times 100}{\dfrac{(P_1 - P_0)}{(P_1 + P_0)} \times 100} = \frac{\dfrac{(150 - 300)}{(150 + 300)} \times 100}{\dfrac{(60 - 40)}{(60 + 40)} \times 100} = -1.667$$

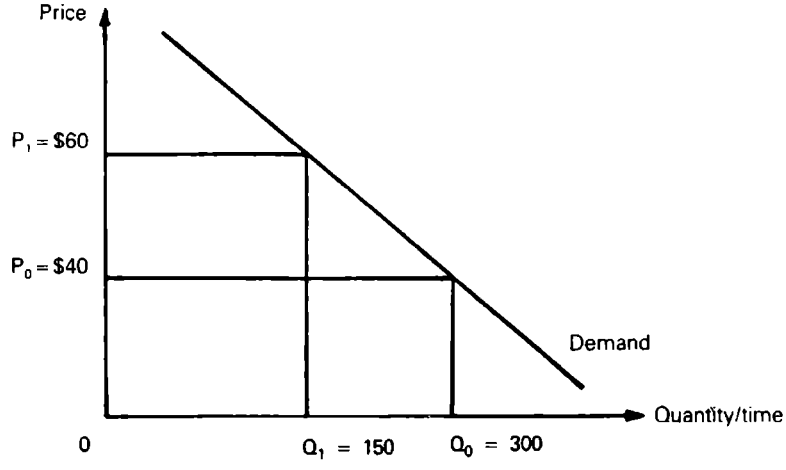


Figure 4.15: Demand for Ceiling Fans

(iv) Obviously, you need to summarize this lecture on elasticity to the under secretary responsible for this decision. Basically, we may have to emphasize the fact that ceiling fans in Ruritania are still a luxury, E_d = 1.66, something rural folks can do without. (Note that while the mathematical value of elasticity is – 1.667, following the convention we use the absolute value during discussion.) Therefore, increasing the price of fans leads to a very sharp decline in the quantity demanded. This decline in quantity demanded wipes out the extra revenue per fan and then some.

CASE IV : Demand Elasticity and Tax Revenue in Taxachusetts

In a recent party election, the Chief Minister of Taxachusetts was elected as the party's nominee for the upcoming presidential election in Nari. On the eve of the general elections, the Chief Minister found himself in a somewhat embarassing situation. Having made his reputation on producing budgetary surpluses for the state budget, he discovers that his latest (proposed) budget will produce a budgetary deficit.

To avoid this dismal and politically damaging eventuality, he decides to raise extra revenue by levying a $0.50 tax on each pack of cigarettes sold in Taxachusetts. The impact of the tax on the cigarette market was quite drastic. Starting from an equilibrium price and quantity of $1.25 and 10 million packs per week respectively, the producers found that after the tax they were only receiving $1.15 net of taxes.

Given an elasticity of demand for cigarettes equal to 0.4, how much revenue can the Chief Minister expect to raise from this tax?

Analysis

We again start by drawing a diagram depicting the facts mentioned in the case.

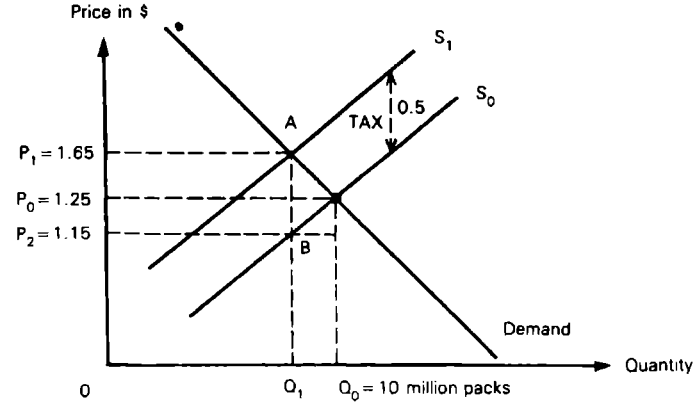


Figure 4.16

(i) In figure 4.16 we depict all the information given in the case. The initial equilibrium is at a price P_o = \$1.25 and quantity Q_0 = 10 million packs per week.

A tax of \$0.50 shifts the supply curve vertically up by this exact amount (For a more detailed explanation of this point, see CASE XI of Chapter 3, page 52). The new equilibrium price is at P_1 and equilibrium quantity is at Q_1 but neither is given explicitly. P_1 can nonetheless be derived because P_2, the net price received by suppliers of cigarettes after paying the tax, is given to be \$1.15. If we add .5 to this, then we know the new equilibrium price P_1 is equal to \$1.65.

(ii) To find how much revenue the Chief Minister expects to raise from this tax, we need to find the new equilibrium quantity Q_1. This can be derived by substituting all available information in the formula for elasticity of demand as follows:

$$E_d = \frac{\dfrac{(Q_1 - Q_0)}{(Q_1 + Q_0)}}{\dfrac{(P_1 - P_0)}{(P_1 + P_0)}} = \frac{\dfrac{(Q_1 - 10)}{(Q_1 + 10)}}{\dfrac{(1.65 - 1.25)}{(1.65 + 1.25)}} = -0.4$$

$$-0.4 = \frac{Q_1 - 10}{Q_1 + 10} \times \frac{1.65 + 1.25}{1.65 - 1.25} = \frac{Q_1 - 10}{Q_1 + 10} \times \frac{2.9}{0.4}$$

$$Q_1 = 8.95$$

Once we know Q_1, we can calculate the total revenue that will be collected by the government, by multiplying the tax collected per pack, i.e. \$0.5 with the new quantity 8.95 million packs. Thus, the tax revenue will be equal to \$ 4.475 million dollars.

Notice, that while in discussing elasticity of demand we ignore the negative sign as per the convention mentioned earlier, we cannot afford to do so while doing calculations as we would get the wrong answer.

The time has finally come to acquire more tools to be able to answer some questions raised in this chapter, which could not be answered with the help of Equipment Set #2.

Question for Class Discussion

In Kawambique a great debate on tax policies is taking place. The background for this is as follows:

The Republic of Kawambique is a major producer of malt used for making whiskey. In fact, whiskey production happens to be a major industry in this country. It has a large number of farmers supplying malt to a large number of distilleries.

Since its independence, the government of Kawambique has always relied heavily on tax revenues generated by a tax on farmers. However, a recent election has resulted in a government which is pro-farmers . One of its first acts after coming to power was the repeal of the tax on farmers and an imposition of an equivalent tax on the distilleries. In other words, the government decided to collect a tax on the use of malt from the distilleries rather than on the sale of malt by farmers. The justification advanced for this act was that farmers had borne the burden for too long and now it was time for the distilleries to pay their dues.

The main opposition party has issued the following statement:

"This is a scandalous act by the government of the rich feudal landlords. A $2.00 tax per bushel on distilleries at the distilleries will hurt distilleries, and hence consumers, more than a $2.00 tax imposed on farmers at their farms because distilleries and hence consumers pay the full amount of the new tax. Whereas, when farmers had to pay the old tax and they could pass on only a part of it to the distilleries and the consumers."

As if the debate was not already confusing, an independent (autonomous) research institute has been quoted in the newspapers as taking the following position:

"Taxes fall where they fall, not where politicians plan to put them."

Many people have called this statement simply an exercise in intellectual obfuscation. To make matters worse, a columnist has suggested in a newspaper that the impact of taxes depends on the relative elasticities of demand and supply. If the demand is relatively more elastic then buyers of malt will be less affected and *vice versa*.

a) What do you think? As a public policy analyst, how would you deal with this debate? What are the issues? What is the effect of these two alternative policies on efficiency and equity?

b) What is the overall effect of the tax on the use of malt and, on the society's welfare? Will the net gain or loss be smaller or larger compared to the one associated with a tax on the sale of malt?

Problems For Practice

1. Price elasticity of demand refers to:
   a. buyer responsiveness to price changes.
   b. the slope of the demand curve.
   c. which way a demand curve shifts when income changes.
   d. how price is determined in the market.

2. If we find that a price causes total revenue to remain unchanged we can conclude that the price elasticity coefficient is:
   a. equal to 1.
   b. less than 1.
   c. greater than 1.
   d. equal to zero.

3. A perfectly horizontal demand curve is described as being:
   a. perfectly inelastic.
   b. perfectly elastic.
   c. unitarily elastic.
   d. relatively elastic.

4. A perfectly vertical demand curve is described as being:
   a. perfectly inelastic.
   b. perfectly elastic.
   c. unitarily elastic.
   d. relatively elastic.

5. In the late 1960s, the demand for male haircuts fell because of the popularity of long hair. To counteract this drop in business, barbers raised the price of haircuts in an attempt to increase their income. As a consequence, many barbers have left the industry because of low income. Which of the following explains this drop in earnings?
   a. Male haircuts are an inferior good.
   b. The demand for haircuts is inelastic.
   c. The demand for haircuts is elastic.
   d. Male haircuts are Giffen goods.

6. If demand is elastic and price is lowered, which will occur?
   a. Quantity sold will decrease.
   b. Total revenue will increase.
   c. Total revenue will decrease.
   d. The firm will necessarily experience a loss in profits.

7. A 20 percent rise in the price of gasoline reduces the amount of gas bought at a particular station by 16 percent. Such a price rise would cause consumers to:
   a. spend a larger amount on gasoline.
   b. spend a smaller total amount on gasoline.
   c. spend the same total amount as before the price increase.
   d. increase the amount of gasoline bought.

8. Which of these products is most likely to have an elastic demand?
   a. milk
   b. mattresses
   c. flour
   d. jewels

9. Which of the following goods would tend to have the most inelastic demand?
   a. houses
   b. color television sets
   c. salt
   d. fur coats

10. The price elasticity of demand coefficient:
    a. is smaller in the long run.
    b. is not affected by time.
    c. is larger in the long run.
    d. varies inversely with time.

11. The elasticity coefficient indicates:
    a. how far businessmen can stretch their fixed costs.
    b. the degree of competition in the market.
    c. the extent to which the demand curve shifts as income changes.
    d. consumer responsiveness to price changes.

12. The price of product X is reduced from $100 to $90 and, as a result, the quantity demanded increases from 50 to 60 units. From this we can conclude that:
    a. the demand for X is elastic.
    b. the demand for X is inelastic.
    c. the demand for X is of unit elasticity.
    d. the demand for X has declined.

13. Suppose the elasticities of demand are 1.42, 0.67, 1.11 and 0.29 for demand schedules D1, D2, D3 and D4 respectively. A 1 percent decrease in price will result in an increase in total receipts in the cases(s) of:
    a. D4 and D1
    b. D2 and D4
    c. D3 and D4
    d. D1 and D3

14. The main determinant of elasticity of supply is:
    a. the number of uses for the product.
    b. the urgency of consumer wants for the product.
    c. the amount of time the producer has to adjust his inputs in response to a price change.
    d. the number of close substitutes for the product available to consumers.

15. The demand for a product is said to be inelastic if:
    a. a drop in price is accompanied by an increase in the quantity demanded.
    b. a drop in price is accompanied by a decrease in the quantity demanded.
    c. the elasticity coefficient is greater than one.
    d. consumers are largely indifferent to a per unit price change.

16. The Illinois Central Railroad once asked the Illinois Commerce Commission for permission to increase its commuter rates by 20 percent. The railroad argued that declining revenues made this rate increase essential. Opponents of the rate incease contended that the railroad's revenues would fall because of the rate hike. It can be concluded that:
    a. the railroad felt that the demand for passenger service was elastic and opponents of the rate increase felt it was inelastic
    b. the railroad felt that the demand for passenger service was inelastic and opponents of the rate increase felt it was elastic.
    c. both groups felt that the demand was inelastic but for different reasons.
    d. both groups felt that the demand was elastic but for different reasons.

CHAPTER FIVE

WELFARE ECONOMICS

CHAPTER FIVE

WELFARE ECONOMICS

Let us start this chapter by recapitulating what we have achieved so far in this book.

Using the supply – demand apparatus developed under Equipment Set #1, we are in a position to identify losers and gainers as a result of an economic policy. For instance, we saw in CASE VIII of Chapter 3, that if the Government of India were to lift the trade ban and allow imports, then consumers would gain and producers would lose. Similarly, in CASE XI of Chapter 3 we saw that a sales tax on the wine industry hurts consumers and producers while it benefits the government by bringing in additional tax revenues.

Further, using the concept of demand and supply elasticities, developed under Equipment Set #2, we can also predict the relative magnitudes of these gains and losses. In Chapter 4 we saw, for instance, that the distribution of the burden of the sales tax between consumers and producers depends on the elasticities of demand and supply.

However, we still do not have a common base to compare the gains and losses of consumers, producers and the government. Thus, we are not in a position to see whether a particular economic policy is, on balance, good or bad for the society as a whole. It is not enough to know, for instance, that consumers benefit while producers lose because of a particular policy. We would also like to know whether the gain to the consumers is more than the loss to the producers if we are to make a policy recommendation.

To overcome this problem we now proceed to acquire Equipment Set #3, and move to a higher level of theoretical sophistication. This equipment set consists of the following two concepts:

1. Consumer's Surplus.
2. Producer's Surplus.

The acquisition of these concepts is our main objective in the next few pages. However, to understand the concept of consumer's surplus we have to improve our understanding of the demand curve. Thus, the logical first step in the discussion of consumer's surplus is the investigation of economic principles operating in the background to justify and explain it.

BEHIND THE DEMAND CURVE

Thus far, we have accepted the law of demand as a common sense notion. We have simply appealed to the following observation in claiming an inverse relationship between price and quantity demanded; A high price usually does encourage consumers to shift to substitutes; a low price typically does encourage them to buy more of the commodity and less of its substitute. Now let us explore another explanation of the downsloping nature of the demand curve which will back up our everyday observation and also make it easier to understand the concept of consumer's surplus.

A good is purchased because someone, somewhere, wants it. A demand for a product exists because it provides someone, somewhere, with satisfaction or utility. Utility is want – satisfying power. It is by no means synonymous with usefulness. Paintings by Picasso may be *useless* in a functional sense of the term yet they are of tremendous *utility* to art connoisseurs. Indeed **marginal utility** is the key concept underlying demand. **Marginal utility is the satisfaction an individual receives from consuming one additional unit of a good or service.**

To illustrate what I am saying, let us consider the case of Chris Warner, a student who is considering how many sailing lessons he should purchase. We ask him to evaluate how much utility or satisfaction he would receive from one lesson, from a second, and a third. His reply is likely to be: "The first lesson would clearly give me the most satisfaction; after studying hard for my exams, I am just dying to get away from it all for a day. The second would give me considerable pleasure, but not quite so much. And less again for the third, since my appetite for sailing gets a bit jaded after a while. And so on."

The message he is giving us is the simple one sketched out in Figure 5.1. His marginal utility decreases as more units are consumed. Since eventually this must be true for every good or service, it is sometimes referred to as the **law of diminishing marginal utility**. But be careful with this "law." Although marginal utility must ultimately fall, it is quite possible that it may rise at first. The first sailing lesson may yield more pain than pleasure, and sailing may not be enjoyable until the second, third, or even fourth lesson. Eventually, however, as more and more lessons are purchased, marginal utility must fall. This is why this law is often referred to as the law of eventually diminishing marginal utility. (For simplicity of exposition, we will deal with an example where marginal utility declines from the very first unit.)

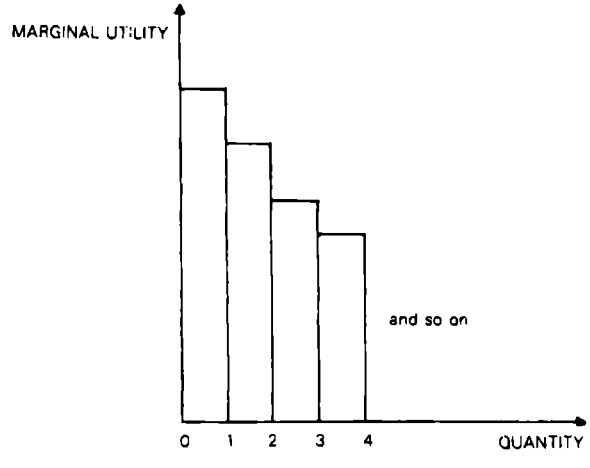


Figure 5.1

So far, Figure 5.1 is imprecise (since we haven't put a unit of measurement on the marginal utility axis). Therefore, we press Chris to be more specific about how highly he values each lesson. He is at a loss to do so until we point out that his evaluation of each lesson should be reflected in how much he would be willing and able to pay for it. Pursuing this line of reasoning, we ask him: "What would you be willing to pay for the first lesson?" When he replies, "Oh, $20," we continue: "And, what would you be willing to pay for the second?" (More precisely, we might ask, How low would the price have to fall before he would be willing to buy two lessons?) In this case, his reply is $17. In this way, we get him to provide the information shown in Figure 5.2.

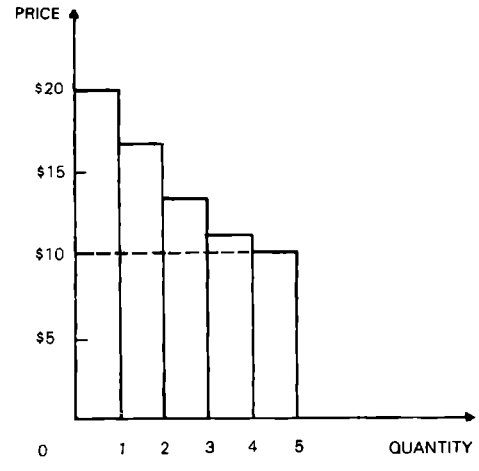


Figure 5.2

Since Chris is very bright, he suddenly realizes: "Figure 5.2 is just my demand schedule. It must be. At any price above $20, I won't buy any lessons. At $20 I'll buy one, because that's what I think it is worth. Only if the price falls to $17 will I buy two lessons. And only if the price falls all the way to $13 will I buy three." Thus you see, when we asked him to give us his marginal utility schedule, the best estimate he could come up with was his demand schedule. This relationship between demand and marginal utility is an important one (and one we shall use frequently in this and future chapters). It can be expressed thus:

The height of a demand curve indicates the marginal utility of the good.

Before we move on to use the above relationship between demand and marginal utility to explain the concept of consumer's surplus, let us see exactly how the consumer decides how much to buy.

Figure 5.2 represents Chris Warner's marginal utility of sailing lessons, and as such it also represents his demand. If all sailing lessons sell for $10, how many will he buy? To answer this, consider his first lesson. Since he values it at $20 (its marginal utility) and it cost him only $10, he will obviously buy it. Similarly, he will also buy the second, third, and fourth lessons because he also values them above their $10 cost. He will stop, however, when he purchases the fifth because the $10 utility it provides is just equal to its $10 cost; he will not really care whether he gets the fifth lesson or not. By convention, economists assume that this last "don't care" unit is, in fact, purchased.

Generally speaking, a consumer will keep buying a good until its marginal utility falls just to the level of its price.

CONSUMER'S SURPLUS

Now, at last, we are in a position to discuss the concept of consumer's surplus. Note that Chris Warner is indifferent to the purchase of the fifth lesson, since it costs exactly the maximum he is willing to pay, but this was not true of the fourth. For that lesson he also paid \$10, even though he was willing to pay as much as \$11. In other words, that fourth lesson provides more benefit or marginal utility (\$11) than its cost (\$10). He gets a surplus or excess benefit over cost, amounting to \$1 on this fourth lesson. Similarly, he gets an even higher consumer's surplus (or \$3) on the third lesson. For all purchases, he gets the shaded consumer's surplus area shown in Figure 5.3.

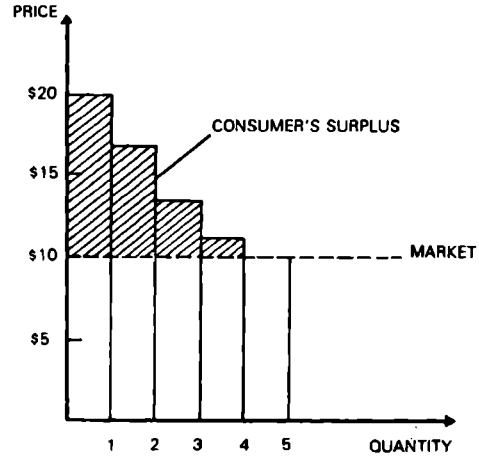


Figure 5.3

So far we have conducted our discussion by visualizing demand as a series of marginal utility bars. If these bars are very, very close to each other, then they will approximate a curve, hence hereafter we approximate it with a smooth demand curve. Remembering that market demand is the sum of the demands of all individuals, all we have said about the demand of one individual will also apply to the market demand.

To summarize, consumer's surplus is the difference between the amounts people would willingly pay for various amounts of specific goods and the amounts they do pay at market prices. Thus the consumer's surplus can be measured as the area below the demand curve but above the price line. That is, area AP_0B in Figure 5.4.

When price falls to P_1, the consumer's surplus increases to AP_1C.

Theoretically speaking, there are some problems with the measurement and use of the concept of consumer's surplus. However, it serves as a great tool for practical decision—making, especially social decisions. It is used extensively in social cost—benefit analysis, such as deciding when the community should incur the heavy initial expenses of constructing a road or bridge. Before we examine the concept of the producer's surplus, let us consider the following case to illustrate the use of the concept of consumer's surplus.

CASE I: Change in Consumer Surplus as a Measure of Benefit from a New Project

In the domestic market for steel in Columbia, the equilibrium price is \$200 per ton and the equilibrium

quantity is 2 million tons. In view of the high price of steel and shortages the government is thinking of building a big steel plant to be run as a public enterprise. The projected impact of building this public enterprise steel plant is that the price will fall to \$150 per ton. The estimated cost of this plant is \$110 million.

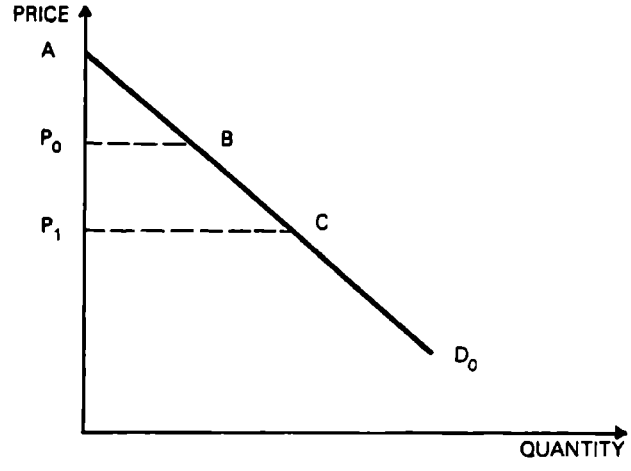


Figure 5.4

The finance minister of Columbia argues, "Since 2 million tons of steel are being consumed, a price reduction of \$50 per ton will bring a total benefit of \$100 million. Obviously, it does not make sense to spend \$110 million of taxpayers' money to bring about benefits worth \$100 million." Evaluate the validity of this statement.

Analysis

(i) Let Figure 5.5 represent the market for steel in Columbia. S_0 and D_0 represent the supply and demand for steel before the public sector steel plant is built.

Welfare Economics

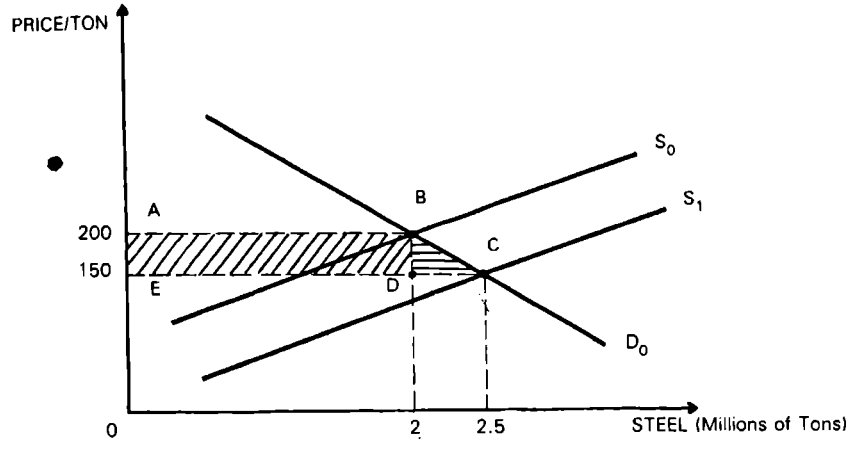


Figure 5.5: Colombian Steel Market

(ii) The effect of the new steel plant is to shift the supply curve to S_1. This leads to a lower equilibrium price and greater equilibrium quantity. Suppose the new equilibrium quantity turns out to be 2.5 million tons of steel.

(iii) The finance minister's reasoning is fallacious because he takes no account of the effect on the quantity demanded at the lower price. If the price is $200 per ton, the quantity demanded is 2 million tons. The new steel plant will reduce the cost of these 2 million tons of steel to the consumer, the savings being the area ABDE, which is equal to $100 million. In addition, however, buyers will purchase 0.5 million tons more if the price is $150 per ton, and the consumer surplus from this amount is equal to the area BCD. In other words, the consumers would be willing to pay an amount equal to the area BCD (in addition to the amount they already pay) for the extra 0.5 million tons of steel. The total benefit to the society from the steel plant is the sum of the two shaded areas in the diagram above (that is, it equals ABCE), not ABDE alone. Thus, the finance minister is underestimating the benefit from the new steel plant. Since the area BCD equals (1/2)(50)(0.5), or $12.5, the total area ABCE, representing change in consumer's surplus, is equal to 112.5. This amount being greater than the estimated cost of $110 million, the steel mill should be built.

Notice that the change in consumer's surplus measures the total benefits of setting up the steel plant.

CASE II : Validity of Traffic Counts as a Measure of Benefits from Highways

Calcutta Metropolitan Authority (CMA) is one of India's oldest municipal organization. Ever since its inception, it has decided on the location of new highway construction based on traffic counts. Their logic in CMA has been that the most heavily travelled roadways must yield the greatest benefit to drivers.

This year Calcutta city is celebrating its tercentenary year and a lot of new things are happening. Among them is a major confrontation between a young engineer and CMA because he has questioned some of the old ways of doing business. In particular, he has questioned the practice of using traffic count as a measure of consumer benefit. Since he is not well trained in economics or management, he is not able to articulate his intuitive feelings and that is why he is attracting flak.

Could you help him out by giving a somewhat rigorous argument?

Analysis

(i) Our young friend has the right gut feeling. To vindicate his position, we can examine the demand curves D_a, D_b, D_c in Figure 5.6.

(ii) Traffic counts are nothing but quantity of travel demanded at zero price. At point M demand curves D_a and D_b have the same quantity demanded. But if the price were to be raised by charging a toll for each trip, consumers would seek out substitute modes of travel, thereby reducing their quantity demanded at higher prices.

The demand curve D_a is relatively more price elastic than demand curve D_b, implying that more substitutes exist for travel in the case of the former than for the latter. If the demand curve is D_b, the consumer's surplus at zero price is OBM but if the demand curve is more elastic as D_a then the consumer's surplus is the much smaller area OAM. Clearly, therefore, traffic counts alone cannot be used to estimate the consumer benefits of particular travel routes.

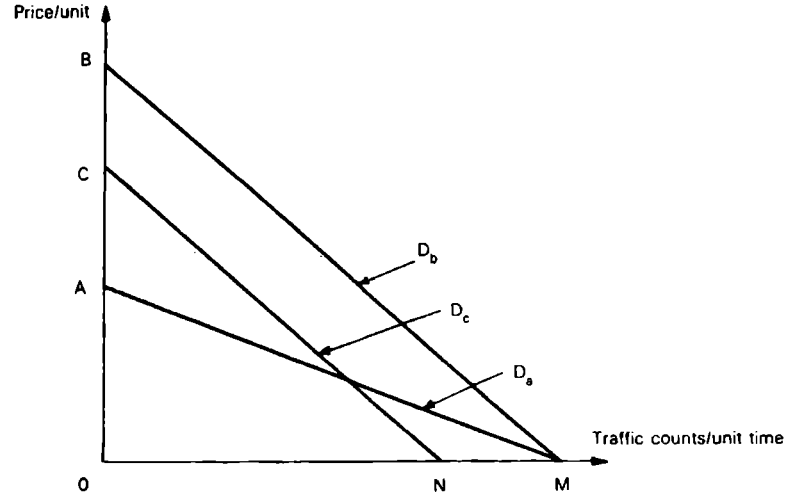


Figure 5.6

To further bolster our young engineer's case suppose that traffic counts along two alternative arteries yield points M and N for demand curves D_a and D_c respectively. We find that the area beneath demand curve D_c is larger than that under D_a. Thus, in this case consumer's surplus is greater for the road with lower traffic count because of the difference in the elasticities of demand for the two roads.

Before we leave this case let us temper our enthusiasm a trifle and remember that consumer's surplus alone cannot provide a complete answer to the investment appraisals, but it certainly helps organize the discussion and may help avoid costly errors in decision making. Once you have the curves in front of you they force your mind to go through the right questions.

PRODUCER'S SURPLUS

Figure 5.7 represents a supply curve. According to Definition 2, mentioned in Chapter 2 (page 26), it shows the minimum prices acceptable for supplying various quantities.

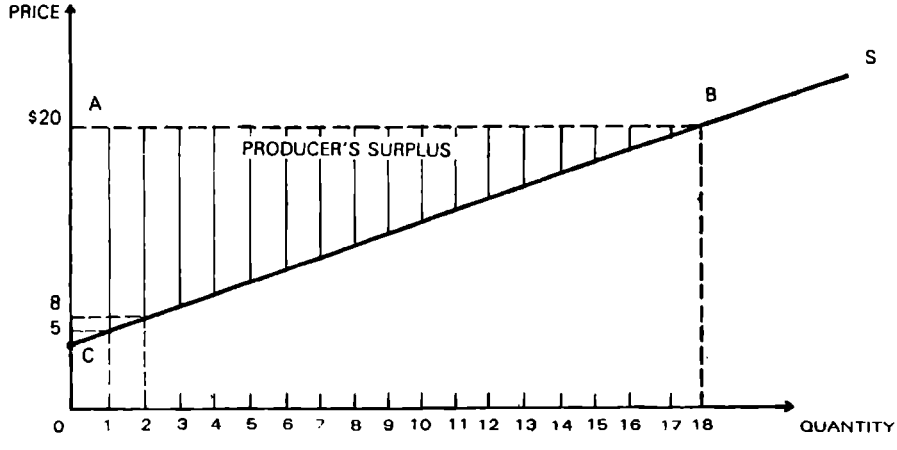


Figure 5.7

Let us suppose that the equilibrium price in this market is set at \$20, and hence for each unit sold the suppliers get a price of \$20. However, we notice that the suppliers were willing to supply the first unit at \$5. Thus, in some sense, they are getting a surplus of \$15 on the first unit. Similarly, producers are willing to supply the second unit of this product for \$8, but they actually get \$20 for it. The surplus on this unit is \$12. This goes on until the last unit supplied, unit 18. On this unit producers are only getting their minimum acceptable price of \$20 and are not reaping any surplus. The total amount of the producer's surplus is the sum of the producer's surplus on each unit and is given by the area ABC.

When price falls the producer's surplus decreases and *vice versa*. In Figure 5.8 we see that when price falls from P_0 to P_1, the producer's surplus decreases from P_0BC to P_1EC.

Finally, let us see how the producer's surplus and consumer's surplus look when the market is in equilibrium. In Figure 5.9, ABP_0 is the consumer's surplus, and CBP_0 is the producer's surplus.

Having become familiar with the essentials of Equipment Set #3 let us start using it immediately. Basically, we will try to find out whether the society gains or loses on balance as a result of various economic policies. Even though, using Equipment Sets #1 and #2, we were able to identify the losers and gainers and the extent of their losses and gains, we could not answer this question. The concepts of consumer's surplus and producer's surplus provide us with a basis for comparison and, hence, make it possible to answer this crucial question.

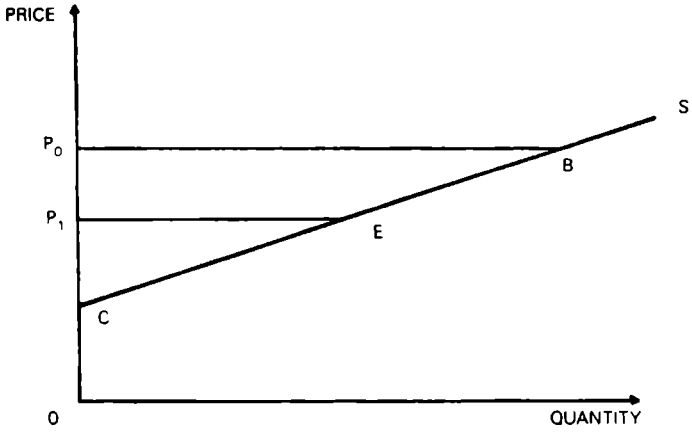


Figure 5.8

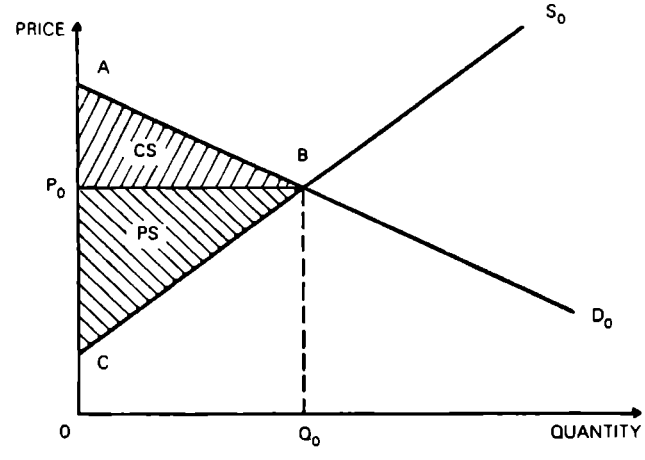


Figure 5.9

PREVIOUS CASES REVISITED: Further Insights

1. Incidence of Sales Taxes:

Figure 5.10 shows the effect of a tax on a market for a particular commodity. Before the tax, equilibrium price is P_0 and the equilibrium quantity is Q_0. After the sales tax is imposed, the supply curves shift to the left and the equilibrium price rises to P_1, and equilibrium quantity decreases to Q_1. The balance sheet of the tax incidence looks like the one shown in Table 5.1. It shows who benefits and who loses as a result of the imposition

of a sales tax. Unfortunately, Equipment Sets #1 and # 2 could not tell us which side of the tax balance sheet is greater. We could not tell whether the negative effects are greater than the positive effects, or *vice versa*. At last, however, we are in a position to tell which side of Table 5.1 is greater. This is made possible, of course, by the use of the concepts of consumer's surplus and producer's surplus.

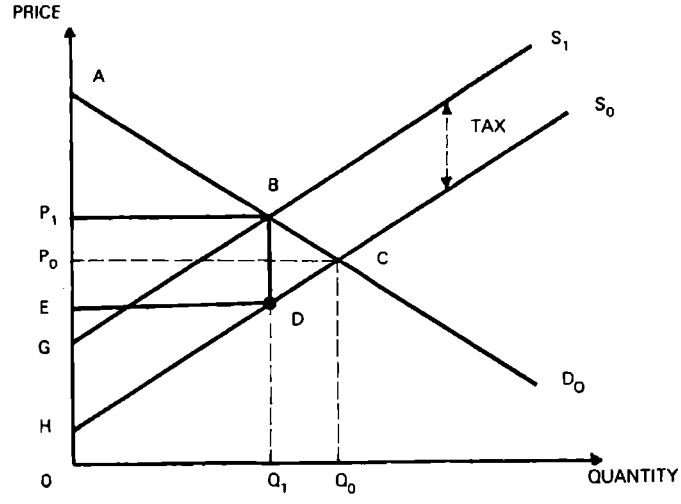


Figure 5.10

Table 5.1: Effects of Tax

Effects of Tax	
+	−
Government Revenues	Consumers Producers

Table 5.2 summarizes the effects of the tax on consumer's surplus (hereafter referred to as CS) and producer's surplus (hereafter referred to as PS), and the government's surplus.

Table 5.2

	Before Tax	After Tax	Changes
Consumer's Surplus	ACP_0	ABP_1	$-P_1BCP_0$ (decrease)
Producer's Surplus	HCP_0	HDE	$-P_0CDE$ (decrease)
Government Revenue	Zero	P_1BDE	$+P_1BDE$ (increase)
		NET CHANGE : −BCD (net loss)	

The conclusion that emerges is that gain to the government is less than the loss in welfare suffered by consumers and producers. This net loss, shown in Figure 5.10 as the triangle BCD, is referred to as the dead – weight loss. It is a dead – weight loss because nobody benefits from it. In other words, it is not transferred to another party as is the area P_1BDE which is transferred to the government. It is an efficiency loss resulting from government interference with the market.

So, have we proved that taxes create inefficiencies and are evil? Does this mean all taxes should be abolished, as they impose a dead – weight loss on the society? Obviously not. What, then, is wrong with our reasoning?

Nothing is wrong with our reasoning and there is no contradiction involved. The problem lies with our assumption about the value of the government revenue. In our analysis, we have assumed that a dollar in the hands of the government has the same value as a dollar in the hands of consumers and producers. Now this is a debatable point. The government performs many important functions such as the defense of the country, maintenance of law and order within the country, protection of the economically weaker sections of the society and direction of the economic growth process. Hence, it is reasonable to say that in most countries, people will collectively put a higher value on the money possessed by the government than on private wealth. This is a matter of "normative" economics, and I do not want to pursue it any further.

But suppose a particular country believes that a dollar in the hands of the government is worth two dollars in the hands of the people, and you can see that the net effect of a tax could very well be positive. In Table 5.2 we have to multiply the government revenue figures, P_1BDE, by two to make them comparable to CS and PS. Once this is done, I am sure the net change box will show a net gain.

2. Determinants of Dead – Weight Loss:

Before you move on to examine the welfare effects of free trade, allow me to discuss just one more case of taxation. The reason I am doing this is to show you the connection between the elasticities of demand and supply and the magnitude of the "dead weight" loss.

Let Figure 5.11 represent the market for Interferon, the new miracle drug famous for its phenomenal success in curing cancer. The demand for something like this is likely to be very inelastic. For simplicity of exposition, let us assume it is perfectly inelastic.

Table 5.3 summarizes the effects on CS, PS, and government revenue of a tax on Interferon. Make sure you understand why consumer surplus is infinite. Just ask yourself, how much are the consumers willing to pay for the first unit of Interferon and how much do they actually pay?

Notice that there is no efficiency loss, in fact, there is a net gain. The general principle that emerges from this is that the **more inelastic the demand curve, the less is the dead weight loss.**

In the extreme, with a perfectly inelastic demand, there is no dead weight loss at all. Thus, one of the rules of thumb for tax policy makers is to tax those commodities which have more inelastic demands. Thus, popular targets are cigarettes, beer and tobacco. (Please confirm, on your own, that it is also true that the more inelastic the supply curve the less is the dead – weight loss.)

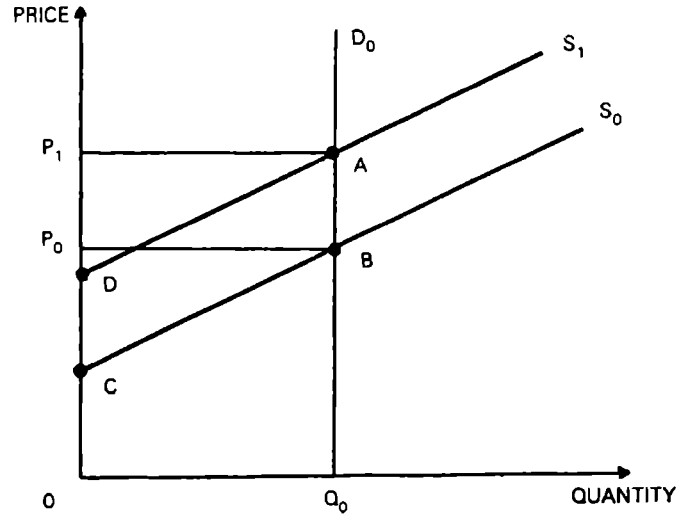


Figure 5.11: Market for Interferon

3. Welfare Implications of Free Trade:

Let us now turn, once again, to CASE VIII of Chapter 3 (page 45). We found that the effect of allowing woollen imports was that consumers benefited while producers lost. However, we could not say, at that time, whether on balance the society gained or lost by this policy action. Fortunately, we are in a position to complete that job.

Table 5.3

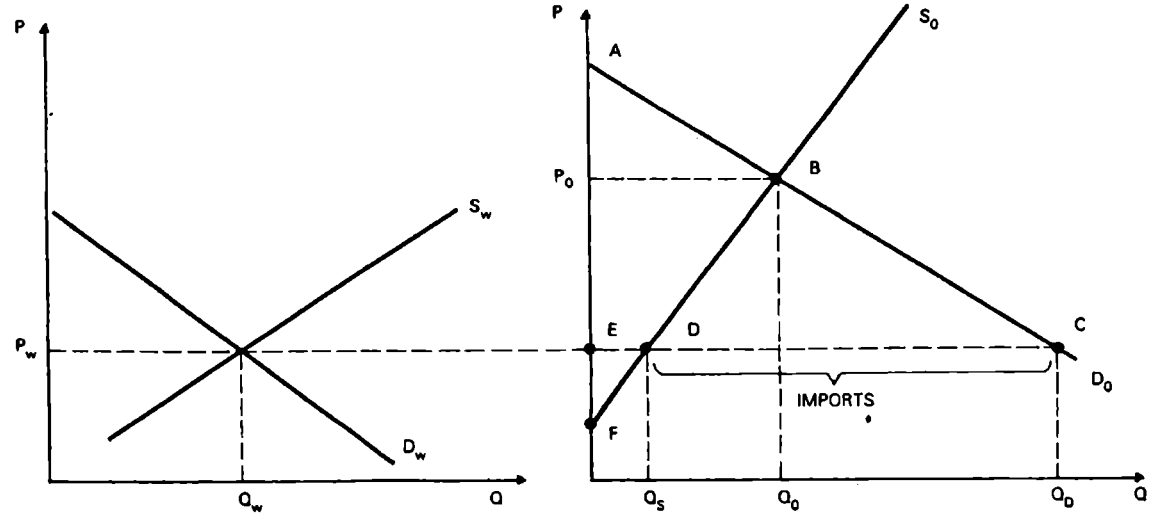
	Before Tax	After Tax	Changes
Consumer's Surplus	Infinite	Infinite	0
Producer's Surplus	P_0BC	P_0BC	0
Government Revenue	Zero	P_1ABP_0	$+P_1ABP_0$
		NET CHANGE : $+P_1ABP_0$ (Net Gain)	

Figure 5.12 shows the effect on the domestic market of allowing imports. I don't think it needs any explanation, as we have gone through it in detail earlier. Table 5.4 summarizes the changes in CS and PS.

Table 5.4

	Before Trade	After Trade	Changes
Consumer's Surplus	ABP_0	ACE	$+P_0BCE$ (Increase)
Producer's Surplus	FBP_0	EDF	$-P_0BDE$ (Decrease)
		Net Change: BCD (Net Gain)	

What we find is that the society on balance gains from free trade. In fact, this kind of reasoning has been behind the supporter for free trade. I don't think this is the place to get into a discussion of free trade versus non-free trade. However, I would like to point out that this is, of course, a very "static" way of looking at things. Besides, whether one should have free trade or not is not a matter of economics only; it is as much a matter of international politics and strategic considerations. In any case, our objective in these chapters is not to solve these problems and come up with cookbook solutions, rather, it is to demonstrate how economists think and how economics may help one to think more effectively about these problems.



World Market **Indian Market**

Figure 5.12

4. Welfare Implications of Tariff:

For those who may have become excited with the use of the CS and PS, let me analyze just one more case. Let us see the welfare implication of a tariff imposed on imports. Figure 5.13 shows the effect of a tariff.

I don't think it needs any further explanation. For details, see CASE X of Chapter 3 (page 48). Table 5.5 summarizes the welfare effects and gives us the net change in society's welfare.

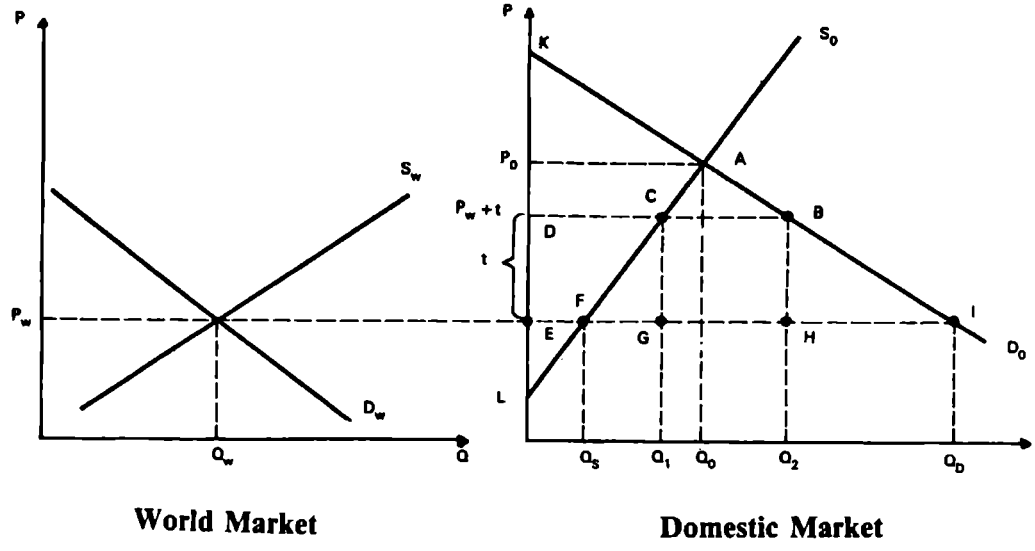


Figure 5.13

Notice that there are two triangles, CGF and BHI, representing the "dead-weight loss."

Table 5.5

	Before Tariff	After Tariff	Changes
Consumer's Surplus	EKI	DKB	−DBIE
Producer's Surplus	EFL	DCL	+DCFE
Government Revenue	Zero	CBHG	+CBHG
		Net Change:	−CGF−BHI (Net Loss)

Before we end this chapter, let us pause and consider, once again, what we have achieved and what we have not achieved so far. Indeed, our tool kit is beginning to get filled up but still some very important tools are missing.

For instance, we have been showing favoritism towards demand. While discussing elasticities, the discussion of demand elasticity was much more exhaustive and detailed than the discussion of elasticity of supply. Similarly, the discussion of the consumer's surplus was much more rigorous than that of the producer's surplus.

Now, as objective theoreticians, dabbling in positive economics, we cannot let this imbalance go uncorrected, especially when we know that the demand and supply sides of the market play an equally important role in determining prices in the market. Demand and supply are like the two blades of a pair of scissors; one cannot say which one is more important. One needs both the blades to cut paper, even if one blade is not moving.

Thus in Chapter 6 we will begin our journey to explore the territory behind the supply curve. Our chief objective will be to explain, in more satisfactory terms than we have done thus far, why the supply curve has the shape it has (and we know how crucial the shape of the supply curve is for policy formulation).

Also, remember that we started our discussion by saying that the three central problems of an economy are solved by prices in a market economy. For simplicity we automatically assumed that all markets are perfectly competitive, with large numbers of buyers competing with large numbers of sellers. Admittedly, some markets resemble this ideal competitive situation, but there are a lot of imperfectly competitive markets, for instance, monopolies and oligopolies. To be good economists we must also be able to solve problems dealing with these kinds of markets. Unfortunately, with the three equipment sets at our disposal we cannot analyze problems related to these market forms. Thus, the need for Equipment Set #4, which we will develop in Chapter 6.

Question for Class Discussion

Please read the following editorial from The Metropolitan Times and answer these questions:

a) Illustrate the arguments in the editorial with the help of a diagram.
b) Explain (using consumer's surplus, producer's surplus and other concepts) how did Ms. Marla Hill arrive at the specific number: $68,000.00.

Metropolitan Times

Metropolis, Tuesday, August 13, 1985

Pay $68,000, Save a Shoemaker

Defying the pleas of some 40 senators, President Reagan seems ready to deny import protection to the shoe industry. Instead, aides say, he'll offer long-overdue measures to stop imports of counterfeit brand-name products.

That will be a double victory. The anti-counterfeiting measures are not a dangerous concession to protectionism; they are necessary justice. To succumb to shoe tariffs would push up prices and damage the economies of our trade partners, while saving few jobs. Indeed, this shoe-industry case is a classic example of the dangers of trade restrictions.

But even if the President holds firm, that so much pressure could be exerted on behalf of such an unworthy cause demonstrates how much the political tides have turned towards protectionism. If Mr. Reagan hopes to resist that, he'll need more than firmness. He'll have to offer an alternative to workers displaced by imports.

Imports account for about 75% of the shoes Americans will buy this year, compared with 48% in 1980. Last spring, the U.S. International Trade Commission ruled that domestic producers had been injured and recommended a 24% cutback in imports of shoes with a wholesale price above $2.50 a pair. With Congressional delegations from a dozen states working hard on behalf of domestic producers, it was widely assumed that the White House would go along.

But the President evidently wants to make a principled stand against protection, and with good reason. The growth of shoe imports reflects fundamental, desirable change in the world economy. Shoemaking requires a lot of labor and relatively little capital or organizational skills. That makes it an ideal growth industry in industrializing countries like Brazil, South Korea and Taiwan. They are now leading makers of cheap and medium priced footwear. In fact, all three depend heavily on shoe export earnings to service foreign debts and modernize their economies.

For mirror-image reasons, shoes are "a sunset industry" for advanced economies which must allow the shift of labour to more complex, capital-intensive enterprises or accept stagnating living standards. The price of blocking such change can be measured. According to Marla Hill of the Advanced Institute for International Economics, the proposed shoe quota would save the jobs of only 33,000 American workers at an annual cost, in higher shoe prices, of $68,000 per job.

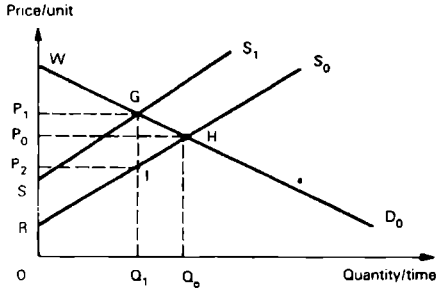
The displacement of workers by imports in recent years does not damage the economy as a whole. Many more jobs, generally better jobs, have been created by private enterprise than have been destroyed by import competition. But such abstractions mean little to a shoe worker in Maine whose company is in trouble. And industries facing import competition are learning fast that they can often stop changes by organized political action.

Shoe producers didn't succeed, this time. But larger industries including cars, steel and apparel have been remarkably successful in stopping or slowing change. So policy makers who want growth must do more than nobly pledge allegiance to free trade. They have a moral and practical obligation to limit the burden individual workers must bear.

Whether this should be done with extended unemployment benefits or retraining or moving allowances isn't clear. It might be clearer had this Administration been willing to invest to find out. If free-traders continue to ignore displaced workers, America will pay, in ever-greater protectionism, ever-slower productivity and ever-higher prices.

Problems for Practice

The government of Camelot is proposing a new tax on the production of cigars. The ruling party concedes that both the consumers and the producers will bear the burden of such a tax. However, it believes the benefits will outweight the burden. The opposition party does not buy this argument and is mounting a massive counter attack to force the government to change its mind. Given this background, answer questions 1 through 8 based on the following diagram.



Market for Cigars

1. Consumer's surplus before the tax is equal to:
   a. P_1 G H P_0
   b. W P_1 G
   c. P_0 H W
   d. P_0 H R

2. Consumer's surplus after the tax is equal to:
   a. P_1 G H P_0
   b. W P_1 G
   c. P_0 H W
   d. P_0 W G
   e. P_0 H R

3. Therefore change in consumer's surplus is equal to:
   a. P_1 G H P_0
   b. W P_1 G
   c. P_0 H L P_2
   d. G H I
   e. P_1 P_2 I G

4. Producer's surplus after tax is equal to:
   a. P_1 G H P_0
   b. P_0 H I P_2
   c. P_0 H R
   d. P_2 I R
   e. G H I

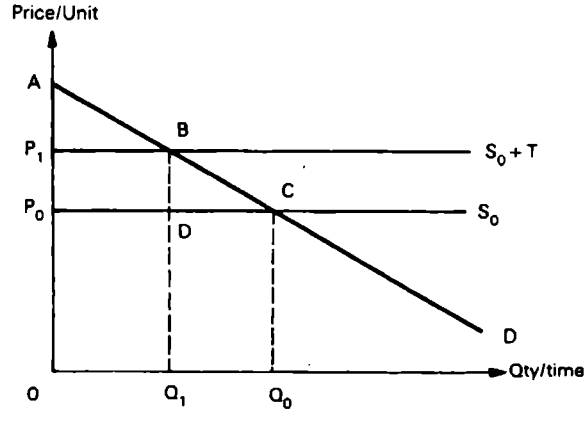
5. Government revenue from the tax is equal to:
   a. P_1 G H P_0
   b. P_1 G H I P_2
   c. P_1 P_0 H I
   d. P_1 G I P_2
   e. P_1 G Q_1 O

6. The effect of this tax in the diagram is a:
   a. Net gain equal to G H I
   b. Net gain equal to P_1 G H I P_2
   c. Net loss equal to G H I
   d. Net loss equal to P_1 G H I P_2
   e. Neither a gain or a loss

7. Under what conditions is this tax likely to produce a net loss?
   a. Always
   b. Never
   c. When a dollar in the hands of consumers and producers is treated equal in value to a dollar in the hands of the government.
   d. When a dollar in the hands of the consumers and producers is not as valuable as the dollar in the hands of the government.

8. Under what conditions is this sort of tax likely to produce a net gain?
   a. Always
   b. Never
   c. When a dollar in the hands of consumers and producers is treated equal in value to a dollar in the hands of the government.
   d. When a dollar in the hands of the consumers and producers is not as valuable as the dollar in the hands of the government.

Now suppose that the demand and supply situation in the cigar market of Camelot is as shown in the following diagram. Answer questions 9 through 11 based on this diagram.



9. Change in the consumer's surplus as a result of the tax is equal to:
   a. A B P_1
   b. P_0 A C
   c. P_1 B C P_0
   d. B D C
   e. None of the above.

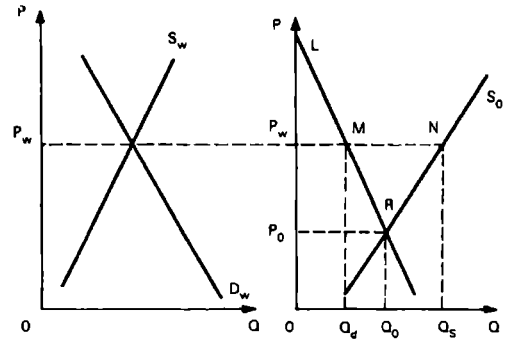
10. Change in producer's surplus as a result of the tax is equal to:
   a. A B P_1
   b. P_0 A C
   c. P_1 B C P_0
   d. B D C
   e. None of the above

11. The effect of tax on this market is:
   a. Net loss equal to P_1 B D P_0
   b. Net loss equal to B D C
   c. Net gain equal to P_1 B C P_0
   d. Net gain equal to B D C

Once upon a time the American Government banned all international trade in wheat. The result was that even though the world price of wheat was very high the domestic wheat price in America remained very low.

However, this situation did not last too long. The powerful farm lobby, chagrined at the missed opportunities to sell wheat at a much higher price abroad, lobbied intensively and in time prevailed upon the then administration. The trade restrictions were removed and free buying and selling of wheat was allowed

The following self-explanatory diagram depicts the situation before and after the trade restrictions were lifted. Answer question 12 through 13 based on this diagram.



World Market for wheat **Market for wheat in U.S.A.**

12. Consumer's surplus after trade is equal to:
   a. P_W N R P_0
   b. L R P_0
   c. L P_w M
   d. M N R
   e. None of the above

13. Change in producer's surplus as a result of trade is equal to:
   a. P_w N R P_0
   b. L R P_0
   c. L P_w M
   d. M N R
   e. None of the above

CHAPTER SIX

THE COST OF PRODUCTION

CHAPTER SIX

THE COST OF PRODUCTION

Our main objective in this chapter is to become familiar with Equipment Set #4. This equipment set consists of the following important concepts:

1. Total Cost, Total Fixed Cost, Total Variable Cost
2. Average Cost, Average Fixed Cost, Average Variable Cost
3. Marginal Cost.

Now, this is indeed a long list of concepts and it will take considerable time and effort on our part to become familiar with it. Therefore, before we undertake this long journey into this jungle of costs, let us convince ourselves that it is worth it. We did give a justification of sorts at the end of Chapter 5, but let us be more specific.

We know that product prices are determined by the interaction of the forces of demand and supply. Hence, a complete understanding of how prices are determined requires a complete understanding of the forces of demand and supply. However, preceding chapters have focused our attention upon the factors underlying demand to the neglect of factors underlying supply. Thus it is only logical to now begin our examination of factors underlying the supply curve.

But the question is this: Is it really necessary to study these factors underlying the supply curve? We seemed to be doing fine without them in the previous chapters, where we analyzed so many real-world-like problems; so why bother now?

I guess the best way to show the limitations of Equipment Sets #1, #2 and #3, and the potential of Equipment Set #4, is to list some questions and issues which cannot be analyzed without the help of Equipment Set #4.

(a) What will be the shape of the supply curve of a firm or industry in the short-run and in the long-run?

(b) What is the price a monopolist is likely to charge? How much profit is the monopolist likely to make? How can monopolies be controlled? This area is especially relevant for public enterprises, as many of them are state monopolies.

(c) How should price be set in a public enterprise which is not a state monopoly?

(d) What policies can be implemented to curb pollution?

(e) If you are the manager of a firm, how much should you produce and what price should you charge? And so on and so forth.

On the assumption that the majority of you will find these questions interesting enough, let us proceed with the acquisition of Equipment Set #4. To facilitate our understanding, I have divided the discussion into three parts:

Part A: A general discussion of the nature of costs in economics.

Part B: Production costs in the short-run.

Part C: Production costs in the long-run.

PART A: A GENERAL DISCUSSION OF THE NATURE OF COSTS IN ECONOMICS

In this part we will answer the following three questions:

1. What is an economist's notion of costs? How is it different from an accountant's notion of costs?

2. What is an economist's notion of profits, and how is it different from an accountant's use of the term?

3. What is the difference between short-run and long-run as used in the context of costs?

Let us discuss these questions one by one.

The Difference between an Economist's and an Accountant's Definitions of Costs

Whenever economists talk about "cost," they mean "opportunity cost." This fact is so well-known that most of the time the word "opportunity" is dropped and only the word "cost" is used. In these chapters, too, whenever I talk about costs, I actually mean opportunity costs.

As we saw in Chapter 1, the concept of opportunity cost implies the idea of sacrifice. If something has an opportunity cost, we understand that something else must be given up in order to acquire it. The steel that is used for armaments is not available for the manufacture of automobiles or apartment buildings. If an assembly line worker is capable of producing automobiles or washing machines, then the opportunity cost to society in employing this worker in an automobile plant is the contribution he would otherwise have made in producing washing machines. The opportunity cost to you in reading this chapter is the alternative uses of your time which you must forego.

From the point of view of an individual firm, the cost of production (or the opportunity cost of production) consists of all the sacrifices made in order to produce and supply a particular quantity of goods. These sacrifices can be either explicit or implicit. The actual monetary payments — that is, cash outlays which a firm makes to those "outsiders" who supply labor services, materials, fuel, transportation services, power, and so forth — are

called **explicit opportunity costs** or simply **explicit costs.** These represent explicit sacrifices because the money you spend on them is not available for other uses.

But in addition, a firm may use certain resources it owns. This represents an implicit sacrifice. The firm doesn't pay money to anybody so no explicit sacrifices are incurred. Yet, it is sacrificing the money these self-employed resources could have earned in their best alternative employment. Thus, the amount these self-employed resources could have earned is called the **implicit opportunity cost** or simply **implicit cost.**

To illustrate, suppose Bruce operates a corner grocery as a sole proprietor. He owns his store building and supplies all his labor and money capital. In other words, he has not hired any workers nor has he borrowed money from anyone. Though his enterprise has no explicit rental or wage costs, implicit rents and wages are incurred. By using his building for a grocery store, Bruce sacrifices the $400 monthly rental income which he could otherwise have earned by renting it out. Similarly, by using his money capital and labor in his own enterprise, Bruce sacrifices the interest and wage incomes which he otherwise could have earned by supplying these resources in their best alternative employment. Finally, by running his own enterprise, Bruce foregoes the earnings he could realize by supplying his managerial talents in someone else's firm.

The minimum payment required to keep Bruce's entrepreneurial talents engaged in this enterprise is sometimes called **NORMAL PROFIT.** Suppose the maximum amount he can get for his managerial talents in the open market is $4,000. Then this is the minimum profit he must make to keep managing his business. If he makes a profit of $3,000, then it doesn't make sense for him to work in his own business unless making a maximum profit is not his sole objective. (More about objectives later.) As is true of implicit rent or implicit wages, this minimum amount ($4,000) required to keep him performing the managerial function in his shop is an implicit cost.

The difference between an economist's conception of costs and an accountant's conception of costs lies in the fact that when accountants talk about costs, they only include explicit costs, whereas economists include as costs all payments, explicit and implicit.

The Difference between an Economist's and an Accountant's Definition of Profit

Our discussion of economic costs correctly suggests that economists and accountants use the term "profits" differently. By "profits", the accountant generally means total receipts less explicit costs. But to an economist, profits means total receipts less all costs (explicit and implicit, the latter including a normal return to the entrepreneur). Therefore, when an economist says that a firm is just covering its costs, he means that all explicit and implicit costs are being met and that the entrepreneur is receiving a return just large enough to continue in his present line of production. If a firm's total receipts exceed all its economic costs, any residual accrues to the entrepreneur. This residual is called an **economic** or **pure profit.** It is not a cost, because by definition it is a return in excess of the normal profit required to retain the entrepreneur in this particular line of production.

In these chapters, not very surprisingly, we shall use the economist's definitions of costs and profits. However, this is not meant to imply that the accountant's concepts are irrelevant to economic behavior. Indeed, book-keeping methods are integrally important to any manager's decision-making process because they can greatly affect the rate of taxation to be applied against profits. Accounting costs also have the desirable property of being readily available sources of data. Since the economist's definition is never used to calculate the profits and costs of private companies and corporations, it is usually necessary to use some accounting concepts for empirical work. The economist's definitions do, however, have the advantage of being broadly applicable to

all firms and of forming a conceptually consistent system. They are, therefore, best suited for a general theoretical analysis.

Let me end this section by giving a case to illustrate what we have discussed in this section so far.

CASE I: Ignoring Implicit Costs can be Misleading

Mr David Stockman was an economist working with a consulting firm in 1977. At the time, he was earning $23,000 as salary, $10,000 as rents from the building he owned and $3,000 as interest and dividends on his financial assets.

He was not very happy with his job, so on New Year's Day in 1978, after deciding to quit his job and evict his tenants, he set up a health food restaurant. At the end of the year his books tell the following story.

1. **Total Revenue from Sales:** $150,000

2. **Total Cost:**

Advertising Expenses	$10,000	
Cost of Food	$85,000	
Employee's Wages	$20,000	
Utilities	$ 5,000	
Taxes	$ 5,000	
		$125,000

3. **Profits** = Total Revenue − Total Costs = $25,000

His book-keeper is happy and sends him a congratulatory note. Do you agree with the book-keeper's assessment? What will you tell Mr. Stockman?

Analysis

Obviously, the book-keeper has used the accountant's definition of costs when he speaks of total costs. We should point out to Mr. Stockman that there are certain implicit costs which his book-keeper has ignored. For instance, the opportunity cost of his time is at least $23,000, because this is the opportunity foregone by working in his restaurant. Further, by using his building and money in the business he is also sacrificing the opportunity of collecting $10,000 as rents and $3,000 as interests and dividends. Hence, the total implicit costs are equal to:

Salary	$23,000
Rent	$10,000
Interest	$ 3,000

4. **Total Implicit Costs:** $36,000

Therefore,

5. Economic Profit = Total Revenue − Explicit Cost − Implicit Cost

= − $11,000

We should thus tell him that he must be some kind of an idiot not to recognize that he has lost his shirt in this hare-brained business.

Accountants are increasingly recognizing the inadequacies of conventional book-keeping concepts of costs and profits, and are changing their procedures so that business decisions are based on data that reflect economic realities. Thus after calculating taxable profits, good accountants will adjust profits for implicit costs in order to provide management with a better picture of the firm's real track record. Too many businesses have experienced positive "accounting profits" when economic profits were negative; they closed down even though they were "profitable" according to book-keepers.

Difference between Short Run and Long Run

The costs which a firm or an industry incurs in producing any given output will depend upon the type of adjustments it is able to make in the amounts of the various resources it employs.

Suppose there is a firm which is producing 1,000 compressors per week for air-conditioners. Now, suppose that due to exceptionally hot weather there is a great spurt in the demand for air-conditioners, and hence the demand for compressors also increases tremendously from 1,000 to 2,000 units per week. However if the firm wants to produce 2,000 compressors per week instead of 1,000 compressors per week at the lowest cost, then it will have to hire 80 more workers and 30 additional units of machinery.

So, if the firm is able to hire 80 extra workers and 30 extra machines, then its costs will be very low, otherwise they will be higher. How high or how low the costs will be, depends on the success or failure of this firm in making these adjustments in the amounts of these resources.

The quantities of many of the resources employed — labor, raw materials, fuel, power and so on — can be varied easily and quickly. However, the amounts of other resources demand more time for adjustment. For example, the capacity of a manufacturing plant, that is, the size of the factory building and the amount of machinery and equipment therein, can only be varied over a considerable period of time. In some heavy industries, it may take several years to alter plant capacity.

These differences in the time necessary to vary the quantities of the various resources used in the production process make it essential to distinguish between the short run and the long run. The short run refers to a period of time too brief to permit an enterprise to alter its plant capacity, yet long enough to permit a change in the level at which the fixed plant is utilized. The firm's plant capacity is fixed in the short run, but output can be varied by applying larger or smaller amounts of manpower, materials and other resources to that plant. Existing plant capacity can be used more or less intensively in the short run.

From the viewpoint of existing firms, the **long run** refers to a period of time extensive enough to allow these firms to change the quantities of all resources employed, including plant capacity. From the viewpoint of an industry, the long run also encompasses enough time for existing firms to dissolve and leave the industry and for the new firms to be created and to enter the industry.

Thus while the short run is a "fixed-plant" period of time, the long run is a "variable-plant" period of time.

Some examples will make clear the distinction between the short run and the long run. If a Ford factory were to hire an extra 100 workers or to add an entire shift of workers, this would be a short run adjustment. If the same factory were to add a new wing to its building and install more equipment, this would be a long-term adjustment.

It is important to note that the short run and long run are conceptual rather than specific calendar time periods. The length of the short run and the long run depends on the particular industry we are talking about. A small firm making men's clothing can increase its plant capacity in a few days or less by ordering and installing a couple of new cutting tables and several extra sewing machines. But it may take Ford several years to construct a new assembly plant and to install elaborate assembly line equipment.

Now that we know the precise meanings of costs in economics and the concept of short run, let us analyze the nature of costs in the short run in the next section.

PART B: PRODUCTION COSTS IN THE SHORT RUN

The main question to be answered in this section is, how does the cost of production change, in the short run, when the quantity produced increases?

We know that a firm's cost of producing any output will depend on two things:

1. Prices of needed resources.
2. The productivity of these resources.

Since we assume, for simplicity, that the prices of resources are constant in the short run, the cost of producing a given output will depend entirely on the productivity of the resources.

Therefore, to see how the cost of producing any given output changes as more is produced, we have to see how the productivity of resources changes as more of these resources are employed to produce greater quantities of output.

However, in the short run, the only way output can be increased is by using more variable resources because in the short run one cannot increase the plant capacity. Thus, the main question of this section, how does the cost of production change, in the short run, when quantity produced increases, boils down to the following question: How does the productivity of variable resources change as more and more variable resources are added to the firm's fixed resources?

The answer to the above question is provided in general terms by the **LAW OF DIMINISHING RETURNS.** The next logical step, then, is to examine this law. Let us start our discussion of this law by precisely defining it:

The law states that **as successive units of a variable resource (say, labor) are added to a fixed resource (capital), beyond some point the extra, or marginal, product attributable to each additional unit of the variable resource will decline.**

Stated somewhat differently, if additional workers are applied to a given amount of capital equipment, as is the case in the short run, eventually a situation will be reached in which each additional unit of labor will add less to total production than did the previous one. To illustrate, consider the use of a variable number of workers in a manufacturing operation. If there is only one worker, that worker must do all the tasks, shifting from one to another and becoming competent in each. As a second, third, and subsequent workers are added it is often possible to break the tasks into a large number of separate jobs, with each laborer specializing in one job and becoming an expert at it. This process is called the **division of labor.** If additional workers permit more and more efficient divisions of labor, marginal product will be rising. This may go on for some time, but (according to the law of diminishing returns) the scope for such increases in the labor productivity must eventually disappear, and sooner or later the marginal product of additional workers must decline. When this happens, each additional worker will increase total output by less than the previous worker increased it. Eventually, marginal product may reach zero and even decline. It is not hard to see why, when you consider the extreme case where there are so many workers in a limited space that additional workers simply get in the way.

Table 6.1 illustrates the law of diminishing returns numerically. In this case, the point of diminishing marginal product occurs with the hiring of the third worker. Total product is found by simply adding the extra, or marginal, product attributable to each successive worker. Total product will increase so long as marginal product is positive.

Table 6.1

Inputs of the variable resource	Total Product	Marginal Product
0	0	0
1	5	5
2	13	8
3	18	5
4	22	4
5	25	3
6	27	2
7	27	0
8	26	-1

With the help of the law of diminishing returns we can now answer the main question of this section: How does the cost of production change, in the short run, when the quantity produced increases? The answer is that in the short run, as we produce more by employing more variable factors, beyond some point the productivity of the variable factor will decrease and the cost of production would thus increase. This description of short run cost behavior is indeed imprecise and, hence, our next step is to study the behavior of costs more precisely.

It is possible to look at the same cost data from three different points of view: (a) total cost, (b) average cost, and (c) marginal cost. To see what we mean by these terms we shall use the hypothetical cost data for an individual firm given in Table 6.2.

Table 6.2: Total, Average, and Marginal Cost Schedules for an Individual Firm in the Short Run

Total Cost data, per week					Average cost data, per week		Marginal Cost data, per week
(1) Total Product (Q)	(2) Total Fixed Cost (TFC) ($)	(3) Total Variable Cost (TVC) ($)	(4) Total Cost (TC)[a] ($)	(5) Average Fixed Cost (AFC)[b] ($)	(6) Average Variable Cost (AVC)[c] ($)	(7) Average Total Cost (ATC)[d] ($)	(8) Marginal Cost (MC)[e] ($)
0	100	0	100	—	—	—	—
1	100	90	190	100.00	90.00	190.00	90
2	100	170	270	50.00	85.00	135.00	80
3	100	240	340	33.33	80.00	113.00	70
4	100	300	400	25.00	75.00	100.00	60
5	100	370	470	20.00	74.00	94.00	70
6	100	450	550	16.67	75.00	91.67	80
7	100	540	640	14.29	77.14	91.43	90
8	100	650	750	12.50	81.23	93.73	110
9	100	780	880	11.11	86.67	97.78	130
10	100	930	1030	10.00	93.00	103.00	150

a: $TC = TFC + TVC$ **b:** $AFC = \frac{TFC}{Q}$ **c:** $AVC = \frac{TVC}{Q}$

d: $ATC = \frac{TC}{Q}$ **e:** $MC = \frac{\text{Change in TC}}{\text{Change in Q}}$

(a) **TOTAL COST (TC)** is the overall cost associated with producing a specific level of output. We have already emphasized that in the short run some resources—those associated with the firm's plant—are fixed, while others are variable. This correctly suggests that in the short run, total cost can be broken down into two components.

(i) **TOTAL FIXED COSTS (TFC)** are those costs which do not vary with changes in output. Fixed costs are associated with the very existence of a firm's plant and, therefore, must be paid even if the firm's

rate of output is zero. The rent paid for the building, for example, may be a fixed contractual obligation, quite independent of the output produced by the factory. In column 2 of Table 6.2 we have assumed that the firm's fixed cost figure ($100) prevails at all levels of output, including zero.

(ii) **TOTAL VARIABLE COSTS (TVC)** are those costs which increase with the level of output. Typically, these consist of the costs of inputs that are purchased only as needed to permit increased output. They include payments for materials, fuel, power, transportation services, most labor and similar variable resources. In column 3 of Table 6.2 we find that the total variable cost changes with output; but note that the increases in variable costs associated with each one-unit increase in output are not constant. As production begins, variable costs will, for a time, increase by a decreasing amount; this is true through the fourth unit of output. Beyond the fourth unit, however, variable costs rise by increasing amounts for each successive unit of output. The explanation for this behavior of variable costs lies in the law of diminishing returns. Because of increasing marginal product, smaller and smaller increases in the amount of variable resources will be needed for a time to get successive units of output produced. This means that total variable costs will increase by decreasing amounts. But when marginal product begins to decline, as diminishing returns are encountered, it will be necessary to use larger and larger additional amounts of variable resources to produce each successive unit of output. Total variable costs will, therefore, increase by increasing amounts.

Figure 6.1 gives a graphical representation of the Total Fixed Cost, Total Variable Cost, and Total Cost data of Table 6.2. Note that TVC is measured from the horizontal axis, and the total fixed cost is added vertically to TVC to derive the total cost curve.

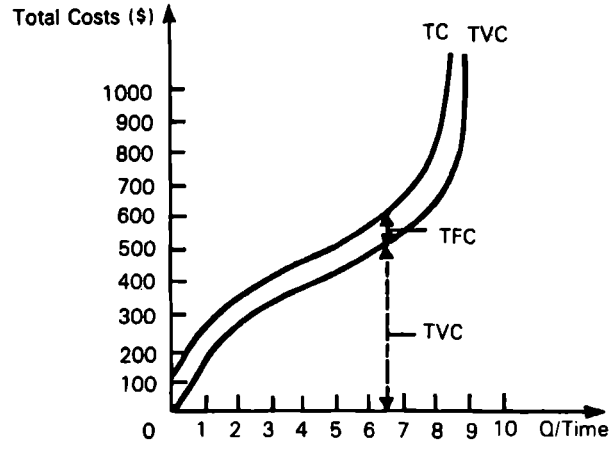


Figure 6.1: The Total Cost Curve

This distinction between fixed and variable costs is of no little significance to the businessman. Variable costs are those costs which the businessman can control or alter in the short-run by changing his level of production. On the other hand, fixed costs are clearly beyond the businessman's control; such costs are incurred and must be paid regardless of the output level.

(b) The second way of analysing the cost data is by finding the per unit or average costs. Producers are certainly interested in their total costs, but they are equally concerned with their per unit, or average costs.

In particular, average cost data are more useful for making comparisons with product prices, which are always stated on a per unit basis. Average Fixed Cost, Average Variable Cost, and Average Total Cost are shown in columns 5 to 7 of Table 6.2. It is important that we know how these unit-cost figures are derived and how they vary as output changes.

AVERAGE TOTAL COST (ATC) can be found by dividing total cost (TC) by total output (Q):

$$ATC = \frac{TC}{Q}$$

ATC can be broken down into two components:

(i) **AVERAGE FIXED COST (AFC)** is found by dividing total fixed cost (TFC) by the corresponding output (Q):

$$AFC = \frac{TFC}{Q}$$

AFC declines as output increases. This is because as output increases, a given total fixed cost of **$100** is obviously being spread over a larger and larger output. When output is just 1 unit, Total Fixed Costs and AFC equal $100. But at 2 units of output, AFC becomes **$50**, then **$33.33**, as $100 is spread over 3 units; $25 when $100 is spread over 4 units, and so forth. This is what businessmen commonly refer to as **spreading the overhead.** We find in Figure 6.2 that the AFC curve declines continually, getting closer and closer to the horizontal axis.

(ii) **AVERAGE VARIABLE COST (AVC)** is calculated by dividing (TVC) by the corresponding quantity (Q):

$$AVC = \frac{TVC}{Q}$$

AVC declines initially, reaches a minimum, and then increases again. Graphically, this provides us with a U-shaped or saucer-shaped AVC curve, as is shown in Figure 6.2.

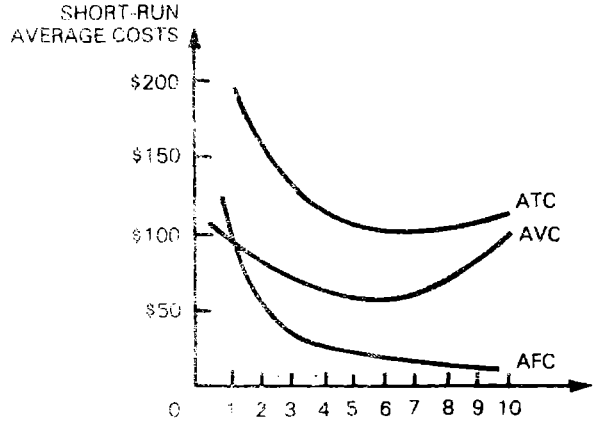


Figure 6.2: The Average Cost Curve

Because total variable cost reflects the law of diminishing returns, so must the AVC figures, which are derived from total variable cost. Because of increasing returns (or increasing productivity) it takes fewer and fewer additional variable resources to produce each of the first four units of output. As a result, variable cost per unit will decline. AVC hits a minimum with the fifth unit of output, and beyond this point AVC rises as diminishing returns necessitate the use of more and more variable resources to produce each additional unit of output. In more direct terms, at low levels of output, production will be relatively inefficient and costly, because the firm's fixed plant is under-manned. Not enough variable resources are being combined with the firm's plant; production is inefficient, and per unit variable costs are, therefore, relatively high. As output expands, however, greater specialization and a more complete utilization of the firm's equipment will make for more efficient production. As a result, variable cost per unit of output will decline. As more and more variable resources are added, some point will eventually be reached where diminishing returns are incurred. The firm's capital equipment will now be over-manned, and the resulting overcrowding and over-utilization of machinery will impair efficiency. This means that AVC will increase.

$$ATC = \frac{TC}{Q} = \frac{TFC}{Q} + \frac{TVC}{Q} = AFC + AVC$$

Therefore, graphically, ATC is found by adding vertically AFC and AVC curves as in Figure 6.2. Thus the vertical distance between the ATC and AVC curves reflects AFC at any level of output.

(c) **MARGINAL COST (MC)** is the extra, or additional, cost of producing one more unit of output. MC can be determined for each additional unit of output simply by noting the change in the total cost which that unit's production entails.

$$MC = \frac{\text{change in TC}}{\text{change in Q}}$$

In Table 6.2 we find that the production of the first unit of output increases total cost from \$100 to \$190. Therefore, the additional, or marginal, cost of that first unit is \$90. The marginal cost of the second unit is \$80, and so on and so forth. MC for each of the ten units is shown in column 8 of Table 6.2. MC can also be calculated from the total variable cost column. How? Because the only difference between total cost and TVC is the constant amount of fixed costs. Hence, the change in total costs and change in TVC associated with each additional unit of output is the same.

MC, which is the third way of looking at the cost data is perhaps the most important one. Marginal cost is a strategic concept because it designates those costs over which the firm has the most direct control. More specifically, MC indicates those costs which are incurred in the production of the last unit of output and, simultaneously, the cost which can be saved by reducing total output by the last unit. Average cost figures do not provide this information. For example, suppose the firm is undecided as to whether it should produce 3 or 4 units of output. At 4 units of output, Table 6.2 indicates that ATC is \$100. But the firm does not increase its TC by \$100 by producing, nor does it "save" \$100 by not producing, the fourth unit. Rather the change in cost involved here is only \$60, as the MC column of Table 6.2 clearly reveals. A firm's decisions as to what amount to produce are marginal decisions (as we shall see), that is, decisions to produce a few more or a few less. Thus MC is the single most useful concept for a firm's decision making process.

MC is shown graphically in Figure 6.3. Note that MC declines sharply, reaches a minimum, and then rises rather sharply.

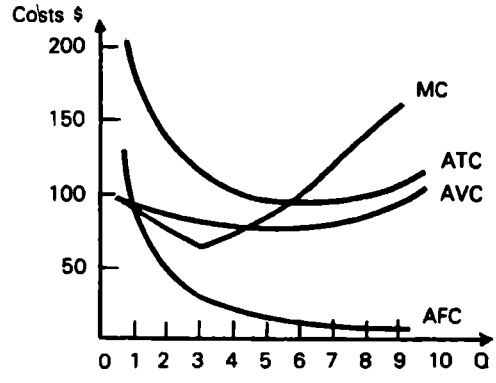


Figure 6.3: Relationship Between Average and Marginal Cost Curves

The shape of the marginal cost curve is a reflection of and the consequence of, the law of diminishing returns. The relationship between marginal product and marginal cost can be readily grasped by looking back to Table 6.1. If each successive unit of variable resource (labor) is hired at a constant price, the marginal cost of each extra unit of output will **fall** so long as the marginal product of each additional worker is **rising**. This is so because marginal cost is simply the price or costs of an extra worker divided by his marginal product. Hence, in Table 6.1 suppose each worker can be hired at a cost of $10 as is shown in Table 6.2. Because the first worker's marginal product is 5 and the hiring of this worker increases the firm's costs by $10, the marginal cost of each of these 5 extra units of output will be $2 (= $10/5). The second worker also increases costs by $10, but his marginal product is 8, so that the marginal cost of each of these 8 extra units of output is $1.25 (= $10/8). In general, so long as marginal product is rising, marginal cost will keep falling. But as diminishing returns set in — in this case, with the third worker —marginal cost will begin to rise. Thus for the third worker, marginal cost is again $2 (= $10/5); $2.50, for the fourth worker; $3.33, for the fifth; and, $5, for the sixth. The relationship between marginal product and marginal cost is evident: **Given the price (cost) of the variable resource, increasing returns (that is, a rising marginal product) will be reflected in a declining marginal cost and diminishing returns (that is, a falling marginal product) in a rising marginal cost.**

The Relationship between MC, ATC and AVC

It is notable that MC cuts both AVC and ATC at their minimum points. To prove this, we must first develop a general rule which governs the relationship between any marginal quantity and the corresponding average quantity.

Suppose in a particular room there are three people and each is 5 feet tall. The average height of all the people in the room is then 5 feet. Now, whether the average height of the people in the room will increase or decrease when we add the fourth person to the room will depend on the height of this fourth person. This fourth

person is the marginal person or marginal unit; remember what the word marginal means. It means additional or extra. The height of this marginal person will be the marginal height. Supposing this marginal height is 6 feet, then the average height of the people in the room will increase to 5 feet 3 inches. On the other hand, if the marginal height or height of the marginal person is 4 feet, then the average height in the room will fall to 4 feet 9 inches. Thus, the general rule is that if the marginal height is greater than the average height, the average height increases, and if the marginal height is less than the average height, the average height of the people in the room falls. The most important thing to note is that this relation between marginal and average holds true for everything, whether it be heights, baseball scores, costs, or revenues.

Here we are concerned with costs. So we can say that when MC is less than ATC, ATC will fall; conversely, when MC exceeds ATC, ATC will rise. This means that so long as MC lies below ATC, the latter will fall, and when MC is above ATC, ATC will rise. Therefore, at the point of intersection where MC equals ATC, ATC has just ceased to fall but has not yet begun to rise. This, by definition, is the minimum point on the ATC curve.

Because MC can be defined as the addition either to total cost or to total variable cost resulting from one more unit of output, the above rationale explains why MC also cuts AVC at the latter's minimum point. No such relationship exists for MC and average fixed cost, because the two are unrelated; MC embodies only those costs which change with output, and fixed costs, by definition, are independent of output.

The time has now come to turn to the relationship between output produced and its average cost of production when all inputs are variable.

PART C: PRODUCTION COSTS IN THE LONG-RUN

Unlike the short run, in the long run a firm can change its plant capacity along with the amount of variable factors it employs. Given this fact, the main question to be answered in this section is, what does the long-run average total cost (LATC) curve look like?

Remember, the short-run average total cost curve (SATC) showed us the lowest possible cost of producing various quantities in the short run. Similarly, the LATC should also tell us the lowest possible cost of producing various quantities in the long run. Obviously, since more options are available in the long run, the LATC curve is likely to be different from the SATC curve. The interesting questions are, how will LATC differ from SATC, and what factors determine the shape of LATC?

To answer these, consider a firm which is producing 10 units, as shown in Figure 6.4.

The cheapest way to produce 10 units is by using a plant whose SATC curve is given by SATC-1. Now, suppose the demand for the firm's product increases to produce 50 units. In the short run, since the plant capacity, cannot be changed the cheapest way available to the producer is represented by point B on SATC-1.

However, in the long run, the producer has more options. He can install plants with different capacities, and each plant will have a corresponding SATC curve. Suppose he has the option of building 4 more plants of different sizes, each bigger than the current plant represented by SATC-1. Let these plants be represented by SATC-2, SATC-3, SATC-4 and SATC-5. Now, the cheapest way to produce 50 units, when the firm has the option of changing plant size, is to use the plant represented by SATC-2 and produce at point C. For any output between 80 and 130, the firm will use the plant represented by SATC-3, and so on. This means that the portions of the SATC curves which are dotted will never be used in the long-run.

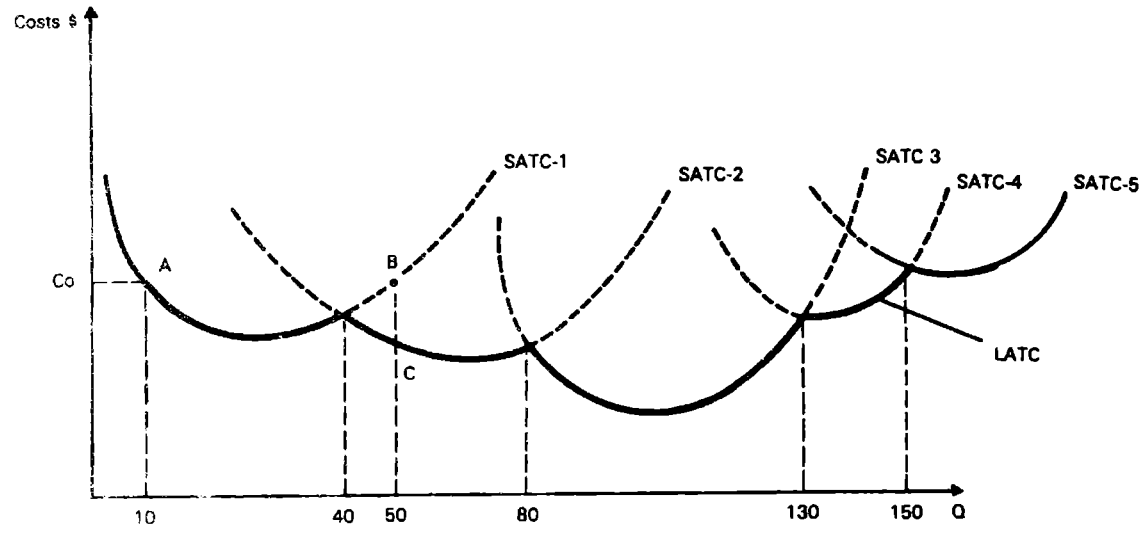


Figure 6.4

Thus one can say that the cheapest way to produce various quantities in the long run is given by the points on the solid segments of the SATC curves in Figure 6.4. These solid segments represent the firm's long run average total cost curve. It is bumpy because we assumed only five possibilities. In most lines of production the choice of plants is much larger than assumed in our example. In fact, in many industries the number of possible plant sizes is virtually unlimited. If we take such a case we would get a long-run average total cost (LATC) curve which is smooth rather than bumpy, as shown in Figure 6.5.

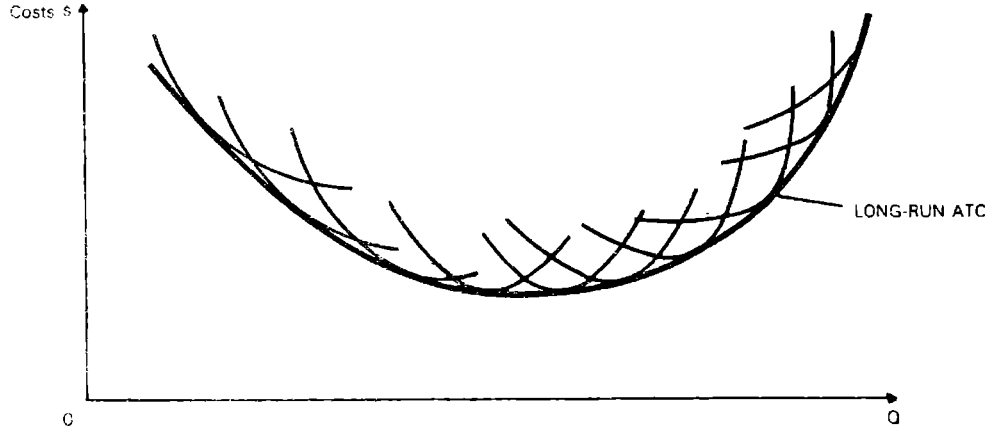


Figure 6.5

The next question we have to ask is, Why does the cost of production fall for a time as we have successively larger plants, when beyond some point larger plants imply higher average costs? In other words, why is the long-run ATC curve U-shaped?

What explains this U-shape is the concept of **economies and diseconomies of large scale production.** Let us then examine what we mean by these terms and what they depend on.

Economies of Scale

Economies of scale or economies of mass production refer to the cost advantages of having a large-scale operation rather than a small-scale operation. This explains the downward sloping part of the long run ATC curve. Following is a partial list of considerations which will lead to lower average cost as the size of a plant is increased.

1. **Labor specialization.** As plant size increases and more workers are hired, it becomes possible for workers to work on just one job rather than doing 5 or 6 different jobs. This makes them efficient at the job they do best and saves the time which is usually wasted in transferring workers from one job to another.

2. **Managerial specialization.** Similarly, in a small plant a sales specialist may be forced to divide his time between several executive functions — for example, marketing, personnel, and finance. A larger scale of operation will mean that the marketing expert can devote full time to supervising sales and product distribution while other appropriate specialists are added to perform other managerial functions. Greater efficiency and lower costs are the net result.

3. **Efficient capital.** In many lines of production, the most efficient machinery is available only in very large and extremely expensive units, and its effective utilization requires a high volume of production. This means that only large-scale producers are able to afford to operate efficiently the best available equipment. For example, in the automobile industry the most efficient methods involve very big assembly lines. Only very large producers can afford and use these assembly lines efficiently.

Diseconomies of Scale

Diseconomies of scale arise when further increases in the size of the plant lead to adverse effects on the efficiency and costs. They explain the upward sloping portion of the long run ATC curve.

The main factor causing diseconomies of scale has to do with certain managerial problems involved in efficiently controlling and coordinating a firm's operations as it becomes a large-scale producer. In a small plant, a single key executive can handle all the problems, as he knows his business thoroughly. As the business becomes large it becomes impossible for one man to assemble, understand and digest all the information.

Finally, I would like to point out that whether a firm will experience economies or diseconomies of scale depends on the industry we are talking about. It is a matter of technology and the situation varies from industry to industry. In Figure 6.6 we show three different cases. In Figure 6.6(A) we have a firm that continually experiences economies of scale and therefore is called the **decreasing cost case**. In Figure 6.6(B) we have a firm that experiences neither economies nor diseconomies of scale and is referred to as the **constant cost case**. In Figure 6.6(B) we have a firm which continually experiences diseconomies of scale and is called the **increasing cost case**.

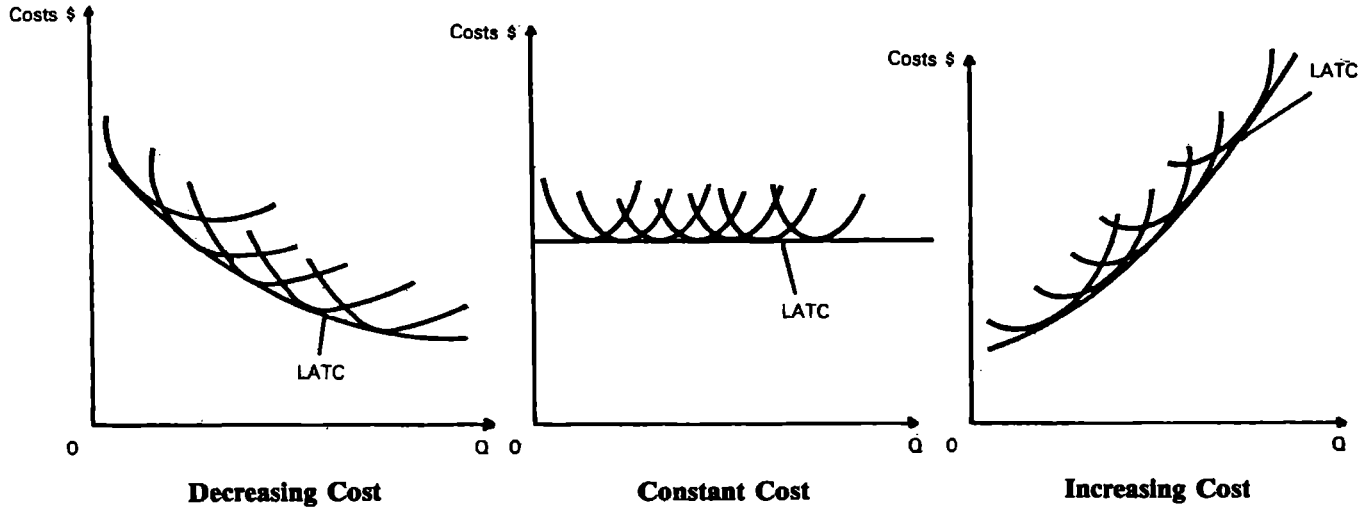


Figure 6.6

Economies of scale and diseconomies of scale are not mutually exclusive. In fact, when a plant size is increased, usually both come into play. However, whether the LATC curve declines or rises depends on which effect dominates. If a larger operation brings about economies of scale which are much greater than the resulting diseconomies of scale, then the LATC slopes downwards, and *vice versa*.

Problems for Practice

1. The law of diminishing returns states that:
   a. The returns on stocks and bonds diminish with higher security prices.
   b. Beyond some point, the increment or addition to total utility diminishes as more units of a good are consumed.
   c. The marginal physical product of any factor of production will eventually diminish as more of that factor is used with a given amount of fixed input.
   d. The output of any good or service increases as more variable input is used.

2. Economies of scale:
   a. Exist in both the short-run and the long-run.
   b. Explain why average variable and average total costs decline in the short-run.
   c. Explain why average costs decline for a given rate of output in the long-run.
   d. Explain why average costs increase for a given rate of output in the long-run.

3. Diseconomies of scale are reflected in:
   a. The rising segment of the long-run average cost curve.
   b. The rising segment of the short-run marginal cost curve.
   c. Greater efficiency that results from specialization.
   d. Downward shifts of the production cost curves.

Use the following cost data to answer questions 4-9

Units of Output	Total Cost
0	$150
1	$155
2	$170
3	$192
4	$228
5	$275

4. The average fixed cost of producing 3 units of output is:
   a. $64
   b. $192
   c. $150
   d. $50

5. The marginal cost of the fourth unit of output is:
   a. $228
   b. $128
   c. $57
   d. $36

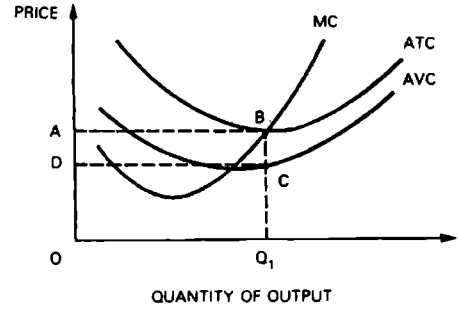
6. The marginal cost of output is greatest for the:
   a. First unit of output.
   b. Third unit of output.
   c. Fourth unit of output.
   d. Fifth unit of output.

7. Total variable cost of producing 5 units of output is:
   a. $30
   b. $125
   c. $55
   d. $25

8. Average variable cost of producing 3 units of output is:
   a. $14
   b. $50
   c. $22
   d. $64

9. Average total cost of producing 4 units of output is:
   a. $57
   b. $228
   c. $9
   d. $36

Use the following figure to answer questions 10 through 13



10. At the Q_1 level of output, average fixed cost:
    a. Cannot be determined from the graph.
    b. Is equal to CQ_1.
    c. Is equal to OD.
    d. Is equal to BC.

11. At the Q_1 level of output, total fixed cost is:
    a. ABCD.
    b. $OABQ_1$.
    c. $ODCQ_1$.
    d. BC.

12. At Q_1 level of output, total cost is:
    a. ABCD.
    b. $OABQ_1$.
    c. $ODCQ_1$.
    d. Q_1CDO.

13 At the Q_1 level of output, total variable cost is:
    a. $ODCQ_1$.
    b. ABCD.
    c. $OABQ_1$.
    d. CQ_1.

14. At 100 units of output per period, average total cost is $20. Total cost at this rate of output is:
    a. $20
    b. $200
    c. $2,000
    d. $5

15. Suppose that the total cost of producing 1,000 units per period is $50,000. At this rate of output, average total cost is:
    a. Equal to fixed costs.
    b. $50,000.
    c. $0.02.
    d. $50.

16. Costs of production that do not change with the rate of output are:
    a. Nonexistent
    b. Variable costs
    c. Fixed costs
    d. Marginal costs

17. Costs of production that change with the rate of output are:
    a. Sunk costs.
    b. Fixed costs.
    c. Opportunity costs.
    d. Variable costs.

18. Which of the following is an example of a fixed cost?
    a. Materials cost.
    b. Labor cost.
    c. Energy cost.
    d. Property taxes.

19. Which of the following is an example of a variable cost?
    a. Contractual lease payments.
    b. Interest payments on borrowed funds.
    c. Property taxes.
    d. Labor and materials costs.

20. The sum of average fixed cost and average variable cost at any rate of output is:
    a. Total fixed cost.
    b. Average total cost.
    c. Total cost.
    d. Marginal cost.

CHAPTER SEVEN

PERFECT COMPETITION

CHAPTER SEVEN

PERFECT COMPETITION

In the previous chapter, we spent a lot of time with Equipment Set #4. However every minute spent on this equipment set was well spent, because it has put at our disposal some of the most important and basic tools of economic analysis. We are now in a position to analyze a far wider range of problems than we were able to do with just Equipment Sets #1, #2, and #3.

However, remember that the main aim of acquiring Equipment Set #4 was to rectify the bias we have had towards the demand side of the market. The theory of production costs, developed under Equipment Set #4, provides the basis we need to analyze what we will call a firm's supply decision. By supply decision I mean the decision the firm makes regarding the quantity of its product, which it will produce and place on the market and the price it will charge. The main question to be answered in this chapter is, how does the firm decide the product price and its output?

The answer to this question depends on two things:

1. The kind of market this firm is operating in: for instance, whether it is operating in a perfectly competitive market, or has a monopoly over the market.

2. The time horizon involved: for instance, whether we are talking about the short-run supply decision or the long-run supply decision.

In this chapter, we will analyze the supply decision of a firm in a perfectly competitive market in the short run as well as in the long run.

In the next chapter, we will analyze the supply decision of firms which are operating in imperfectly competitive markets.

The purpose of the above introduction was to give you some idea of what is to come in this chapter and the next one. However, before we get on with the main business of this chapter—the supply decision in a perfectly competitive market — let us see how various market structures differ from one another.

SOME MARKET STRUCTURES

A market comes into existence when buyers and sellers exchange a product for money. This transaction could be conducted in person as in most shopping centers or by telephone and computer, as in the case of the international gold market. Thus, to characterize a market, one has to describe the following three crucial elements of that market:

1. The number of buyers
2. The number of sellers
3. The nature of the product

The following is a list of some important types of market structures:

1. **Perfect competition** implies:

   a. a large number of buyers
   b. a large number of sellers
   c. a homogeneous product.

Because of these characteristics, an individual firm does not have the power to influence the market price which is determined by the interaction of market supply and demand. It is too small to make any difference and is referred to as a **price taker.**

Example: Many of the agricultural commodities, such as wheat and oranges.

2. At the opposite extreme lies the case of a **monopoly.** It has the following characteristics:

   a. a large number of buyers
   b. one seller.

Example: The domestic telephone industry in most countries.

A monopolist has the power to alter market prices by his actions and is thus known as a **price maker.**

In between these two polar cases lie various other forms of imperfectly competitive markets. For instance:

3. **Oligopoly:**

   a. a large number of buyers
   b. few sellers
   c. homogeneous or non-homogeneous products.

Example: The automobile industry in the U.S.

4. **Monopolistic Competition**

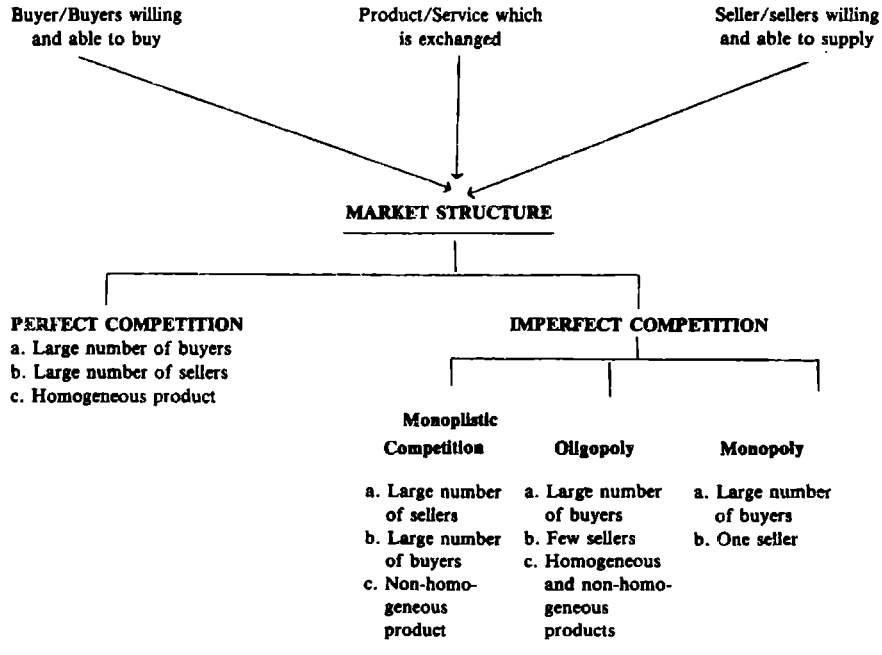
   a. a large number of buyers
   b. a large number of sellers
   c. non-homogeneous or differentiated products

Example: The cereal industry or the soap industry in most countries.

This is a list of just the important markets and is by no means exhaustive. Table 7.1 gives a bird's-eye view of what we have said so far.

Another important assumption we will make about all market structures is that the firms in all these markets try to maximize profits. Now, this is a very debatable point, and there are indeed many instances where firms do not maximize profits but something else, for instance, some combination of total sales and profits. Certainly, most public enterprises claim not to maximize profit but social welfare (conveniently defined to explain their losses). However, we make this assumption for two reasons:

Table 7.1



1. A large number of firms do in fact maximize profits, and such an assumption yields predictions which explain most of their behavior.

2. It is a convenient starting point and can be used as a reference point to compare firms which deviate from this goal.

Let us now begin to answer the main question of this chapter, how does the firm make its supply decisions in a competitive market?

SUPPLY DECISIONS IN A PERFECTLY COMPETITIVE MARKET

Before we spend any time and effort on this topic let us be convinced that it is worth pursuing. Some of you must be wondering, why study a market form, which is so rare in practice? Well, I can think of at least three good reasons for doing so.

1. In the first place, there are quite a few industries which resemble this form of market more than any other market structure. For example, much can be learnt about American agriculture by understanding the functioning of competitive markets.

2. Moreover, perfect competition provides a simple context in which we can practice the handling of Equipment Set #4 before we undertake the analysis of more complex situations. Perfect competition is a clear and meaningful starting point for any discussion on price and output determination.

3. Finally, the operation of a perfectly competitive market is used as a norm or standard against which the efficiency of other market structures can be judged.

Thus even though perfect competition is a relatively rare market structure in most economies, it is one of considerable analytical and some practical importance. With this brief justification of what we are doing, let us get back to the business of answering the main question of this chapter, how does a firm operating in a perfectly competitive market decide what price to charge for the product it produces and how much of it to produce?

However, as I pointed out earlier in this chapter, a firm operating in a competitive market has no power over price because it is assumed to be too small compared to the overall size of the market. The price is fixed in the market by the interaction of market demand and market supply. Every consumer and producer is so small compared to the market that he cannot affect the market price.

Therefore, given this fact, the main question of this chapter, how does the competitive firm decide what price to charge and how much to produce, boils down to the simple question, how much should a competitive firm produce?

The answer to this question depends on the time horizon involved: that is, whether we are analyzing the behavior of the competitive firm in the short run or in the long run. We begin by examining how a competitive firm decides on how much to produce in the short run, and then we go on to examine the long-run situation.

SHORT RUN

The main question, how much should a competitive firm produce, can be split up into three related questions:

1. Should the competitive firm produce?
2. If so, what amount?
3. What profit (or loss) will be realized?

The best way to analyze these questions is to imagine that you have been hired as a manager/economist to advise a company which is thinking of going into business. Suppose the projected cost of production is given by Table 6.2 in the previous chapter. The owners of the company, who want to maximize profits, are naturally interested in knowing the answers to the above three questions. How should you go about answering these questions?

Well, there are basically two approaches available to you to answer these questions.

(a) "Total Revenue – Total Costs" Approach
(b) "Marginal Revenue = Marginal Cost" Approach

These approaches are based on two alternative ways of calculating profit and will give you exactly the same answers. But to enhance our understanding we will use both of them.

"Total Revenue Minus Total Cost" Approach

Profits are defined as total revenue minus total cost. Thus to maximize profits (which is assumed to be the sole objective for the time being) the firm should produce that quantity of output where the difference between the total revenue and total cost is the greatest. This, in short, is the crux of this approach.

Before we go into the details of this approach and answer the three questions, a logical thing to do would be to see if we have all the data to do so. Obviously, we have the data on total cost of this firm given in Table 6.2, but that is not enough to calculate profits. We also need data on total revenue, and so let's get that first.

Suppose the price of the good which this company wants to sell is $131 per unit. The question we have to answer is, how does your total revenue change as you sell successively greater quantities of your output? If this firm sells one unit it gets $131, if it sells two units it gets $262, and so on. But the next question is, how much can this firm sell? The answer is, as much as it wants. Because the capacity of each firm in a perfectly competitive market is assumed to be so small relative to the entire market, that it has practically no influence on the market price. Price is set by the intersection of the market demand and the market supply curves, and the individual firm can sell as much or as little as it chooses at that price. This situation is depicted graphically in Figure 7.1.

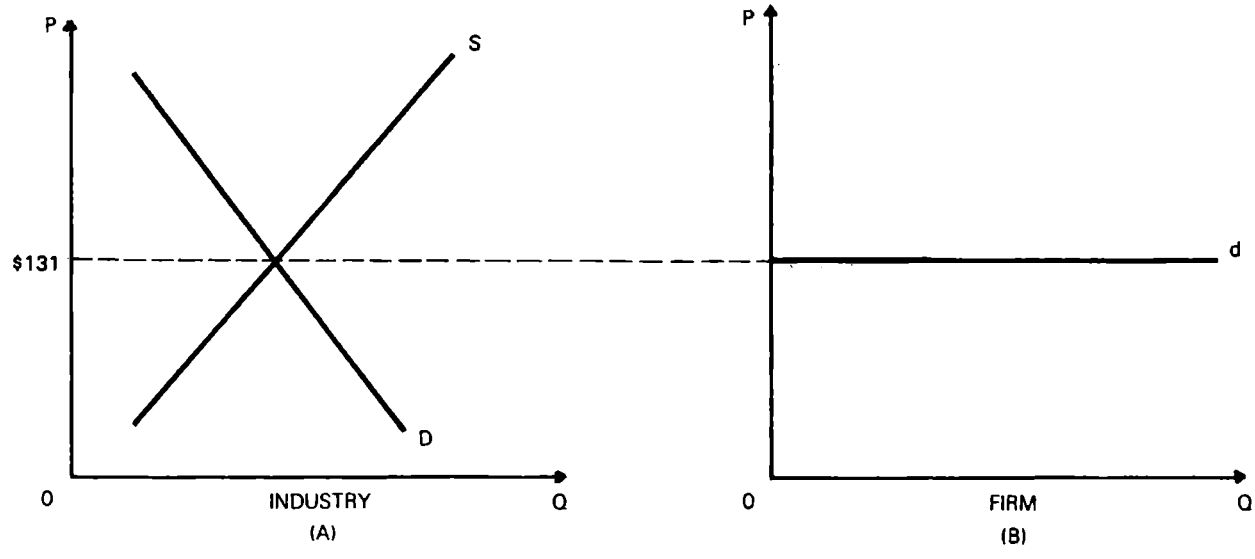


Figure 7.1

In Figure 7.1(A) we find that the market price is determined by the market demand and market supply at $131. Once this is determined, Figure 7.1(B) on the right shows that an individual firm can sell as much as it wants at $131. This is why the demand curve facing a firm in a perfectly competitive industry is said to be perfectly elastic. It shows that the maximum price one can get for each unit sold is $131. If the firm tried to charge more than $131 no one would buy from it because they could get it from others at $131 (and remember in perfect competition products sold by all firms are of the same quality).

Column 2 of Table 7.2 shows the figures for total revenue derived by simply multiplying output times price, and Figure 7.2 depicts these figures in graphic form.

Table 7.2: The Profit Maximizing Output for a Purely Competitive Firm: Total Revenue Minus Total Cost Approach (Price = $131)
(hypothetical data)

(1)	(2)	(3)	(4)	(5)	(6)
Total product	Total revenue	Total fixed cost	Total variable cost	Total cost	Profit (+) or loss (−) = (2) - (5)
0	$ 0	$100	$ 0	$100	$-100
1	131	100	90	190	- 59
2	262	100	170	270	- 8
3	393	100	240	340	+53
4	524	100	300	400	+124
5	655	100	370	470	+185
6	786	100	450	550	+236
7	917	100	540	640	+277
8	1048	100	650	750	+298
9	1179	100	780	880	+299
10	1310	100	930	1030	+280

Now that we have all the data needed to answer the three questions, let us answer them one by one.

1. Should the firm produce? Yes, if at any level of output it is making a profit. That is, in Table 7.2, one has to look at the firm's total costs (TC) and total revenue (TR) at various levels of output and see if at any level of output TR exceeds TC. We find that, in fact, TR exceeds TC at all output levels starting from the third unit. It is easier to see this in Column 6 of Table 7.2 where starting from the third unit, all units show a profit. So the answer to the first question is YES; the firm should produce because it can make a profit at some levels of output.

Before we leave this, let us see how we would answer this question if, instead of numerical data, only the graphic data in the form of curves in Figure 7.3 were available. To see if the firm should produce at all, one should find out if the TR curve lies above the TC curve at any level of output. As you can see in Figure 7.3 the TR curve lies above the TC curve between points A and B.

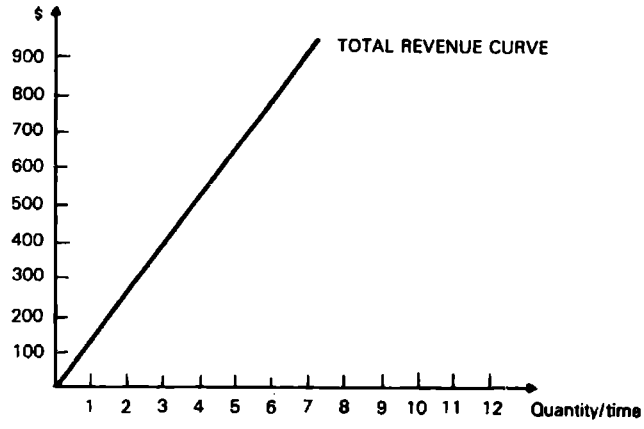


Figure 7.2

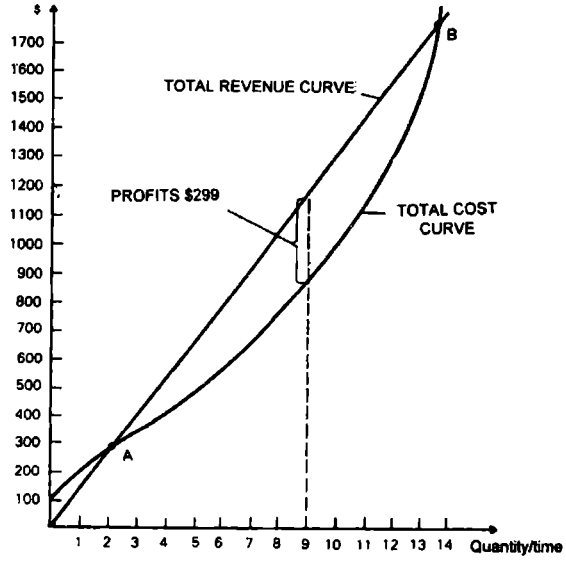


Figure 7.3

2. How much should the firm produce given the fact that it is profitable to do so at many levels of output? The answer to this is simple. Since the objective of the firm is to maximize profits, it should produce that level of output at which profits are maximum. Table 7.2 tells us that this profit maximizing level of output is 9 units.

Graphically, the maximum profit is obviously achieved where the vertical difference between TR and TC is greatest. This is at 9 units in Figure 7.3.

3. The third question, what profit (or loss) will be realized, is now easy to answer. It will be $299, as shown in Table 7.2 or Figure 7.3.

We have now given answers to the three questions when the price in the market is $131 per unit. Before we move on to answer these very same questions using the "Marginal Revenue = Marginal Cost" Approach, let us try to answer these three questions when the price is lower than $131. The reason we are analyzing the next two cases

is that we can learn something about how producers behave when price changes. This will give us an explanation of the upsloping nature of the supply curve of a firm in the short run.

Loss-Minimizing Case: Let us suppose that your firm goes into business and it follows your advice to produce and sell 9 units. However, after a year the managers find that the demand for their product has fallen and as a result the market price has fallen from \$131 to \$81. The result of this is that the demand curve facing your firm also declines to a lower level as shown in Figure 7.4.

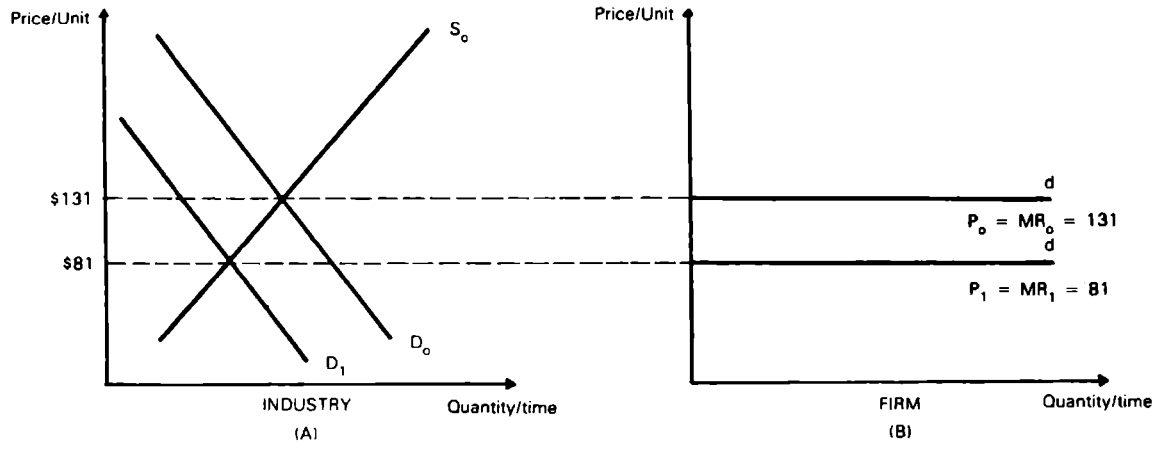


Figure 7.4

The owners of the company come to you, once again, to find out:

1. "Should we produce?"
2. "If so, what amount?"
3. "What profit (or loss) will be realized?"

This is the way you should answer these questions:

The first thing you do is to examine whether the firm will make a profit at any level. To do this you should compare the new figures in Table 7.3 i.e., the total revenue (when the price is \$81) with the total cost figures (which are the same as they are assumed not to have changed).

When we do this we find that this firm is not making a profit at any level of output. Does this mean you should advise your bosses to close down? The answer is NO; you should not give such advice. Why?

The best way to answer this is by simply asking, will our losses be greater by closing down or by keeping the factory running? Now, if the firm stops production, its total revenue would be zero, but its TC will be \$100, because it would have to pay the fixed costs no matter what the output. Thus the loss will be equal to \$100. Whereas, if it continues to produce 6 units, we find its loss will be only \$64. Therefore, clearly, it should continue to produce.

The point here is that in the short run the firm has to pay its fixed costs no matter what its output is because fixed costs do not depend on the level of output. So even if a firm makes a loss, but if it can cover its

variable costs and still have a little left over to pay for the fixed costs, then it makes sense, in the short run, to keep on producing.

Graphically, the same point is illustrated in Figure 7.5, where the TR curve when the price is **$81** lies below the TC curve and hence, no profits are made at any level. But since TR ($81) lies above the TVC curve it is possible to minimize losses by producing rather than not producing.

Table 7.3: The Loss-Minimizing Outputs for a Perfectly Competitive Firm: Total Revenue Minus Total Cost Approach (Prices = $81 & $71)
(Hypothetical data)

PRODUCT PRICE = $81						PRODUCT PRICE = $71		
(1) Total Product	(2) Total Revenue	(3) Total Fixed Cost	(4) Total Variable Cost	(5) Total Cost	(6) Profit (+) or Loss (−) = (2)-(5)	(7) Total Revenue ($)	(8) Total Cost ($)	(9) Profit (+) or Loss (−) = (7)-(8)
0	$0	$100	$0	$100	-$100	$0	$100	-$100
1	81	100	90	190	-109	71	190	-119
2	162	100	170	270	-108	142	270	-128
3	243	100	240	340	-97	213	340	-127
4	324	100	300	400	-76	284	400	-116
5	405	100	370	470	-65	355	470	-115
6	486	100	450	550	-64	426	550	-124
7	567	100	540	640	-73	497	640	-143
8	648	100	650	750	-102	568	750	-182
9	729	100	780	880	-151	639	880	-241
10	810	100	930	1030	-220	710	1030	-320

To summarize the answers to the three questions:

1. "Yes, you must keep producing even if you make a loss, because by closing down, in the short run, your losses will be greater."

2. "You must produce 6 units because that's where your loss is at the minimum."

3. "Your loss by producing 6 units is only $64, whereas it would be $100 if you closed down."

Close-Down Case: Let us assume that bad luck continues to strike your industry and once again the demand for your industry's product decreases. This leads to a decrease in price from \$81 to \$71. This time your bosses are really panicking and they ask you the same questions:

"1. Should we produce?"
2. "If so, what amount?"
3. "What profit (or loss) will be realized?"

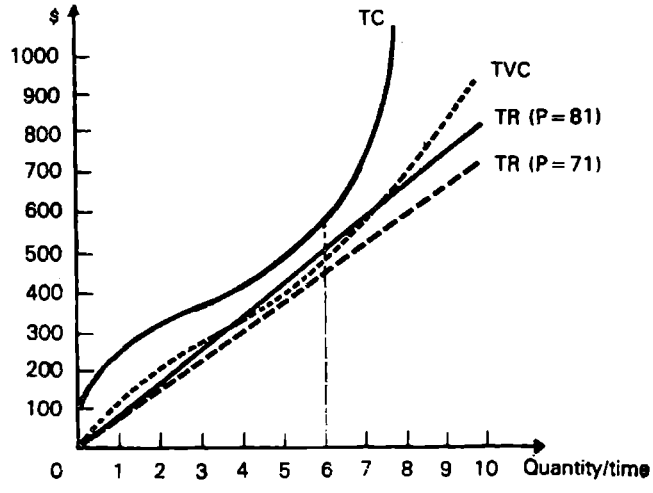


Figure 7.5

Once again, you compare the new total revenue schedule with the total cost schedule as is done in Table 7.3. You will discover that once again the firm is making losses at all levels. You may say, "That's not new, this was the situation even when the price was \$81." But wait a moment, and look at the losses. You will find that under these circumstances, the firm will be better off by producing nothing. By not producing any output it has a loss of \$100, and by producing any level of output its losses exceed \$100. The reason for this is that the firm is not able to cover its variable costs at any level of output. So if it produces any output, it not only has to pay for the unavoidable fixed costs, it also has to pay for losses incurred by not being able to cover the variable costs.

In short, your advice to your boss should be to close the factory and dispense with your services (this will, of course, be a rare example of professional integrity).

Let us now move on to the second approach which can be used for answering the three questions about a firm's supply decision.

"Marginal Revenue Equal to Marginal Cost" Approach

Under this approach, we compare the amounts that each additional unit of output will add to total revenue, on the one hand, and to total cost, on the other. That is, we compare the marginal revenue (MR) and the marginal cost (MC) of each successive unit of output. Any unit whose marginal revenue exceeds its marginal cost should, obviously, be produced. Why? Because on the sale of each such unit, the firm is gaining more in revenue from its sale than it adds to costs in getting that unit produced. Hence, the unit of output

is adding to profits. Similarly, if the MC of a unit of output exceeds its MR, the firm should avoid producing that unit. It will add more to costs than to revenue; such a unit will not "pay its way."

Table 7.4: Derivation of Marginal Revenue for a Perfectly Competitive Firm

(1) Product price (average revenue) ($)	(2) Quantity demanded (sold)	(3) Total revenue ($)	(4) Marginal revenue
131	0	0	131
131	1	131	131
131	2	262	131
131	3	393	131
131	4	524	131
131	5	655	131
131	6	786	131
131	7	917	131
131	8	1048	131
131	9	1179	131
131	10	1310	131

Before we get into the details of the approach described above and answer the three supply decision questions, a logical thing to do would be to see if we have all the data to do so. We do have the data on marginal cost, as given in Table 6.2, but we do not have the data on marginal revenue, so let us get that first.

As you might suspect, marginal revenue is analogous to marginal cost. Marginal cost is the addition to total cost associated with the production of one more unit and the marginal revenue is defined as the increase in total revenue associated with the sale of one more unit.

Let us return to our example where the market price is $131. Now, if no unit is sold, the total revenue will obviously be zero. However, the first unit sold will increase the total revenue from zero to $131. Marginal revenue—the increase in total revenue resulting from the sale of the first unit of output—is, therefore, $131. The second unit sold increases total revenue from $131 to $262, so marginal revenue is again $131. Indeed, you will note in column 4 of Table 7.4 that marginal revenue is a constant figure of $131. Why? Because under perfect competition additional units can be sold at a constant price. This means that each additional unit sold

adds exactly its price—$131, in this case—to the total revenue. Thus, total revenue increases at a constant rate with every extra unit sold. And since marginal revenue is nothing but the rate of increase in total revenue, it is also constant.

Graphically, the MR curve is a horizontal line and coincides with the demand curve facing the firm as shown in Figure 7.6.

Now we have all the data we need to use the MC = MR approach to answer the three supply decision questions:

1. "Should we produce?"
2. "If so, what amount?"
3. "What profit (or loss) will be realized?"

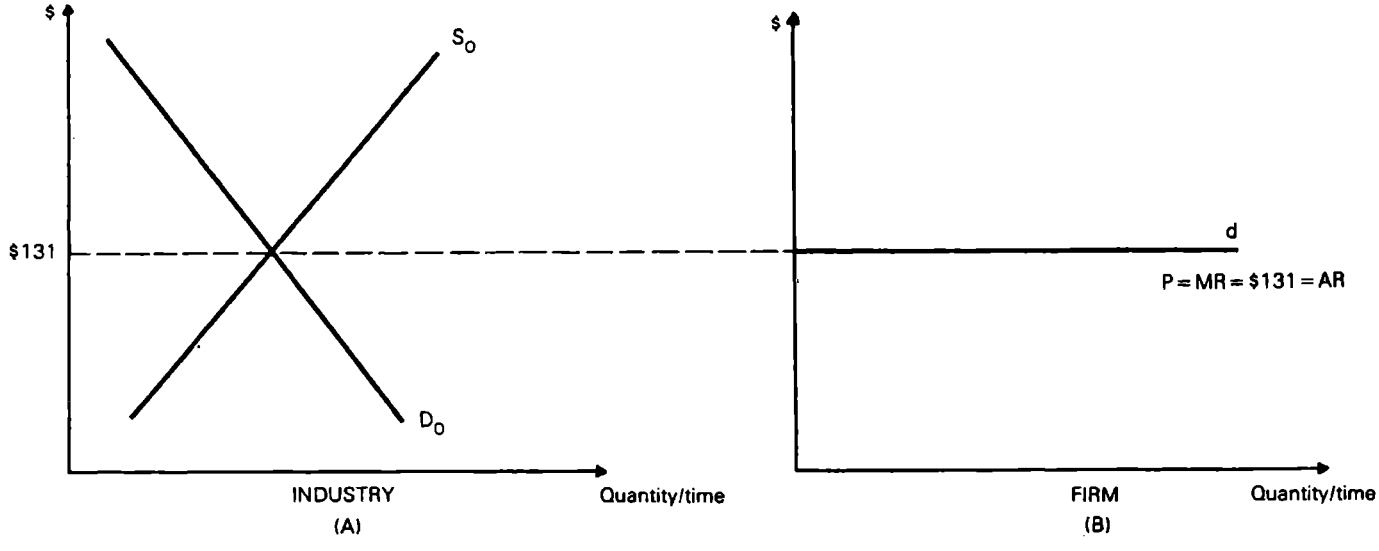


Figure 7.6

Profit Maximizing Case (Price = $131): Once again, imagine a company is thinking of going into business and you have been hired as a manager/economist to advise the owners. If the current market price is $131, then how would you go about advising the owners on the three supply decision questions?

Let us start with the question, how much should the firm produce? Since the objective of the firm is assumed to be profit maximization, this question is really asking, what is the profit-maximizing level of output? The distinguishing characteristic of this approach is that we look at each unit and ask ourselves whether it is worth producing this unit. For instance, we begin by asking whether we should produce the first unit? The answer is, yes, we should produce the first unit because it adds more to our revenue than to our costs. That is its marginal revenue ($131) is greater than marginal cost ($90). Thus our profits increase. Similarly, the second unit also increases our profits by adding $131 to our revenues and by costing only $80.

Now, since the objective of the owners of the firm is to maximize profits, you should advise them to produce all units which add more to the total revenue than to total cost. In other words the firm should produce all units whose MR exceeds MC. From Table 7.5 we can see that this implies that the firm should produce nine units. The tenth unit should not be produced because it would add more to cost ($150) than to revenue ($131) and thus decrease profits.

Table 7.5: The Profit Maximizing Output for a Perfectly Competitive Firm: "The Marginal Cost Equal to Marginal Revenue Approach"

(1) Total Product	(2) Average Fixed Cost	(3) Average Variable Cost	(4) Average Total Cost	(5) Marginal Cost	(6) Price = Marginal Revenue
0					
1	$100.00	$90.00	$190.00	$90	$131
2	50.00	85.00	135.00	80	131
3	33.33	80.00	113.33	70	131
4	25.00	75.00	100.00	60	131
5	20.00	74.00	94.00	70	131
6	16.67	75.00	91.67	80	131
7	14.29	77.14	91.43	90	131
8	12.50	81.23	93.73	110	131
9	11.11	86.67	97.78	130	131
10	10.00	93.00	103.00	150	131

Diagrammatically, this means that we must produce all units whose MC curve lies below MR curve as in Figure 7.7.

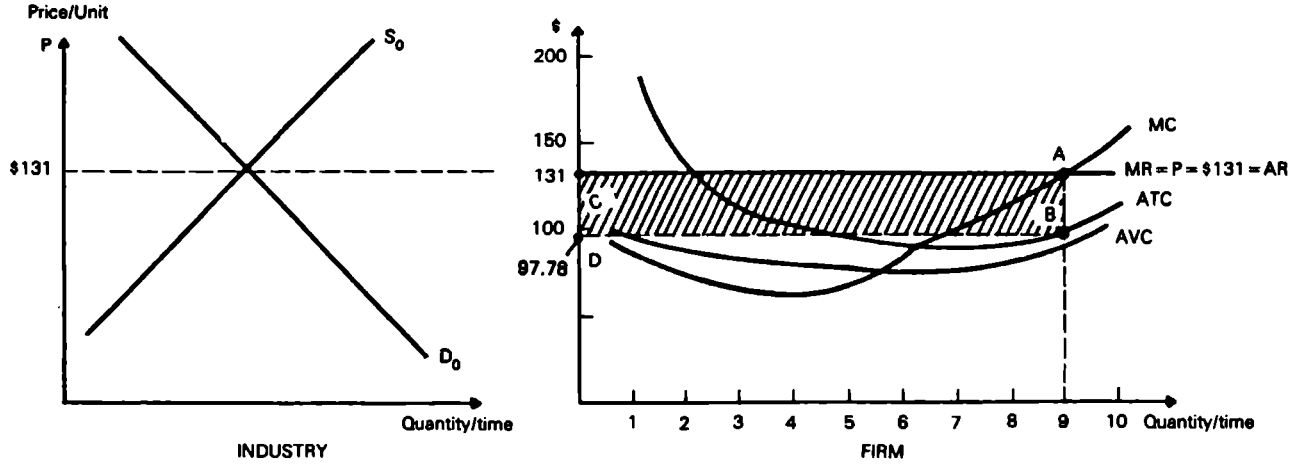


Figure 7.7

Having answered the question, how much should the firm produce, let us see how you would go about answering the question, what profits will be realized?

1. First, you can calculate total profits by adding up profit from each individual unit. For instance, in Table 7.5, we can see that the first unit increases total revenue by \$131 and total cost by \$90 so the profit on this unit is \$41. Similarly the profit of the second unit is \$51 and so on. Now if we add profits on each of the nine units produced (minus fixed costs) we would get the net total profit equal to \$299.

However, this is a very cumbersome method. In our hypothetical example it was easy to calculate profits as there were only 9 units. But, in reality, when there are a lot more units it is easier to use the following method.

2. The second method of calculating total profits follows from the definition of total profits:

We know that,

Total Profits = Total Revenue - Total Cost

and,

Total Revenue = Q x Price = Q x Average Revenue (AR)
Total Cost = Q x ATC

Therefore,

Total Profits = (Q x AR) - (Q x ATC)
= Q(AR - ATC).

And, so in our example,

Total Profits = 9(131 - 97.78) = \$299.

This is the same amount we obtained by using the first method.

Notice that the average revenue is defined as $\frac{\text{Total Revenue}}{\text{Quantity}}$

In our case, since each unit is being sold at \$131, the average revenue is the same as the price and is also equal to the MR. Diagrammatically, it coincides with the MR curve as in Figures 7.6 and 7.7.

Diagrammatically, also, it is easy to use this second method to calculate total profits. The first step is to see where MC = MR. This gives the profit maximizing quantity, Q. In our example, Q = 9. Then, at that point we find our ATC by looking at the height of ATC curve at 9 units. Finally, we find out the value of AR by looking at the height of the AR curve (it is constant at \$131). With this done, we have all the information to calculate Q(AR - ATC). In Figure 7.7, (AR - ATC) at 9 units is equal to AB and Q = BD. Therefore, total profits are equal to the area of the shaded rectangle ABDC.

Loss-Minimizing Case: Let us suppose that the firm under consideration goes into business and the owners follow your advice to produce and sell 9 units. However, after a year they find that the demand for their product has decreased and as a result of which the market price has fallen from \$131 to \$81. Your bosses come to you, once again, to find out:

1. "Should we produce?"
2. "If so, what amount?"

3. "What profit (or loss) will be realized?"

The best way to answer these questions using the MC = MR approach is as follows:

The first step you take is to compare the new marginal revenue (equal to price) data with the MC data in Table 7.6. Since each unit sold brings in $81 instead of $131, the MR is a constant at $81. Comparing columns 5 and 6, we find that the first unit of output adds $90 to the total cost but only $81 to total revenue. Thus you might be inclined to conclude, "Don't produce—close down!" But this would be a hasty decision. Remember that in the very early stages of production, the efficiency of variable factors is low thus making the marginal cost unusually high. The price-marginal cost relationship might improve with increased production. And it does in this case. On the next 5 units—2 through 6—price exceeds MC. Each of these 5 units adds more to revenue than to cost, more than compensating for the "loss" incurred on the first unit. Beyond 6 units, however, MC exceeds MR. The firm should thus produce at 6 units. (Notice a very important point has come up. In general, the profit maximizing producer should always compare marginal revenue with the rising portion of his marginal-cost schedule or curve.)

Table 7.6: The Loss-Minimizing Outputs for a Perfectly Competitive Firm: Marginal Revenue Equal to Marginal Cost Approach (Prices = $81 and $71)
(Hypothetical Data)

(1) Total Product	(2) Average Fixed Cost	(3) Average Variable Cost	(4) Average Total Cost	(5) Marginal Cost	(6) $81 = Price = Marginal Revenue	(7) $71 = Price = Marginal Revenue
0						
1	$100.00	$90.00	$190.00	$90	$81	$71
2	50.00	85.00	135.00	80	81	71
3	33.33	80.00	113.33	70	81	71
4	25.00	75.00	100.00	60	81	71
5	20.00	74.00	94.00	70	81	71
6	16.67	75.00	91.67	80	81	71
7	14.29	77.14	92.43	90	81	71
8	12.50	81.23	93.73	110	81	71
9	11.11	86.67	97.78	130	81	71
10	10.00	93.00	103.00	150	81	71

Having answered the question, how much to produce, the next logical thing to do is to find out, what profit (or loss) will be realized at 6 units. Remember, the total profits = Q(AR − ATC). Now, in this case, Q = 6, AR = 81 and ATC = 91.67, therefore total profits equal −$64 or a loss of $64.

Having answered the two questions, how much to produce and what will be the profit (or loss), we come to the third question, should we produce? The answer is YES; we should produce even if our loss is about $64, because this loss is less than the $100 loss the firm will incur in the short run by closing down.

Diagrammatically, this case is depicted in Figure 7.8. We find that the optimum amount of production will be at 6 units because at that level MC is just about equal to MR. However, at that output the ATC of the firm is more than the AR by EC and, hence, it suffers losses equal to ECAD ($64). But by closing down it would have to pay the entire fixed cost which is equal to the area GCAV ($100).

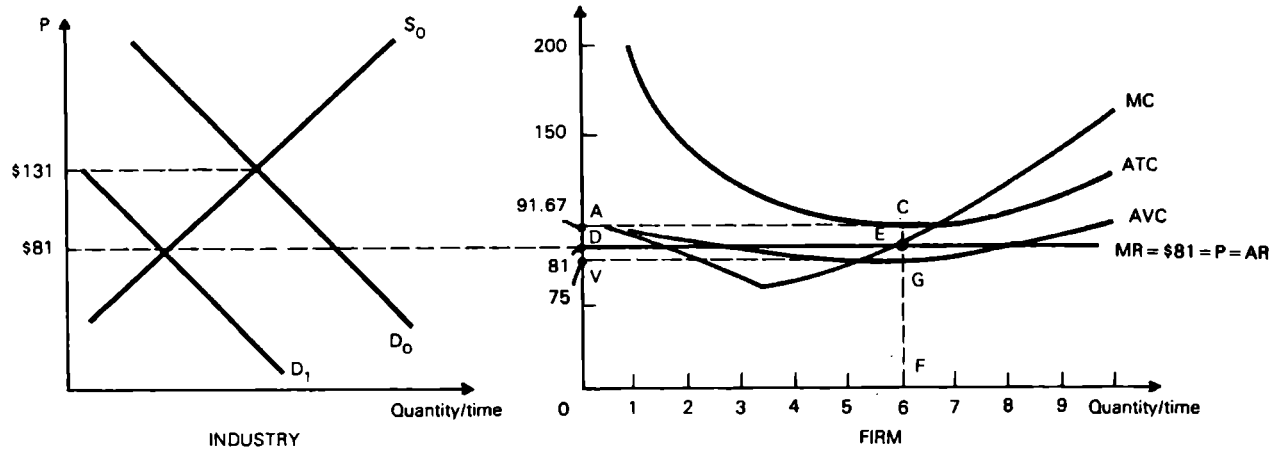


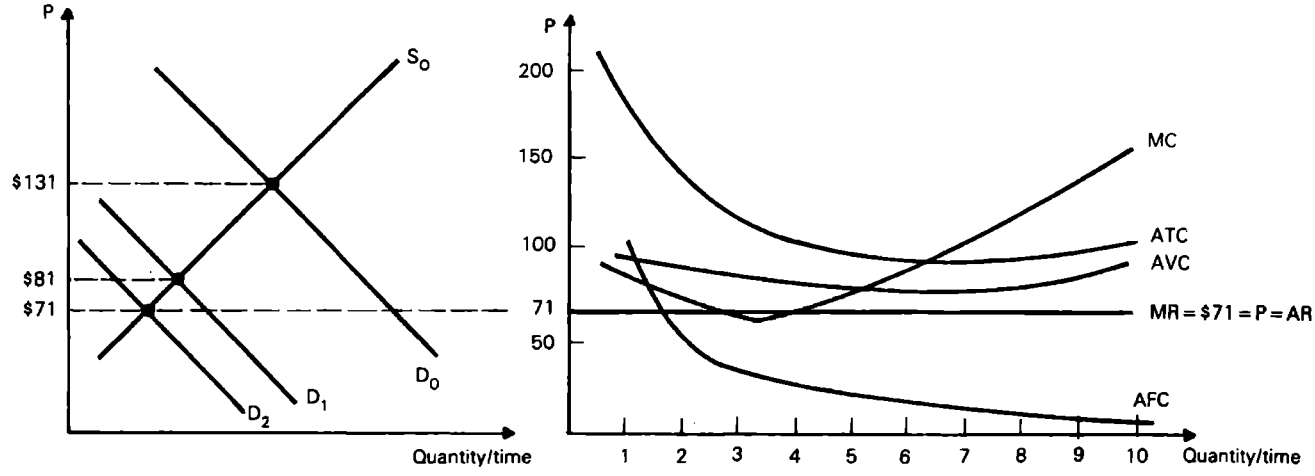
Figure 7.8

The crucial thing to note is that, what is important for a business in the short run is to cover its variable costs. In our example, the average variable cost is $75 at 6 units of output whereas average revenue is $81. Thus the business is covering all its variable costs and making about $6 per unit on top of it. For six units it is making $36 after covering its variable cost. This $36 is used to pay part of its fixed costs of $100. Thus the loss is only $64 as compared to $100 if it had shut down. The general principle, then, is that *whenever a business can cover its variable cost in the short run, it should produce.*

Close-Down Case (Price = $71): Let us suppose that the price of the firm's product falls further to $71 because of a steep decline in its demand. The owners turn to you, once again, for advice. However, your task now is quite simple. You can now advise them to shut down as at this price there is no output at which the firm can cover its average variable costs, much less its average total cost. In other words, the loss by producing at any level of output is greater than $100 worth of fixed costs it will lose by closing down. This can be verified by comparing columns 3 and 7 of Table 7.6. Diagrammatically, if the MR = AR curve falls below the minimum AVC then the best thing for the firm to do is to close down. This is shown in Figure 7.9.

Let us now summarize this MC = MR approach.

1. In this approach, it is noteworthy that in deciding whether or not to produce, it is the comparison of Price (= AR = MR) with the minimum AVC which is all important.



Industry **Firm**

Figure 7.9

2. Then, in determining the profit maximizing or loss minimizing amount to produce, it is the comparison — or better yet, the equality — of MR and MC which is crucial.

3. Finally, in determining the actual profit or loss associated with the optimum (MR = MC) output, price (= AR) and ATC must be contrasted. To see how this approach contrasts with the total revenue-total cost approach and to summarize our discussion so far, please check Table 7.7.

Table 7.7: Summary of Competitive Output Determination in the Short Run

	Total Revenue - Total Cost Approach	Marginal Revenue = Marginal Cost Approach
Should the firm produce?	Yes, if TR exceeds TC or if TC exceeds TR by some amount less than total fixed costs.	Yes, if price is equal to, or greater than, minimum average variable costs.
What quantity should be produced to maximize profits	Produce where the excess of TR over TC is a maximum or where the TC over TR is a minimum. (and less than total fixed costs)	Produce where MR or price equals MC.
Will production result in an economic profit?	Yes. If TR exceeds TC. No, if TC exceeds TR.	Yes, if price exceeds average total cost No, if average total cost exceeds price.

Before we end this section on the short-run supply decision of a firm, we must examine the relationship that exists between the MC and the short-run supply curve of a firm. One of the objectives of acquiring Equipment

Set #4 was to discover what lies behind the supply curves of an individual producer and the industry. We are finally in a position to answer that question.

Marginal Cost and the Short-Run Supply Curve

For a moment, recall the definition of the supply curve of a firm. It gives us an indication of the maximum amount that would be produced at a given price. However, we have just seen, while dealing with the MR = MC approach, that for a given price the maximum amount that would be produced is given by the MC curve, provided it is above the minimum average variable cost. For instance, when the price was \$131, we saw that the quantity that would be supplied at that price is found by drawing a MR = P line parallel to the horizontal axis and seeing where it intersects with the MC curve. In this case, it was at 9 units, and when the price was \$81 it was at 6 units. By taking other prices, we can find out the quantity supplied at those prices by simply looking at the intersection of the MR curves with the MC curves. Thus it is not difficult to see that **the portion of the firm's marginal cost curve which lies above its average variable cost curve is its short-run supply curve.** This is shown in Figure 7.10 where the ABC portion of the MC curve represents the firm's short run supply curve.

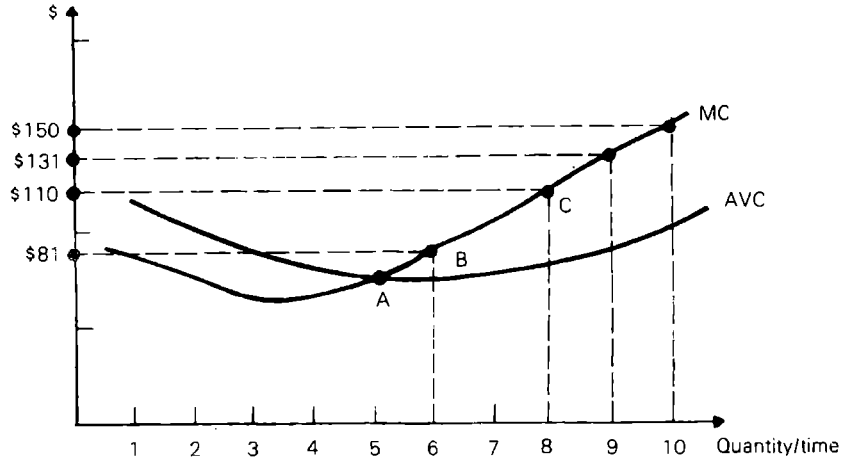


Figure 7.10

Figure 7.10: Derivation of a Firm's Short Run Supply Curve

Thus the industry's short-run supply curve, which is obtained by the horizontal summation of the supply curves of all the individual producers, represents the horizontal sum of the MC curves of all the individual producers.

Long-Run Adjustment Process

In the previous section, we analyzed the behavior of a producer in the short run. We saw how the producer decides on the optimum output under different prices. However, in all his decisions the producer in the short run is constrained by the fact that he has certain unavoidable costs, the fixed costs, and so producers could not leave or enter the industry freely. Therefore, the main question to be answered in this section is, how does the behavior of the producer differ in the long run from that in short run, when he has enough time to change all costs and factors?

The best way to understand the long-run adjustment process is to once again take up the story of your imaginary career as an economist. Let us then pick up the threads of that story which, in the short run, ended

rather tragically. Having advised your bosses to close down their operations because at a price of $71 your company was not even able to cover its variable cost in the short run, you were obviously unemployed.

Let us now suppose that this unhappy situation for you just ended because you have found another job as an economist with a dairy company called Milko Dairy, producing milk. The milk industry is a perfectly competitive industry with a large number of buyers and producers and a standardized product. The prevailing price of milk in the market is $1.50 per gallon and has been at this level for a long time. Thus all firms in the industry have had time to build the optimum plant.

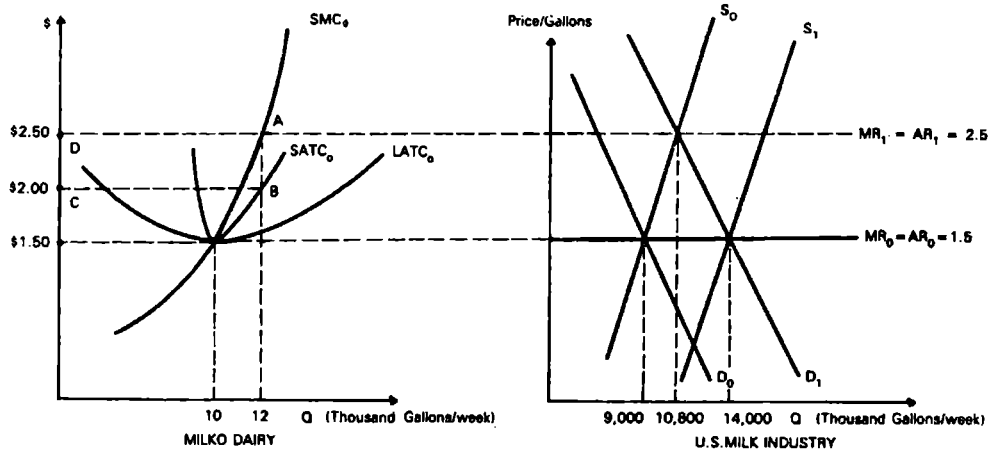
However, let us suppose, further, that due to a world-wide shortage of milk in a particular year, the demand for milk in America suddenly increases. The economic serenity of the milk industry is disturbed. The owners of Milko Dairy turn to you with the following questions:

1. What will be the effect of this increased demand on the equilibrium price and quantity in the milk industry, in the short run as well as in the long run?

2. What will be the effect of this increase in demand on the sales and profits of our firm in the short run and in the long run?

You are expected to analyze the situation and come up with the answers to these questions in your report. The question is, how should you go about analyzing and answering the above questions? The following is the usual way in which an economist would analyze and answer these questions.

Analysis: Let us begin our analysis with Figure 7.11 which shows the initial equilibrium in the milk industry.



(A) Milko Dairy **(B) U.S. Milk Industry**

Figure 7.11: Long-Run Market Adjustments

To start with, Milko Dairy is producing 10 thousand gallons of milk at $1.50 per gallon. $LATC_0$, $SATC_0$ and SMC_0 depict Milko Dairy's long-run ATC, short-run ATC and short-run marginal cost curves, respectively, at the initial equilibrium. No economic profits are being made. Remember that cost, as defined by us already, includes a normal profit to the owners.

To make our analysis simple, we can make a simplifying assumption which does not change the substance of our analysis. Let us assume that the milk industry consists of 900 more or less identical firms. Each firm is

assumed to have cost curves just like the ones shown for Milko in Figure 7.11(A). Thus whatever happens to Milko will also happen to others. In the milk market, the equilibrium quantity is 9 million gallons per week (900 × 10,000) when the demand and supply curves are at D_0 and S_0.

Now let us consider the changed situation. We show the increase in demand for milk by shifting D_0 to D_1. The question is, what will be the effects of this increase in demand?

In the short run, we know the equilibrium price will shoot up from \$1.50 per gallon to a new higher level where the new demand curve, D_1, intersects the supply curve S_0. Let this new price be \$2.50 per gallon. Further, responding to this higher price, the individual firms in the industry will increase their production from 10 thousand gallons to a higher level where the new MR cuts the SMC_0. Let this be 12 thousand gallons per week. The total industry output will increase to 10.8 million gallons per week.

As you can see, at this price Milko Dairy Company will be making an economic profit given by the area ABCD, which is equal to \$6000 per week. This profit will be over and above the normal profit which is included in the costs and, hence, is referred to as **extra-normal** or **super-normal profit.**

This will be the short run situation only, because in the long run the firm can change its plant size. This means that unlike in the short run, the established firms may leave an industry if the industry has below-normal profits, or that new firms may enter an industry if the industry has above-normal profits.

In our case, Milko and other firms in the industry will be making above-normal profits at a price of \$2.50 per gallon. These above-normal (super-normal, extra-normal) profits will lure new firms into the industry. Some of the entrants will be newly created firms; others, will shift from less prosperous industries. But as the firms enter, the market supply of milk will increase causing the supply curve S_0 to shift to the right.

But the question is, how far to the right will this curve shift? The answer to this question is, as far right as it takes to bring the price back to \$1.50. This is because, so long as the price is at any level higher than \$1.50, the firms, like Milko, will continue to make extra-normal profits. And so long as they make extra-normal profits, the new firms will keep entering the milk industry and thus keep shifting the supply curve to the right. The entry into the milk industry will end once the supply curve has moved to S_1 and the price has fallen back to \$1.50 per gallon.

When the price falls from \$2.50 to \$1.50, Milko and other firms will reduce their optimum output per week from 12 thousand gallons to 10 thousand gallons. But in Figure 7.11(B) we notice that the equilibrium quantity in the milk market will now be 14 million gallons. This is explained by the fact that we are making an assumption that there will be five hundred more firms in the industry. So even if each firm produces 10 thousand gallons—the optimum amount before the demand change—the total industry output will be more because a larger number of firms are now in business than before.

Let us then summarize the main points that will be part of your report to your boss.

Effects of an Increase in Demand

(i) In the Short Run

a. the price of milk will shoot up to \$2.50 per gallon.

b. Milko will increase its production from 10 to 12 thousand gallons.
c. Milko will make extra-normal profits.

(ii) In the Long Run

a. the price of milk will gradually begin to fall as more firms are attracted to the milk industry because of extra-normal profits
b. with decreasing prices the optimum output of Milko will also begin to fall from the 12 thousand gallon level.
c. the extra-normal profits will also be gradually competed away with declining price.

The Long-Run Equilibrium

a. Price will be back to $1.50 per gallon
b. Milko's production will be back to 10 thousand gallons per week.
c. There will be 500 more firms in the industry.
d. The industry output would increase to 14 million gallons.

Now, how good your predictions are about the time path of price and quantity changes depends on how good a data base you have at your disposal and how good you are at economic forecasting. But as far as the final outcome of the price is concerned there can be no doubt. Given our assumption, it will definitely come down to $1.50.

Shape of the Long-Run Supply Curve

The above analysis gives us a clue as to what the shape of the long-run supply curve would be. We know that a supply curve is supposed to tell us at what price various quantities of a good will be supplied. In the case just discussed, we find that no matter what the final output in the industry, the price will always be $1.50. Suppose in the milk industry the demand shifts once again from D_1 to D_2 as in Figure 7.12. In the short run, the price will go up once again to where D_2 intersects with S_1. But the extra-normal profits due to higher prices will attract new firms until the supply shifts to S_2 and industry output is 20 million gallons, and so on. Therefore, no matter what the quantity of output, in the long run, the supply curve of the industry is a straight line parallel to the horizontal axis, like the curve LS in Figure 7.12.

In our discussion of the above case, we have implicitly made a very important assumption. In our story, we ignored the effects of so many firms entering the industry on the price of the resources used in this industry and thus implied that the resource prices remain unaffected in spite of the greater demand for them. Now this is definitely a possibility, but it is an empirical issue to be confirmed by empirical investigation. If one believes it is true for the industry being considered, then one should make this assumption explicitly, something we did not do earlier. Such industries, where the resource prices do not change when more firms enter the industry, are known as **CONSTANT-COST INDUSTRIES.** Only such industries have a perfectly horizontal long-run supply curve.

However, all other industries can be divided into two other categories.

1. Increasing-Cost Industries.
2. Decreasing-Cost Industries.

Let us now examine how our conclusions regarding the effects of an increased demand on Milko Dairy and the U.S. milk industry change as we assume the milk industry to be either an increasing or a decreasing cost industry.

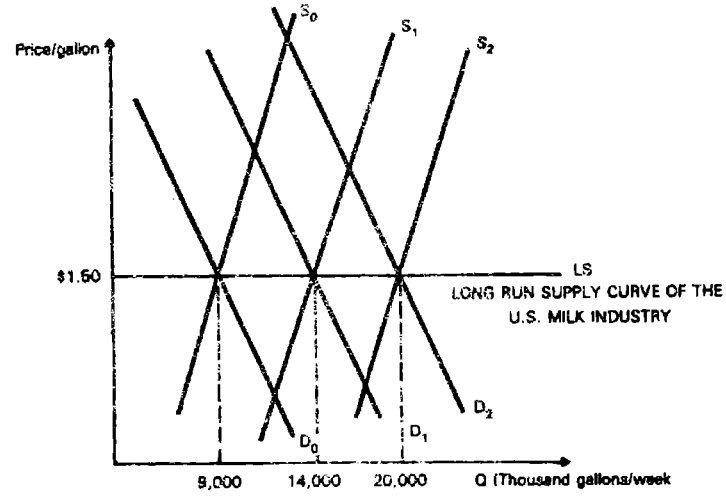


Figure 7.12: Long-Run Supply Curve with Constant Input Costs

Increasing-Cost Industry: In general, constant-cost industries are rare. In most industries the entry of new firms will lead to increased competition for scarce inputs, thus, driving up their costs. The results of higher resource prices will be higher long-run average costs for firms in the industry. These higher costs, it should be noted, take the form of an upward shift in the long-run average cost curve for the firms.

This case is shown in Figure 7.13. The initial equilibrium price is $1.50. At this price, Milko Dairy produces 10 thousand gallons of milk per week and the total industry output, shown in Figure 7.13(C), is 9 million gallons per week. Suppose now that the demand curve for the industry shifts outward to D_1. In the short run, price will rise to $2.50, just like in the constant-cost case, since this is where D_1 and the industry's short-run supply, S_0, intersect. At this price, Milko Dairy will make extra-normal profits. Other firms will also make these extra-normal profits as we have assumed , for simplicity, that they have the same cost structure as Milko. It is these extra-normal profits that attract new entrants into the milk industry and shift the supply curve outward.

Suppose that the entry of new firms causes the cost curve of all firms to rise, because the new firms compete for scarce resources and thereby hike the prices of these resources up. The new higher set of cost curves for Milko is shown in a separate panel, Figure 7.13(B), to avoid cluttering Figure 7.13(A).

The net results of these changes is that a two-way squeeze on profits occurs to eliminate them. On the one hand, the entry of new firms will increase market supply and lower milk price and, on the other, the entire LATC curve of Milko will shift upward. This means that the equilibrium price will be now higher than it was originally. Unlike the constant cost case, the price is prevented from falling back to $1.50 because the higher ATC curves imply that profits disappear at a higher price and, hence, no further entry takes place.

The new equilibrium price for the milk industry will be somewhere between $2.50 and $1.50. Let it be $2.00 and let the equilibrium quantity for the industry be 15.4 million gallons per week. We now have two points (P_0 = $1.50, Q_0 = 9 million and P_1 = $2.00, Q_1 = 15.4 million) on the long-run supply curve. All

other points on the curve can be found in an analogous way considering all possible shifts in the demand curve. These shifts would trace out the long-run supply curve LS as in Figure 7.14. Here LS has a positive slope because of the increasing-cost nature of the industry. Notice that the LS curve is somewhat flatter than the short-run supply curves. This indicates the greater flexibility in supply response that is possible in the long run.

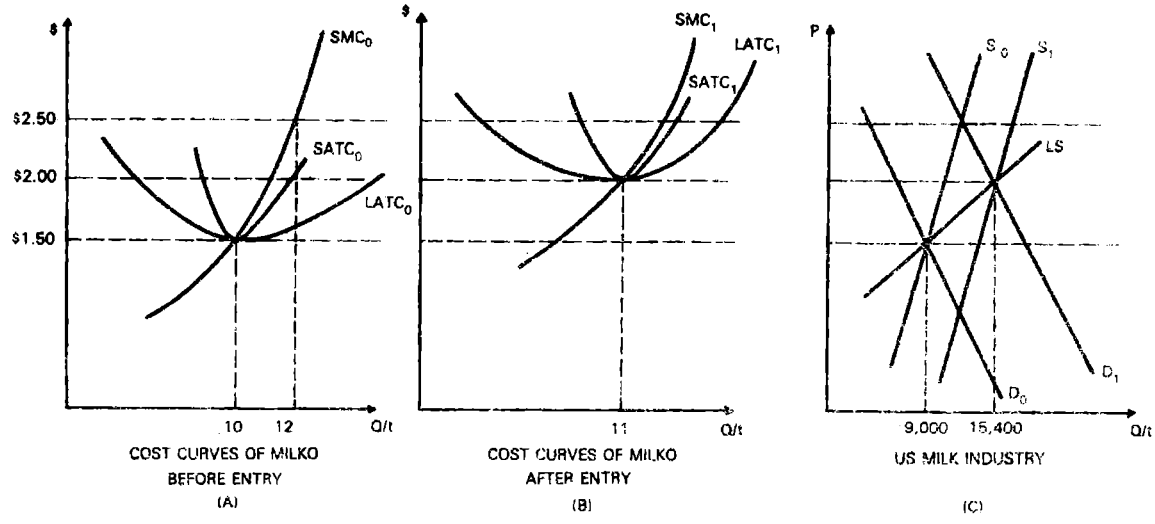


Figure 7.13: Long-Run Market Adjustment with Increasing Input Costs

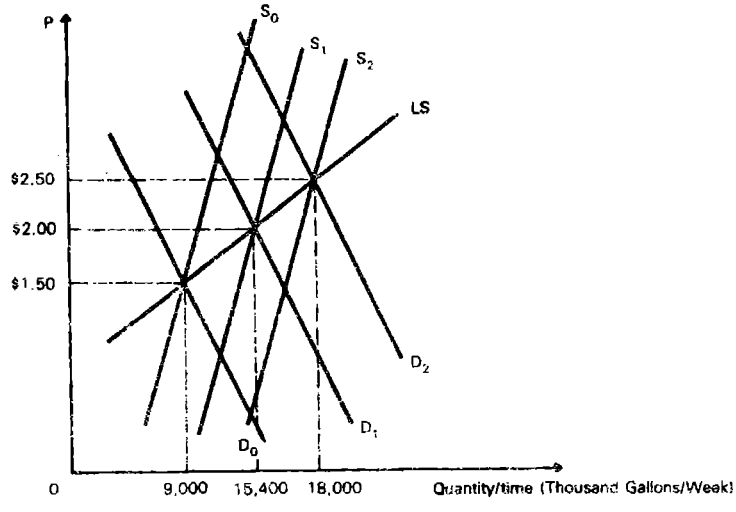


Figure 7.14: Long-Run Supply Curve with Increasing Input Costs

Thus you can see that if the milk industry is, indeed, an increasing-cost industry, then all your longrun predictions would go wrong even though your short-run predictions may still hold. The long-run price will not come back all the way to $1.50 but will stick at $2.00.

Decreasing-Cost Industries: It is equally possible that you may have made the error in the other direction. That is, the milk industry may actually be a decreasing-cost industry. Not all industries must exhibit constant or increasing costs. There are reasons why the entry of new firms may, in fact, reduce the costs of firms in an

industry. For example, the entry of new firms may provide a larger pool of trained labor from which to draw than was previously available, thus, reducing the costs associated with the hiring of new workers. Similarly, the entry of new firms may provide a "critical mass" of industrialization, which permits the development of more efficient transportation and communications networks.

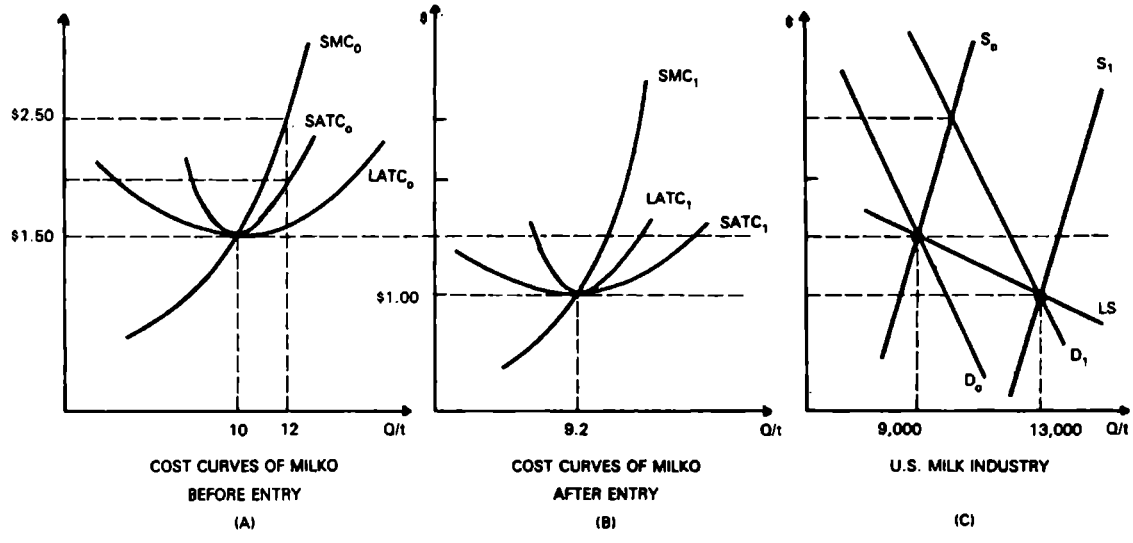


Figure 7.15: Long-Run Market Adjustment with Decreasing Input Costs

Suppose the milk industry is, indeed, a decreasing-cost industry. Figure 7.15(C) shows the initial price ($1.50) and quantity (9000) combination when the industry is in initial equilibrium. As in the previous two cases, all firms including Milko Dairy produce 10 thousand gallons and earn zero in economic profits (or extranormal profits). Now suppose that the market demand shifts outward to D_1. In the short run, price will increase to $2.50 and Milko will produce, once again, 12 thousand gallons. But at this price level, extra-normal profits are being earned. These profits cause new entrants to come into the market. If this entry causes costs to decline, the new set of cost curves for Milko may look like those shown in Figure 7.15(B). Now, the new price is $1.00 and at this price the industry output is 13 million gallons. By considering all possible shifts in demand, the long-run supply curve, LS, can be traced out as in Figure 7.16. This curve has a negative slope because of the assumption of the decreasing-cost nature of the milk industry. So, once again, your long-run predictions, based on the assumptions of a constant-cost industry, will prove wrong.

The moral of this long story is that as an economist you should be aware that a perfectly competitive industry may have either a horizontal or a positively or a negatively sloped long-run supply curve. The crucial factor is how the entry (or exit) of firms affects the cost structure of the firms in the industry. Although the constant and increasing cost cases are probably the most frequently encountered one, a negatively sloped long-run supply curve should not be ruled out. Whether the industry you are analyzing has increasing, decreasing or constant costs is an empirical matter and you will have to become familiar with the industry before diving head-long into analysis.

However, whether a perfectly competitive industry is one of constant, increasing or decreasing costs, the final long-run position for each firm will be the same, as depicted in Figure 7.17.

In the long run, equilibrium occurs when P = MR = AR = LATC. This tells us that although a competitive firm may realize economic profits or losses in the short run, it will barely break even in the long run.

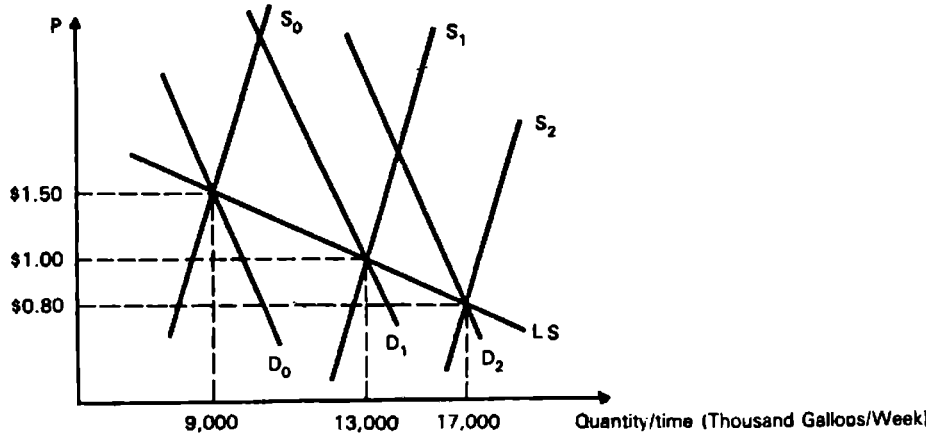


Figure 7.16: Long-Run Supply Curve with Decreasing Input Costs

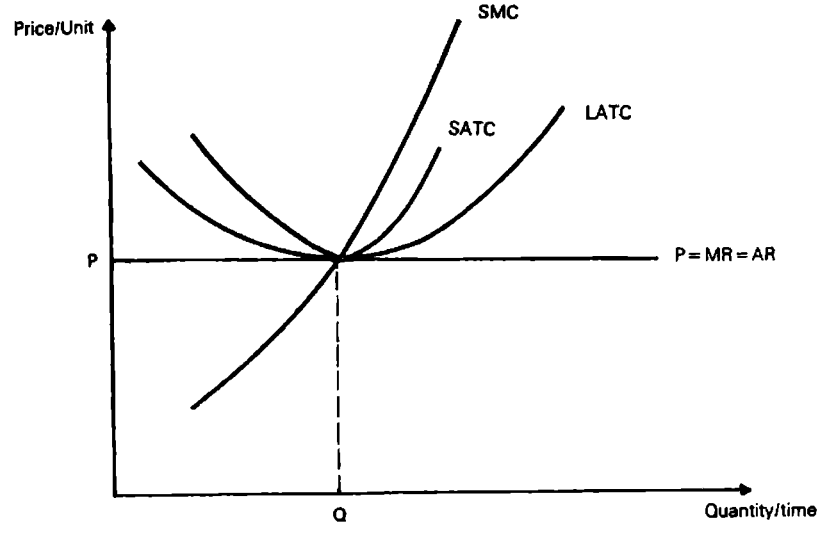


Figure 7.17: Long-Run Equilibrium for a Firm in Perfect Competition

The Appeal of Perfect Competition

The appeal of perfect competition has both a non-economic and an economic aspect. We are concerned here primarily with its economic appeal. The main question we want to answer here is, why is perfect competition supposed to lead to an efficient allocation of resources?

To answer this question, let us start by transferring ourselves for a moment from the market economy to a socialist, centrally planned, non-market economy. Suppose you have been appointed the economic advisor

to the Chief Planner and you have been asked to determine how much of the resources should be allocated to the production of bread. In other words, how much bread should be produced? Given that resources in the country are scarce you are obviously required to use them efficiently. Let us see how you would go about allocating resources efficiently in the production of bread.

Let bread production be measured in tons. The first thing, then, is to find out whether to produce the first ton of bread. To do this you have to ask the question, is the extra benefit of one ton of bread worth the extra cost of producing it? You ask your deputy to supply you with this information. Once you get this information, you notice that the extra benefit is being measured by marginal utility and extra cost is really being measured by marginal cost of production. On examining the figures, you find that the marginal utility of producing one ton of bread is greater than the marginal cost. (Marginal cost represents the sacrifice of the best contribution of these resources elsewhere). Thus what we are saying is that by shifting resources from elsewhere to the production of bread we are sacrificing less welfare (or utility) and gaining more utility. Thus this transfer represents more efficient use of the resources.

We ask the same question for the second unit. Is the benefit of having the second ton of bread, (represented by its marginal utility), more than the benefits sacrificed elsewhere (represented by its marginal cost)? If the marginal utility of allocating resources to produce this second ton of bread is greater than the marginal cost of producing this second ton of bread, then we should produce it, otherwise we should not. And so on.

Using this principle, you can find out how much of the resources should be devoted to bread production. Diagrammatically, in Figure 7.18, you should allocate resources to the production of Q_0amount of bread. Beyond that point the benefit of extra bread, represented by its marginal utility, is less than the extra-opportunity cost of resources, represented by MC. You know by now that the MC curve in Figure 7.18 is the same thing as the market supply and that the MU curve is the same thing as the market demand. Thus in a market economy, the point of optimum or efficient allocation of resources is where demand and supply curves intersect. Because in a competitive economy the equilibrium is automatically reached at Q_0, it is said to allocate resources efficiently. In other words, the efficient allocation which you reached as a cold calculating planner in a planned economy is reached automatically through competitive forces in a perfectly competitive economy.

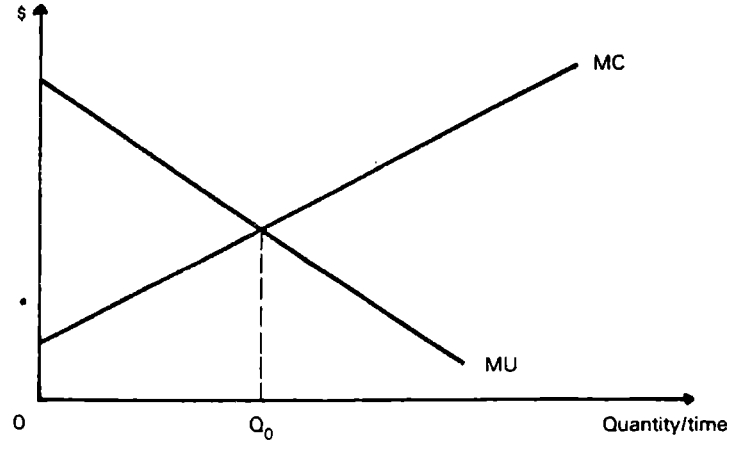


Figure 7.18

Now before we finish let us make one last point. The quantity Q_0 in Figure 7.18 does not represent a desirable point because perfect competition takes us there. In fact, it is the other way around. We consider perfect competition to be desirable because it takes us to that point. If planned economies were to take us there, then they would be as desirable as perfect competition. However, in planned economies the problem is that it is difficult to reach Q_0 because it is impossible for a planner to correctly know the MU of millions of individuals.

Problems with Perfect Competition

The above discussion does not mean that perfect competition does not have its share of problems. The most important problem of perfect competition is its total neglect of the income distribution. Rich can get richer and poor can get poorer, but so long as demand is equal to supply, things are fine under perfect competition.

If we depended on perfect competition, certain goods, like police, judges, and armies, may never be provided by the market. In addition, some firms may use perfect competition as a license to pollute rivers and air in the name of freedom to produce what they want, where they want. More about these problems in chapters to come.

CASE I: Application of Marginalism in Corporate Decision Making

The Chairman of the Board of Transcontinental Airlines Incorporated recently convened an emergency meeting of the Board to discuss the dismal profitability of his airlines. The main agenda for the meeting was to discuss a proposal for increasing profits, submitted by the newly appointed Vice-President for Economic Planning, Mrs. G. R. Winters.

Normally, there would be no need for such a meeting. However, the proposals of Mrs.Winters have been strongly criticized by the Chief Finance and Accounts Officer, Mr. T. Craig. Matters had come to such a pass that a meeting of the Board had to be called to resolve the issue, once and for all. The arguments of both parties may be summarized as follows.

Mrs. Winters has suggested that the time has come to make use of every possible business opportunity. Therefore, according to her, Transcontinental Airlines should fly on all such routes where it can earn enough revenue to cover its out-of-pocket expenses. She illustrated her case using the following example.

Problem :	*Should Transcontinental run an extra daily flight from Salem to Macomb.*	
The Facts :	*Fully-allocated costs of the flight*	*$55,000*
	Out-of-pocket costs of this flight	*$30,000*
	Expected Revenue from the flight	*$42,000*
Decision :	*Run the flight.*	
Reasoning :	*This flight between Salem and Macomb will add $42,000 to total revenue and only $30,000 to total cost.*	

Overhead and other costs which equal to $25,000 ($55,000 - $30,000), would be incurred whether the flight is run or not. They are fixed costs or sunk costs. Therefore, fully allocated or "average" costs of $55,000 are not relevant to this business decision. It is out- of-pocket or "marginal" costs that count.

Mr. Craig calls this a recipe for disaster. He has gone to the extent of saying that Mrs. Winters should go back to her old job of Associate Professor of Economics in Macomb University because those who can do, do, those who can't, they teach. His main criticism of Mrs. Winters' approach is that "nobody ever made a profit without meeting all costs."

Mr. Craig asked Mrs. Winters in the board meeting what if each flight, looked at individually, more than covers marginal costs, but added together they don't cover the firm's total cost. Would she still stick to her marginal principle?

To this Mrs. Winters responded by saying that she "considers that the bulk of her scheduled flights have to return at least their fully allocated costs. Overheads, depreciation and insurance are very real basic schedule has been set."

This debate has left the Chairman of the airlines somewhat confused. He sees merit in both arguments and is not able to decide which side he should lean. Should he allow flights that just cover marginal costs, or allow those that cover the average total cost. Imagine that the Chairman has hired you as a consultant to put things in proper perspective and help him make up his mind.

What will you advise him?

Analysis

The doubts raised by Mr. Craig the Chief Finance and Accounts Officer of Transcontinental airlines, are legitimate. However, these doubts arise due to the incorrect understanding and application of the marginal principle.

Three broad levels of decisions are involved in deciding the airlines operations. First, the airlines has to decide its basic schedule. At this stage the airlines has control over many of its overheads and hence they are to be treated as "variable costs" which form part of the marginal cost for this level of decision. Mrs. Winters hinted at this when she said, that while deciding the basic schedule she makes an attempt to cover all costs.

Once the basic schedule is decided and commitments made with regard to overhead costs, most of these costs become fixed costs for deciding on extra flights. Therefore, for this level of decision concerning additional flights besides the basic schedule, the out-of-pocket expenses or marginal costs will not include most of the overheads.

By out-of-pocket costs, Mrs. Winters means just that—the actual dollars that Transcontinental has to pay out to run an additional flight. The way to get this figure is by circulating a proposed schedule to every operating department concerned and finding out just what extra expenses it will entail. If a ground crew already on duty can service the plane, the flight should not be charged a penny of their salary expenses. In fact, there may be some costs that would be eliminated in running the flight; they won't need people to roll the plane to a hanger, for instance, if it flies on to another stop.

Once the number of flights in the basic schedule and the number of additional flights are fixed, the third level of decision concerns the tariff to be charged for these flights. In making the first and second level decisions,

a certain price has to be assumed for arriving at a conclusion. However, once the flight has been scheduled, and is ready to leave, the "relevant marginal costs" change dramatically. One more passenger will not make any material difference to the airline's costs. That is, for all practical purposes the "marginal cost" for carrying an additional passenger is zero. This explains the practice of heavily discounted tickets for standby passengers.

This case is a classic episode in the application of central economic concepts to business situations. Getting management to accept and apply the marginal cost concept is probably the chief contribution any economist can make to his company. Put more simply, marginalists maintain that a company should undertake any activity that adds more to revenues than it does to costs—and not limit itself to those activities whose returns equal average or "fully allocated costs."

Mrs. Winters' travails at Transcontinental are a good example of the truth in a famous comment by Prof. Sidney Alexander of MIT—formerly economist for Columbia Broadcasting System—that the economist who understands marginal analysis has a full time job in undoing the work of the accountant.

CASE II : Unanticipated Consequences of Price Support Policies in an Increasing Cost Industry

The Union of Prosperous States (UPS) is a large industrialized nation with a highly efficient agricultural sector. In recent years, the rapid technological advances in the farming of corn have made UPS a world leader in this crop.

This status as a world leader in corn production was achieved not only due to the ingenuity of individual farmers but also due to very supportive public policies. Initially, breakthroughs in corn farming brought prosperity to the UPS farmers. Sure enough, as the total supply of corn increased, the price of corn in the market plummeted. However, lower prices led to larger sales and increased revenues for corn farmers. Encouraged by this trend, they redoubled their efforts to increase their productivity even further.

Unfortunately, what was good in small doses began to back-fire in higher doses. After a while, UPS farmers noticed that their collective income from increases in corn supply had begun to decrease. A survey sponsored by the Association of Corn Growers of UPS (ACGU) confirmed that this decline in revenue was taking place in spite of stable patterns of demand for corn.

Seizing the opportunity during an election year, ACGU managed to get a "price support" legislation through the country's parliament. The gist of this legislation was that the price of corn will be pegged at a much higher price than the price prevailing before this legislation. As we saw in Case VI (Chapter 3), this support price was expected to lead to a surplus. The government of UPS promised to pay the farmers not to produce this amount. Of course, the government could have bought this surplus. However, the economic calculations done by the government economists showed that it was not worth while to do so.

Once the legislation came into effect, the Ministry of Agriculture came under severe pressure while negotiating crop quotas. The quantity offered for production at the legislated support price exceeded all projections. For a couple of years the government paid the farmers not to grow. In spite of fierce haggling, the drain on the Treasury was simply stupendous.

Finally, the Parliament woke up to the reality of the situation and amended the price support legislation. While the price support was still maintained, the new law mandated that government would buy all the surplus at that price.

A year after this change in policy, the Agriculture Ministry noted that 20 million tons of the surplus corn was offered to the government. This was in sharp contrast to 100 million tons worth of corn that was allegedly offered and paid for by the government to prevent its production under the old policy.

A Parliamentary committee was set up to investigate why this happened. It was asked to look into the allegations of collusion between program administrators and farmers.

The committee looked into the data and found that the key to this mismatch between "anticipated" and "actual" surplus lay in "oversight" rather than in "collusion." It found that the government economists had done a good job of estimating the marginal cost curves of corn production for the farms. Hence, the expected production calculated at the point where price equals marginal cost was also reasonable. The only problem was that they had ignored the impact of "external diseconomies."

The chief economist working for this committee made the following statements during his deposition:

"What we have observed is a very frequent occurrence in the annals of price support legislation. Attempts to "rig" or "peg" price above the market equilibrium, are subjected to considerable greater pressure than is usually anticipated. However, the abandonment of such attempts frequently produces less change in actual output than the pressure against them would lead one to expect....."

Question 1: Explain the phenomenon described in the case using economic tools you have acquired so far.

Analysis

(i) Let the supply and demand situation in the UPS corn market be represented in Figure 7.19. Without any support price the price of corn would have plummeted to P_0. However, as mentioned in the case, a **minimum** price of P^* is legally imposed and effectively enforced.

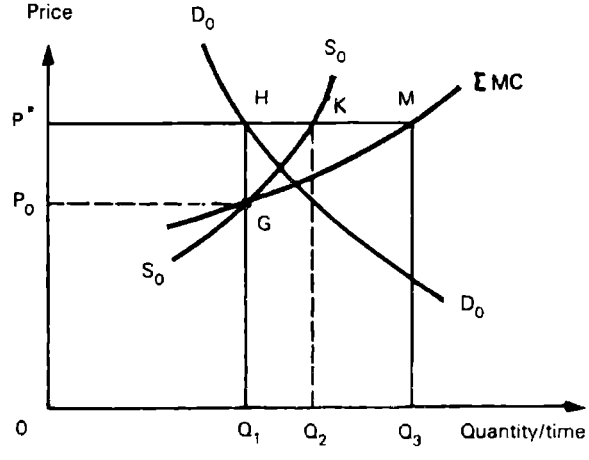


Figure 7.19

(ii) At this support price of P^*, Q_1 is the maximum quantity that can be sold. To produce this quantity, the suppliers would be operating at point G on the market supply curve S_0.

(iii) At point G, if we were to add up all the MC curve for the suppliers, we would get a curve designated as Σ MC in Figure 7.19. This curve shows the sum of what individual firms "think" they would like to produce at various prices given that the output of the industry is OQ_1; it is, as if it were, a "virtual" or "shadow" supply curve for the industry because no other point besides G could become a reality. Any attempt to expand production would cause the entire MC curve to shift leftwards due to "external diseconomies" resulting from increasing input costs. ("External Diseconomies" and "External Economies" are sophisticated terms used by economists to refer to the case of "increasing Cost" and "Decreasing Cost" Industries discussed on pages 150-152).

(iv) However, this "shadow" supply curve explains the curious occurrences in UPS. It shows the pressure on the market at non-equilibrium prices. No wonder the Government of UPS estimated the surplus to be equal to HM (100 million tons) in Figure 7.19, whereas, in reality, it turned out to be HK (20 million tons). When arguing, the farmers genuinely believed that under prevailing factor market conditions, they would produce OQ_3. However, when all of them tried to produce this amount after the government of UPS amended the price support legislation obligating the Government to buy any surplus resulting from this price support program, they bid up the price of resources and, hence, raised each other's cost of production. This change in cost made it less attractive for them to produce the original amount.

CASE III: Unanticipated Consequences of Price Ceilings in a Decreasing Cost Industry

Atavia is primarily an agricultural country in the middle of Africa. Its economy is heavily dominated by the public sector. However, video-cassette production is one of the areas which is entirely in the private sector.

Over the years there has been a tremendous growth in this industry. The demand for video-cassettes has increased because the staid state-run TV station offers a very poor quality entertainment and, therefore, people are forced to rent pre-taped videos to watch on their VCRs.

While VCRs are mostly imported, the blank video cassettes are produced in Atavia. The decade of '80s saw a steady decline in both the cost of production as well as the equilibrium price of video cassettes in Atavia. Yet, there was a general resentment against the video-cassette producers because they were reported to be making enormous profits while video-cassettes continued to be quite expensive though cheaper than before.

Of late, there has been a strong demand to privatize the TV station in Atavia. Proponents have argued that the state-run TV is promoting an illegal market for pre-taped entertainment videos because most of them were illegal copies of the American originals. They pointed out the potential threat of a trade embargo by USA if the situation is not rectified soon. Besides, the advocates of privatization have also conceded that the TV news can still be censored by the Government. To quell the growing tide of sentiments in favor of the above idea, the Government of Atavia announced a price ceiling on blank video-cassette sale.

In doing so the Atavian government was fully aware of the usual consequences of a price ceiling. It expected the quantity supplied of blank video cassettes to go down slightly. But it figured that benefits of lower prices will far outweigh the decrease in the available quantity of video cassettes. However, the Government was surprised to find that the consequence of price ceiling turned out to be a complete disappearance of domestic supplies. In fact within two years the entire stock of domestic videos disappeared.

The Government's price czar, Joint Secretary, Pricing Division in the Bureau of Industrial Costs and Prices, has gone to the press saying that the price ceiling was just a trifle lower than the existing price and hence that could not be the sole reason for the death of the domestic blank-video industry.

Could you help the Atavian Government understand what is going on in this business ?

Analysis

(i) Let us start looking at the rationale for the Government's expectations. Figure 7.20 depicts the usual scenario that the Atavian Government had assumed.

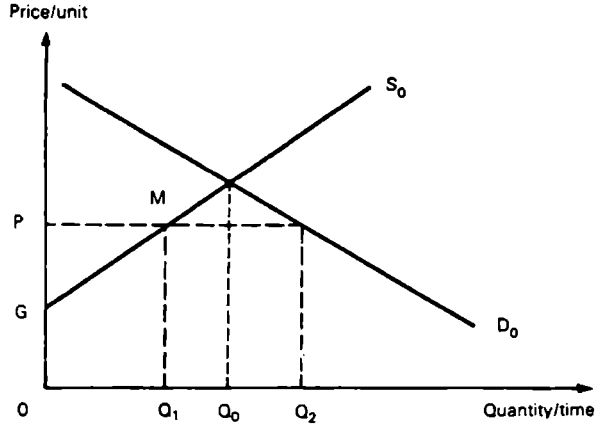


Figure 7.20: Market for Blank Video Cassettes

According to this figure, an imposition of a ceiling price ought to lead to a decrease in the quantity of blank videos produced from Q_0 to Q_1 and not a complete disappearance of the market for domestic videos. Clearly, there are producers in the range GM, who ought to still find it worth their while to produce blank video cassettes.

(ii) Unfortunately, the actual market for blank video cassettes in Atavia resembles the one depicted in Figure 7.21.

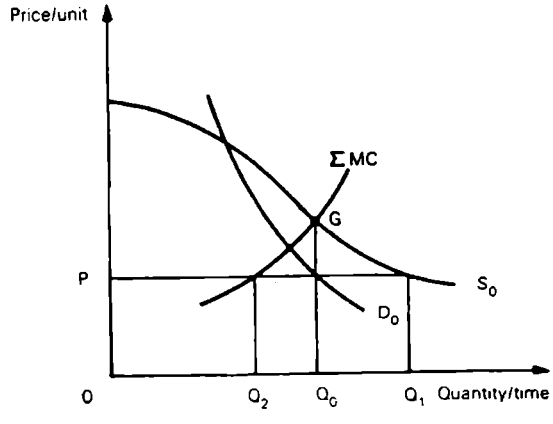


Figure 7.21: Market for Blank Video Cassettes (Assuming External Economies or Decreasing Cost Industry)

The difference between this figure and Figure 7.19 is that the supply curve here is depicted as possessing a negative slope as a result of the existence of external economies. That is, this industry is a decreasing-cost industry.

(iii) In this kind of a market, it is clear that no output greater than OQ_0 would be possible at the price OP since it could not be sold. At this output, the relevant "shadow" marginal cost curves are those associated with point G on the supply curve, the sum of which is given by the curve labeled ΣMC.

(iv) Now, if suppliers were to try to adjust their output in the light of these marginal cost curves, they would try to produce OQ_2 (at a price of OP) or less than OQ_0. As they try to do so, their cost curves would rise and their desired output would fall. If they adjust to this situation by cutting back their output to the desired lower level, they would further reduce the desirable level. There is no end to this process short of an output of zero, so long as we suppose the supply curve to be negatively inclined throughout. Of course, if, as might well happen, that the supply curve had a positive sloping segment (as in Figure 7.22), then the final solution would be at OQ_2. Obviously, the supply curve of the Atavian video-cassette industry must be like the one depicted in Figure 7.22.

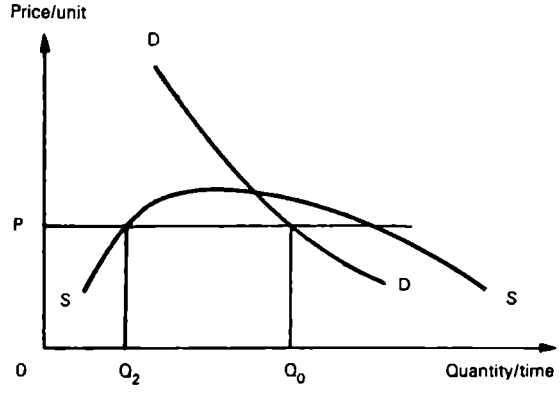


Figure 7.22

CASE IV: Who Benefitted from Proposition 13 in California?

Some years back, every newspaper around the world was full of news about the so called Prop 13. This was a short reference to Proposition 13 which was up for a vote during a California State referendum. It was a proposal for limiting property taxes to 1 per cent of the market value. It passed by a 2 to 1 vote due to the overwhelming support of apartment dwellers who were told their landlord's saving would be passed on to them.

The passage of Prop 13 in California was followed by similar moves in other states of America. Unfortunately, the expected bonanza has not materialized for the apartment dweller in California and similar propositions are under great fire.

The following are excerpts from the newspaper columns written by two eminent economists in an eastern state known as the home of the world's leading universities.

According to Dr.Carlos Ramirez "Reduction in property taxes is a great relief for harassed apartment dwellers in big cities. The fact that rents have not come down in California is not an indication of the failure of Prop 13. Rather, it reflects a failure of the analytical faculties of commentators.

Those who have had even a modicum of economic education should be able to see that this situation is a classic one where the well known *ceteris paribus* condition is violated. It is a familiar part of the economic folklore that a tax in a competitive market leads to higher final prices for consumers and lower prices for the producers, other things being same (*or, ceteris paribus*). In California a general rise in the price level and a sharp increase in demand for apartments has negated any benefits that Prop 13 would have yielded. We just have to be thankful that the rise in rents in California is lower than what it would be in the absence of Prop 13.

Dr. Charles Dunn, on the other hand feels quite differently. According to him property taxes are more in the nature of a fixed cost and, therefore, in the short run, repealing them will only benefit the owners and not tenants. And only in the long run some benefits might trickle down to tenants.

Please illustrate the above debate using the basic tools of microeconomic analysis. Can you decide who is right?

Analysis

To analyze this case let us assume that the rental market in California is highly competitive. It is an appropriate assumption because there are large number of landlords on the supply side and a large number of tenants on the demand side.

However, let us drop one of the simplifying assumptions made earlier in the chapter while analyzing the long-run equilibrium. Remember we assumed that the milk industry consists of 900 more or less identical firms. Each firm was assumed to have a cost curve just like the ones shown for an enterprise called Milko Dairy in Figure 7.11 (A). This assumption has served its purpose very well and if you have reached this far in the Chapter, and understood everything, it is time to make a slightly more realistic assumption about the nature of the firm's cost structure.

The final panel in Figure 7.23 illustrates the situation of an industry with a positively sloped supply curve; the other panels depict the situation of three different firms (apartment houses). The apartment house in panel A is earning positive economic profits due to such factors as prime location or better management. The one in panel B is earning no profits and the one in panel C is a firm waiting to enter the market if the price (rent) were to increase. These firms are referred to as "infra-marginal," "marginal" and "extra-marginal" firms respectively.

This industry could be in equilibrium in spite of the profits of firms like those which resemble Firm A, if there are no other potential firms which have an incentive and are in a position to take the return away. That is, so long as there are no firms now in the rental business that have a minimum average cost below OP_1.

The profits of the infra-marginal apartment house are reflected in their property value. And since the property value of the infra-marginal apartment house is greater than that of the marginal apartment house, any percentage decrease in property taxes will be bigger in absolute terms, for the infra-marginal than for the marginal firms(or apartments).

With the basic framework in place, let us examine the impact of reducing property taxes due to the passage of Proposition 13. In the short-run, property taxes enter the firm's costs as fixed costs. Recall, the basic distinction between fixed costs and variable costs. The latter is related to the level of output, the former is not. In the present case, owners would have to pay property taxes whether they rent the house for a month or a complete year. Hence property taxes are fixed costs for existing firms.

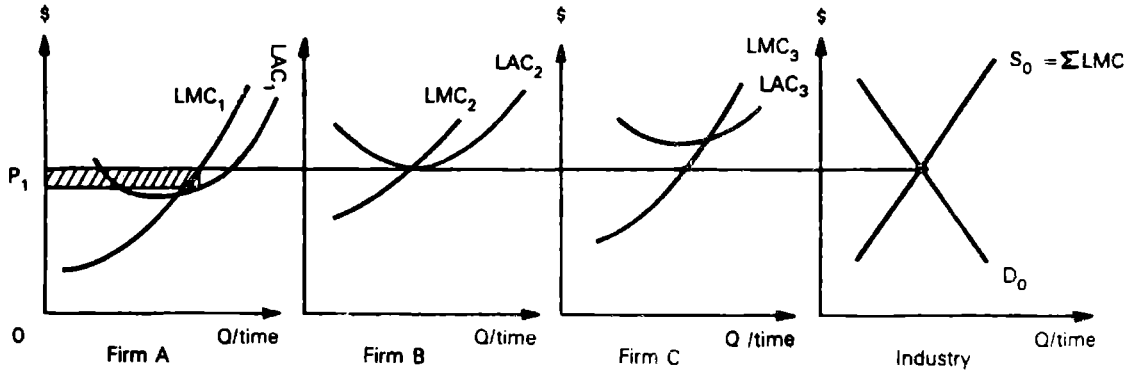


Figure 7.23

As shown in Figure 7.24, reducing property taxes shifts the LAC curves down without affecting the firms' marginal cost curves or the industry supply curve, Σ LMC. Note that the profitable infra-marginal apartments receive a larger reduction than the less profitable apartments. The interesting result is that there will be no impact on rental rates in the short-run! So, Dr.Dunn is right? Yes! But wait a minute, the analysis is not complete.

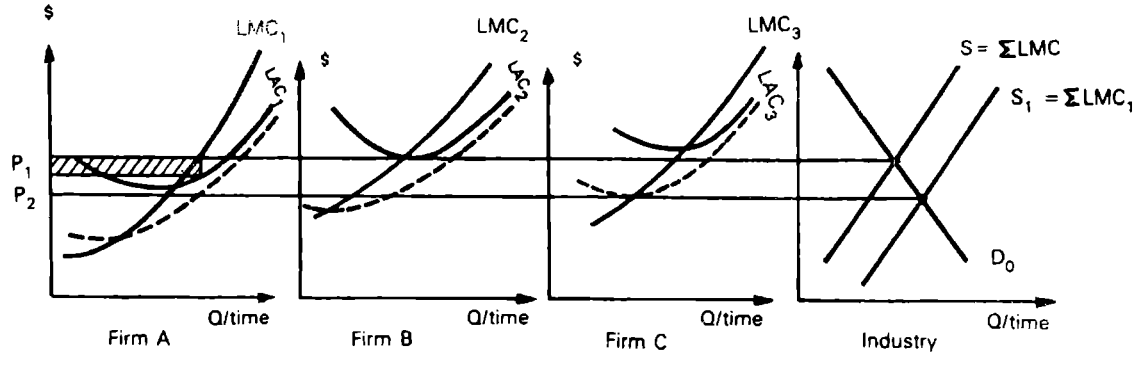


Figure 7.24

In the long run, previously extra-marginal firms like that in panel C will enter the industry, shifting the industry supply curve to ΣLMC_1. This entry reduces price (rent) to P_2. Although there is long-run entry, it bears no relation to the size of the cost reductions of the infra-marginal firms. The rent reduction depends only on the number of previously extra-marginal firms that can enter under the new tax formula.

In short, there will be no reduction in rents in the short run and some rental relief in the long run. With a fixed percentage reduction, property taxes will be reduced more on the more profitable apartments, which have greater property value. This rental rate reduction would be smaller than property tax reduction. Further, it is not the competitive market that will pass through the cost savings as argued by Dr. Ramirez. Instead, any rental reduction will be due to entry of new, higher cost or poorly located apartments that could not survive under previously higher taxes.

Thus both Dr.Ramirez and Dr.Dunn are right. The former for the long run and latter for the short run. However, Dr.Ramirez's reason for rent reduction is not correct.

Question for Class Discussion

The following case is the continuing saga of Mr. Wanchai Radeesri, Deputy Minister in the Minister of Finance, Government of Thailand and Mr. Kitti Ghooprasert, a graduate of the MPA program at Harvard's Kennedy School of Government. (See Questions for Class Discussion at the end of Chapter 3 for the earlier episode.)

Mr. Ghooprasert was indeed lucky that his previous encounter with the minister did not turn into an unpleasant confrontation. Two months after their chance meeting at the official reception for a visiting foreign dignitary, Mr. Ghooprasert was transferred to the Ministry of Finance and found himself working directly under Mr. Radeesri.

Mr. Radeesri is the Chairman of a high level committee looking into the possibility of deregulating the mini-bus industry in the greater Bangkok area. Mini-buses are inexpensive and ideal for a congested city. It is expected that this industry will be very close to our model of a perfectly competitive industry.

Mr. Ghooprasert has been asked by the minister to prepare a report on the consequences of deregulation in the short run and in the long run. The following sentence appears in the draft prepared by him:

> *"In the long-run competitive equilibrium, profits are zero. As soon as positive profits appear, new producers will enter the market, driving prices lower and profits to zero. No firm can make positive profits for too long unless it has monopoly power."*

Mr. Radeesri calls Mr. Ghooprasert to his office and blows up:

> *"This is the craziest thing I have ever heard. Why would a businessman ever be in business if he cannot make profits? Profits are to entrepreneurs what wages are to workers. What would an entrepreneur and his family eat, if his profits are zero?"*

Imagine that you were sitting in the room while this meeting between the two took place. How would you mediate between the two? Who is right and, why?

Problems for Practice

1. Perfect competition is characterized by all of the following except:
   a. large number of sellers.
   b. homogeneous products.
   c. individual firm advertising.
   d. perfect knowledge.

2. The demand curve facing the individual seller in perfect competition is:
   a. the same as market demand.
   b. perfectly inelastic.
   c. down-sloping.
   d. horizontal.

3. Large numbers of buyers and sellers imply
   a. the inability of one to influence price.
   b. the ability of one to influence price.
   c. utter chaos in the market.
   d. rising long-run supply curves.

4. Market supply is
   a. horizontal.
   b. impossible to find.
   c. the sum of individual supply curves.
   d. equal to the average cost of production.

5. An individual seller in perfect competition will not lower price because
   a. it cannot be done.
   b. all that is produced can be sold at the going market price.
   c. losses would occur.
   d. demand is inelastic.

6. Maximum profit is found where
   a. MC = MR
   b. MR = ATC
   c. total revenue equals total cost.
   d. MR is greater than MC by the largest amount.

7. Which of these statements applies to the perfect competition model?
   a. firms can affect the market price for their products.
   b. only buyers have perfect knowledge of the market.
   c. resources of firms cannot be adapted easily for alternative uses.
   d. products are standardized and uniform.

8. In a perfectly competitive market.
   a. there is a small number of buyers and sellers.
   b. a firm can easily switch from the production of one good to the production of another.
   c. individual buyers or sellers cannot affect the price by their actions.
   d. price of product never changes.

9. Which of these industries would most closely fit the perfectly competitive mode?
   a. aluminium.
   b. eggs.
   c. bourbon.
   d. television sets.

10. Assume that a perfectly competitive industry is in equilbirium. If the market price increases.
    a. a firm will expand output in the short run until marginal cost equals the new price.
    b. firms may decide to contract capacity in the long run.
    c. there will be lower profits.
    d. firms will leave the industry.

11. Which of these markets is least likely to fit the perfectly competitive model?
    a. wheat
    b. corn
    c. cotton
    d. radios

12. A perfectly competitive firm can incur losses but continue to operate in the short run, if it is at least able to cover its
    a. total costs.
    b. fixed costs.
    c. variable costs.
    d. average total costs.

13. If a perfectly competitive firm is producing at a point where marginal cost is less than the price, it is
    a. maximizing profits.
    b. likely to increase output.
    c. likely to decrease output.
    d. unlikely to change the quantity of output.

14. If a firm in a perfectly competitive industry raised the price of its product, it would
    a. sell a smaller quantity.
    b. increase profits.
    c. not be able to sell any of its output.
    d. none of these.

15. In perfect competition, profit is equal to
    a. total revenue minus explict costs.
    b. price minus AVC times quantity sold.
    c. price minus ATC times quantity sold.
    d. marginal revenue minus marginal cost.

16. If the price is greater than ATC at the point of maximum profits.
    a. firms are attracted to the industry.
    b. the firm is earning a normal profit.
    c. the market demand is falling.
    d. the industry cannot be competitive.

17. What is the greatest possible size of the loss that a rational competitive firm can suffer in the short run?
    a. infinity.
    b. explicit plus implicit costs.
    c. zero.
    d. total fixed costs.

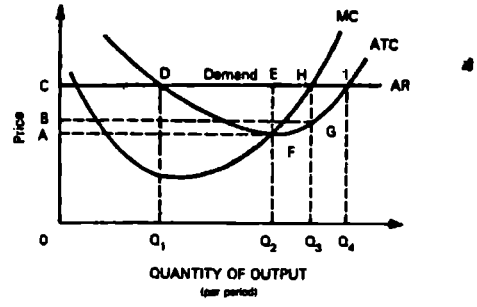
18. All of the following are the results of the short-run economic profits in a competitive industry except that
    a. existing firms expand capacity.
    b. new firms enter the industry.
    c. industrial supply increases.
    d. market price rises.

19. A constant-cost industry
    a. cannot exist.
    b. has a perfectly straight average variable cost curve.
    c. can produce different levels of output at long-run equilibrium at the same cost.
    d. has a short-run supply curve that is down-sloping.

20. Under perfect competition, the demand facing the seller is perfectly elastic because
    a. market demand is perfectly elastic.
    b. there is a large number of perfect substitutes for the firm's product.
    c. production is always elastic in the long run.
    d. none of these.

21. The short-run supply curve of a competitive firm:
    a. shows the quantities buyers will purchase at alternative prices per period, *ceteris paribus*.
    b. Is that portion of the firm's marginal cost curve above minimum average variable cost.
    c. Shows the profits the firm will make at various rates of output.
    d. Is exactly opposite the firm's demand curve.

Use the following figure to answer questions 22 through 26



22. Total economic profit is maximum at the output rate:
    a. OQ_1
    b. OQ_2
    c. OQ_3
    d. OQ_4

23. Maximum economic profits are measured by the area:
    a. $OAFQ_2$
    b. ACEF
    c. $OCIQ_4$
    d. BCHG

24. Per unit profit is maximized at the output rate:
    a. OQ_1
    b. OQ_2
    c. OQ_3
    d. OQ_4

25. Maximum per unit profit is equal to:
    a. HG
    b. EF
    c. DQ_1
    d. EQ_2

26. Total revenue at the output rate OQ_2 is equal to:
    a. $OCEQ_2$
    b. EQ_2
    c. OQ_2
    d. OQ_2FA

CHAPTER EIGHT

MONOPOLY

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MONOPOLY

Let us begin this chapter by summarizing what we have achieved so far and what we are about to do in this chapter.

In the previous chapter, we made use of Equipment Set #4 to analyze the behavior of the producers in perfectly competitive markets. We saw how producers decide how much to produce and supply at various prices. This analysis gave us a better understanding of the supply curve of a firm and that of the industry in a perfectly competitive market. We discovered, for instance, that the shape of the firm's supply curve in the short run depends on its marginal-cost curve, and the industry's supply curve in the long run, depends on whether the industry is a decreasing-cost, increasing-cost, or constant-cost industry.

With this understanding of the factors behind the supply curve, we have corrected the imbalance in our discussion of the determination of prices due to the neglect of the supply side. Remember we said that in a market economy, the answers to the three central problems — WHAT, HOW, and FOR WHOM to produce — are determined by prices. Therefore, it was essential to know how prices are determined. Subsequently, we found that since prices are determined jointly by demand and supply, it was, therefore, essential to understand both the supply and demand side of the market. But, our earlier chapters concentrated on the demand side while neglecting the supply side. It is this imbalance that has now been rectified.

However, there remains another important imbalance in our discussion thus far. We have analyzed how prices are determined in a perfectly competitive market. But in the real world, not all market economies are perfectly competitive. Thus, in this chapter we make an attempt to begin to understand how equilibrium price and quantity are determined under imperfectly competitive markets. The three market structures we will examine in these two chapters are: monopoly, oligopoly and monopolistic competition.

The most important thing to note at the outset is that the profit-maximizing producers under each of these market structures use the same basic approach. They will produce each successive unit of output so long as it adds more to their total revenue than it does to their total costs. In technical language, the firms in these markets will produce up to that output at which marginal revenue equals marginal cost.

Thus, the only thing we have to do to analyze these markets is to find out what the marginal-revenue and marginal-cost curves look like under each of these markets. This task becomes easier when we realize that the general shape of the marginal-cost curve is the same for all three markets. This is so because costs depend primarily on technological considerations, which remain unaffected by the market structures. In other words, we

are saying that the productivity of a machine is likely to remain unaffected whether it is operated by a monopolist, oligopolist or, for that matter a perfect competitor. Therefore, all one has to do is to find out how the shape of the marginal-revenue curves in these markets differ, and the rest of the job is easy. Let us then examine the supply decisions of the producers in each of the three imperfectly competitive markets, one by one.

MONOPOLY

The main question to be answered in this section is, how does a monopolist decide how much to produce and what price to charge? However, let us take this opportunity to also discuss a few other issues related to the existence of monopoly. In particular, no discussion of monopoly would be considered satisfactory without dealing with the following issues: How does a monopoly come into existence, or why do monopolies exist? In what sense are monopolies inefficient, or what is wrong with a monopoly? What can be done to control them?

But first, let us define a monopoly more precisely. In the previous chapter, we said that monopoly implies that there exists only one seller. However, consider the case of a shop which gets the exclusive right to sell bread made by Pepperidge Farm Inc. Would you consider this shop to be a monopolist? Certainly not. There are a number of shops selling very similar types of bread. It can hardly act like a monopolist. Thus we have to modify our definition slightly. **A monopolist is, then, a single seller selling a product which does not have any close substitutes.** By the absence of close substitutes, we mean that there are no other firms producing the same product or products varying only in very minor ways from that of the monopolist. For example, there is no close substitute for the electricity or water supplied by local utilities.

Even though pure monopolies, where there is just one producer or seller, are rare, I can think of at least two good reasons to justify our spending time on analyzing the pure monopoly case:

(1) First, some industries are reasonable approximations of a pure monopoly. The behavior of firms with 80, 70, or even 60 per cent of the market can often be explained with considerable accuracy through the pure monopoly market model we are about to examine.

(2) Second, a study of pure monopoly provides us with valuable insights concerning the more realistic market structures of monopolistic competition and oligopoly, which will be discussed later. These two market situations combine, in differing degrees, the characteristics of perfect competition and pure monopoly.

Having seen what is meant by the term monopoly and why we should spend time and effort to examine it, let us begin by examining why monopolies arise.

Why Monopoly Arises?

The reason monopolies exist is that other firms find it unprofitable or impossible to enter the market. Barriers to entry are, therefore, the source of all monopoly power. If other firms could enter the market, there would, by definition, no longer be a monopoly. These barriers to entry can be classified into two groups: legal barriers and technical barriers.

Legal Barriers to Entry

(1) Control over patents: By granting an inventor the exclusive right to control a product or technique, the patent laws are aimed at protecting him from having his product or process usurped by rival enterprises which have not shared in the time, effort, and money outlays which have gone into its development. Situations of this sort are numerous. Xerox machines and Polaroid cameras are the most notable examples. Because the basic technology for these products was uniquely assigned to one firm, a monopoly position was established.

(2) Ownership of essential raw materials: A firm owning or controlling a raw material which is essential for production can obviously prohibit the creation of rival firms. One example is the oft-cited case of Alcoa, in America which retained its monopoly position in the aluminium industry for many years by virtue of its control of all basic sources of bauxite, the major ore used in the manufacture of aluminium.

(3) Government franchises: A monopoly is created when government awards an exclusive franchise to serve a market. Generally, these franchises are awarded in cases of public utility (gas and electric) service, the post office, some airline routes and some television and radio markets.

Technical Barriers to Entry

In certain industries the cost conditions are such that the emergence of monopolies is natural. These monopolies are thus called natural monopolies. In these industries, the cost of production declines as more is produced. That is, there exist economies of scale. Therefore, if there is one large company providing the service, its costs would be very low. Thus another firm trying to enter the market will find it very hard to compete. An example is New England Telephone Company (NYNEX). Because of the cost advantage that monopolist NYNEX enjoys, no other firm would want to install telephone lines in a community already serviced by NYNEX.

Let us now examine how the pricing and the output decisions are made by a monopolist.

Price and Output Determination Under Monopoly

Let us assume a pure monopolist who through, say, patent and materials control is able to block the entry of new firms into the market. Assume that the monopolist is unhampered by the existence or the prospect of a regulatory commission. In other words, we have a monopolist who is in a position to make full use of her monopoly power. The main question of this section then, is, how would such a monopolist decide how much to produce and what price to charge?

As mentioned earlier, the basic approach of a profit maximizing monopolist is the same as that of a profit maximizing firm under perfect competition. Both will produce up to the point at which marginal revenue equals marginal cost. However, the crucial difference between these two firms lies in the different shapes of their marginal revenue curves. The next logical step in answering the main question of this section is to examine the difference in the shape of the MR curve of a firm under perfect competition and under monopoly.

A firm in a perfectly competitive market could sell as much as it wanted to sell at a constant price because it is too small compared to the entire market to affect it. And since each unit of output sold increased the total revenue by a constant amount, the marginal revenue was said to be constant.

However, a monopolistic firm is not insignificant when compared to the market, in fact, it represents the entire supply side of the market. The demand curve it faces is the entire market demand curve, which is downward sloping. Therefore, whenever a monopolist wants to sell more she has to lower the price. The crucial thing to note is that to sell more the monopolist will have to lower the price not only of the extra units of output she wants to sell, but of all units of output. This point is very important, and I would like to spend some time on it to make sure we understand it.

Let us assume that the demand schedule for the monopolist is given by Table 8.1 and diagrammatically in Figure 8.1.

Table 8.1: Demand Schedule for a Monopolist

Quantity demanded per week	Price per unit ($)
0	10
1	9
2	8
3	7
4	6
5	5
6	5
7	3

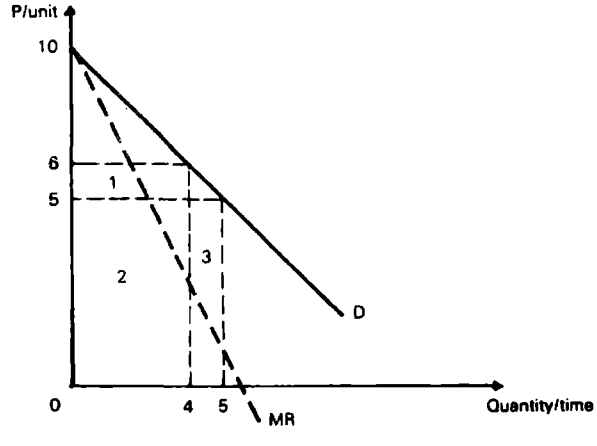


Figure 8.1: Demand Curve for the Monopolist

Now, suppose that the monopolist wants to sell 4 units. (Why she may want to do so we will see later.) The question is, how much should she charge? Can she charge a price of $10 per unit? Obviously not. From Table 8.1 it is clear that the maximum the consumers are willing to pay for buying the first unit is $9. So to sell the first

unit, the maximum the monopolist can charge is \$9. But this doesn't solve her problem. She is still left with 3 unsold units. The maximum the consumers are willing to pay for the second unit is \$8. But now the monopolist has a problem on hand. She can charge a price of \$9 for the first unit and \$8 for the second unit only if she can identify the consumers who are willing to pay these respective amounts. This may be possible if there are a handful of buyers, and the monopolist knows them well enough to be able to gauge their maximum willingness to pay. However, in a market with a large number of buyers, this kind of price discrimination is not feasible. Therefore, the only alternative left to the monopolist is to charge the same price for each unit, but the price should be such that she is able to sell the desired amount.

From Table 8.1 it is clear that to be able to sell 4 units the monopolist will have to charge a price of \$6. This way she will be able to sell all 4 units. People who are willing to pay \$4 or more will buy her output. Similarly, if she wants to sell 5 units, she will have to charge a uniform price of \$5 per unit to ensure that all units are sold.

There are two implications of the above features of monopolist's demand.

(a) Since extra units can only be sold by lowering the price, the MR is not constant.

(b) Further, MR is always less than the price. The MR is equal to the price the monopolist receives from selling an extra unit minus the revenue lost because prices must be reduced on all the other units sold. In Figure 8.1, Total Revenue (TR) when 4 units are sold is equal to the area (1 + 2). When 5 units are sold, TR is equal to the area (2 + 3). Therefore, MR, which is defined as the change in TR as a result of selling one more unit, is equal to the area (3) minus area (1). Now the area (3) is simply the price of the fifth unit and the area (1) is the loss in TR because prices must be reduced on the other four units also. Thus, clearly, MR from the fifth unit is less than its price. Since this is true for all units, we find that the monopolist's MR lies below the demand curve facing her, as shown in Figure 8.1. Table 8.2 shows the complete marginal revenue schedule in column 4.

Table 8.2: The Profit Maximizing Output and Prices for a Monopolist

(1) Quantity Q	(2) Price AR (\$)	(3) Total Revenue TR (\$)	(4) Marginal Revenue MR (\$)	(5) Total Cost TC (\$)	(6) Average Cost AC (\$)	(7) Marginal Cost MC (\$)	(8) Profit (\$)
0	10	0	—	2	—	—	-2
1	9	9	9	9	9	7	0
2	8	16	7	14	7	5	2
3	7	21	5	15	5	1	6
4	6	24	3	18	4.5	3	6
5	5	25	1	22.5	4.5	4.5	2.5
6	4	24	-1	30	5	7.5	-6
7	3	21	-3	49	7	19	-28

Once we get the MR curve for a monopolist, it is easy to see how she is going to make her supply

decisions. The basic approach is the same as that of a perfectly competitive firm. She will compare her MR with her MC and decide to produce all units whose MR is greater than MC. From Table 8.2 it is clear that the monopolist will produce 4 units. By doing so her profits are at a maximum level of $6. (You may wonder why she should produce the fourth unit when its MR is equal to its MC and, therefore, it does not make any contribution to the profits. There are two ways of justifying this. First, as mentioned in the previous chapter all such "don't care" units are assumed to be produced by convention. Second, remember our definition of cost includes normal profits, and so even when costs are just covered, a monopolist will still be making a normal profit on that unit.)

Once the monopolist has decided the optimum output, the price she should charge to be able to sell this amount is given by the demand curve. For 4 units, $6 is the maximum price she can charge. If she chargec more than $6, she would not be able to sell all 4 units.

Figure 8.2 represents this process diagrammatically. To see the profit maximizing point, what we do is put the revenue and cost data on the same diagram. Then the optimum output is read by looking at the point where MC = MR. The profit is obtained by using the definition of profit used in the case of a competitive firm, i.e., profit = Q (AR - ATC). Thus, the shaded area represents the profits. Notice that the demand curve is also the average revenue (AR) curve for a monopolist. For each quantity, the demand curve shows the price at which all units can be sold. For instance, 4 units are sold at $6 each. Therefore, the total revenue is $24 and the average revenue is $24/4 = $6. Similarly, for each level of output the price on the demand curve is also the average revenue at that output level.

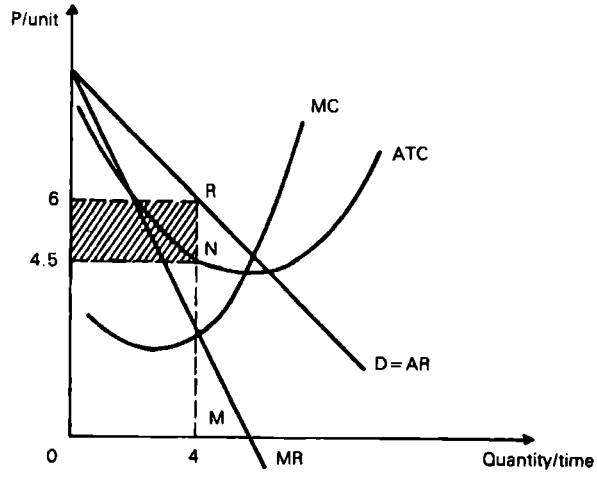


Figure 8.2: The Profit Maximizing Output and Price for a Monopolist

No Supply Curve for a Monopolist

It might be thought that the next logical step, after analyzing the supply decision of a profit-maximizing monopolist, would be to describe the shape of the monopolist's supply curve. However, we cannot do this. The supply curve is a concept which does not apply to the case of pure monopoly. In order to draw a supply curve, we must be able to specify a unique quantity of output associated with each possible product price. For a firm in a perfectly-competitive market, the required quantity was that which made marginal cost equal to price (as long

as MC exceeded short run variable cost at this point). For a monopolist, no such simple relationship between price and output exists. As demand changes, the price and output decisions of the monopolist change according to a more complicated pattern.

Figure 8.3 can help us understand the problem. In this figure, we have drawn a marginal cost curve together with two different possible sets of demand and marginal revenue curves. If the demand curve is at position D_0 and the marginal revenue corresponding to it is at MR_0, then the equilibrium price and quantity are given by P_0 and Q_0, respectively. Starting from here, if the demand curve shifted to D_1, with the corresponding marginal revenue at MR_1, the equilibrium price and quantity becomes P_1 and Q_0, respectively. Therefore, we find that at two different prices the same quantity may be supplied by a monopolist. Thus, there is no unique relationship between price charged and quantity sold, and so there can be no supply curve for a monopolist.

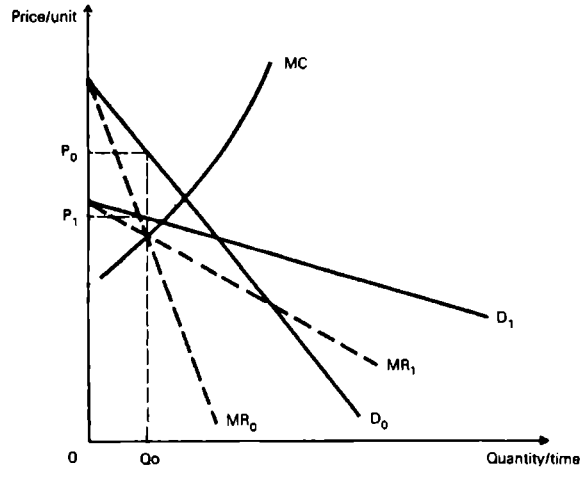


Figure 8.3

Before we move on to consider the inefficiency created due to the existence of monopolies and how to control them, let us examine the validity of two popular misconceptions about monopolies.

Two Common Myths about Monopoly

(1) Because a monopolist is the sole producer in the market, a lot of people believe that she charges the highest possible price. This is clearly false as we have just seen. She could have charged more than $6, but she did not. The monopolist is interested in maximizing profits and not in charging the highest possible price.

(2) It is popularly believed that monopolies can never make a loss as they are the sole suppliers in the market. But this is just not true. If the demand and cost situation faced by the monopolist is less favorable than that shown in Figure 8.2, she may realize a short-run loss. In Figure 8.4 the monopolist is making a loss equal to area PABC. But in the short run, she will continue producing as she is still covering her variable costs.

The discussion on the two popular myths implies that even when monopolists are free to act as profit maximizers, they are not as powerful as is commonly believed. In reality, however, because of certain considerations, most monopolists do not act (or cannot afford to act) as profit maximizers and, therefore, they are even less powerful in reality than in theory. Those considerations are:

a) It is difficult for a monopolist to be anonymous. Therefore, if she tries to fully exploit her market position, she may become the target of public criticism and, ultimately, government intervention, e.g., anti-trust action, regulations, etc.

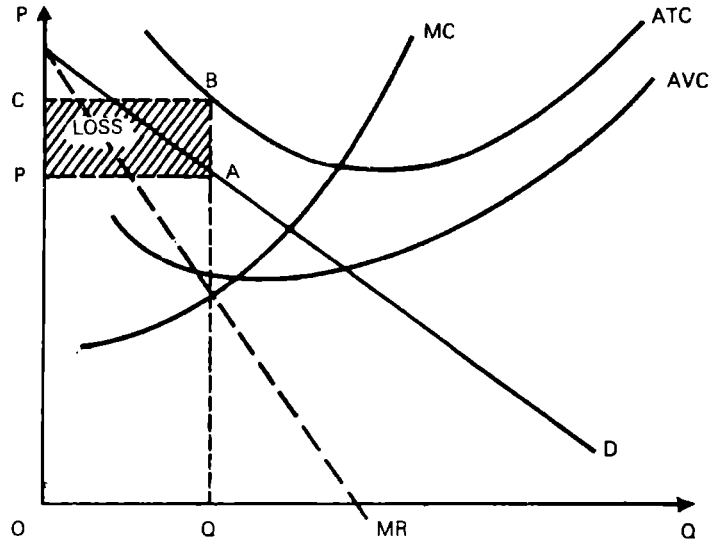


Figure 8.4: A Loss-Making Monopolist

b) Secondly, the monopolist may deliberately limit her profits so as not to attract new competitors. A highly profitable monopoly may cause potential rivals to increase their efforts to overcome the barriers to entry created by the monopolist.

The fact that monopolists are not as powerful as commonly believed and that they have to operate under certain constraints, does not mean that the public alarm about the evils of monopoly is simply much ado about nothing. As a matter of fact, monopolies do create certain inefficiencies in the economy, and now we shall examine some of them.

Productive Inefficiency

We saw on page 147 of this book that, in the long run, under perfect competition, a firm produces the level of output at which the average cost of production is the lowest. This is referred to as productive efficiency. Under monopoly, there is no pressure (as in perfect competition) to push production to the level where cost of production is at a minimum. A profit maximizing monopolist produces at that level of output at which MR equals MC. Now, it is possible that by sheer coincidence this point may also be the lowest point on the average total cost curve as shown in Figure 8.5. But remember that though this kind of coincidence is possible, there is no guarantee that it will always come about under monopoly.

Allocative Inefficiency

On page 153 of this book, we said that one of the main advantages of perfect competition is that it leads to an efficient allocation of resources. This allocative efficiency requires that resources be allocated so as to

produce a good to the point where the marginal benefit to the society (or marginal social benefit) is just equal to the marginal cost to the society (marginal social cost). This condition is met in a perfectly competitive market when equilibrium is where supply, representing marginal social cost, equals demand, representing marginal social benefit. It is against this backdrop that the allocative efficiency of a monopoly is judged. It is alleged that a monopoly will produce too little output and that the nation's resources will be misallocated as a consequence.

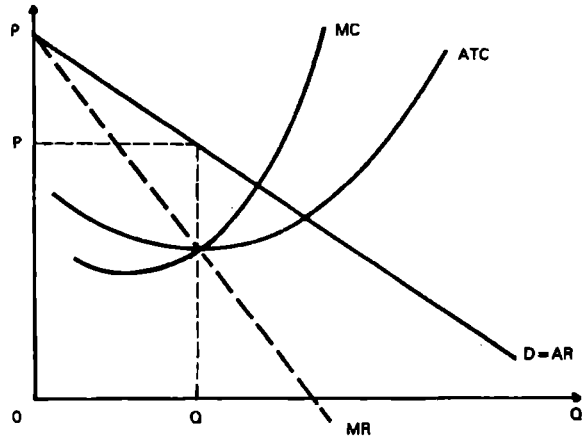


Figure 8.5

Before we explain the reason for such alleged allocative inefficiency under monopoly, let us examine why a monopoly will produce too little output. To illustrate this point, Figure 8.6 shows the operation of the same industry under two different market structures. Therefore, the demand conditions and the cost conditions are exactly the same in both cases. The only difference is that the perfectly competitive market in Figure 8.6(A) is serviced by a large number of perfectly competitive firms, while the market in Figure 8.6(B) is serviced by a monopolist. Suppose that the perfectly competitive industry in Figure 8.6(A) becomes a pure monopoly as a result of a wholesale merger or one firm somehow buying out all its competitors. What were formerly, say, 100 competing firms are now a pure monopolist consisting of 100 branch plants. The industry supply curve, S, is now simply the marginal cost curve of the monopolist, the summation of the MC curves of its many branch plants.

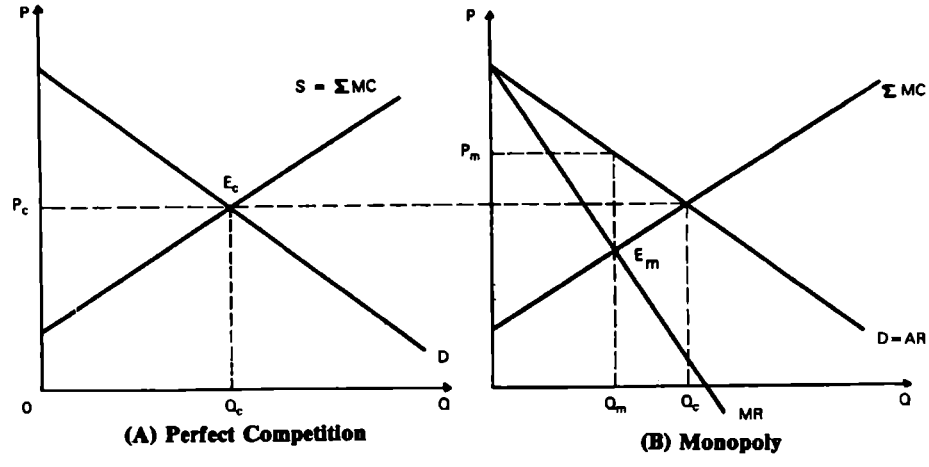


Figure 8.6

For the perfectly competitive industry in Figure 8.6(A), the marginal cost curve for the whole industry is the supply curve, and the equilibrium is at E_c, with Q_c as the output and P_c as the price. But, if this industry is monopolized as in Figure 8.6(B), equilibrium will be at E_m, where MR (and not demand) meets the ΣMC. The equilibrium price and quantity will be P_m and Q_m, respectively. Not only is the monopoly price higher, but the monopoly output is lower than that for a competitive industry. Thus, on both counts, the consumers under monopoly suffer. However, the producer under the monopoly benefits as he has an opportunity for profit not available under perfect competition. So, once again, in trying to evaluate monopoly, we are faced with the typical dilemma of the policy maker; monopoly damages one group (consumers) but benefits another (producers). **HOW CAN WE DETERMINE ITS OVERALL NET EFFECT ON SOCIETY AS A WHOLE?**

There are two ways of answering this question.

(a) First, this question can be answered with the help of Equipment Set #3. The basic approach is the same as in Chapter 5, where we used the concept of consumer's surplus and producer's surplus to analyze many policy questions involving the evaluation of the net effect of the gains and losses of various groups.

In Figure 8.7 we show the change in equilibrium price and quantity when a perfectly competitive industry is monopolized. Equilibrium price changes from P_c to P_m, and equilibrium quantity changes from Q_c to Q_m. Table 8.3 summarizes the changes in consumer's surplus and producer's surplus.

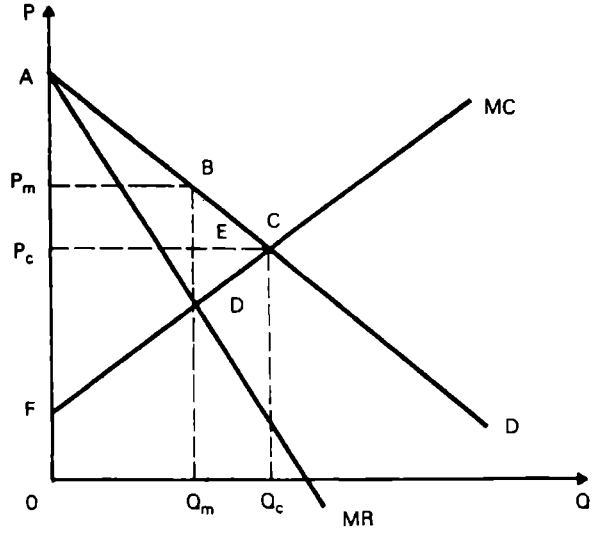


Figure 8.7

The area P_mBEP_c represents that part of the consumer's surplus which goes to the producer and thus represents a pure redistribution from consumers to the monopolist. Such a redistribution does not affect allocative efficiency as the loss to one group (consumers) is balanced by the gain to the other (monopolist), leaving the welfare of the society as a whole unaffected. But the two triangles, BEC and DEC, represent losses to one group that are not gains to the other. They are dead-weight losses and are a measure of the allocative inefficiency of monopoly.

The monopolist, by restricting output and raising prices above the competitive level, gains a larger share of a smaller "pie." The dead-weight loss arises because of the decrease in the size of the pie caused by not

Table 8.3: Welfare Impact of Monopoly

	Under Perfect Competition	Under Monopoly	Changes
Consumer's Surplus	P_cAC	P_mAB	$-P_mBEP_c$ $-BEC$
Producer's Surplus	P_cFC	P_mBDF	$+P_mBEP_c$ $-DEC$
		Net Change : -DBC (Net Loss)	

producing units that consumers value above the opportunity cost of production. This brings us to our second way of explaining allocative inefficiency caused by monopoly.

(b). The marginal benefit to society (that is, marginal utility) of a good is reflected in its market demand, D, in Figure 8.7, regardless of whether the industry servicing that demand is competitive or monopolized. The marginal cost of producing a good is given by the marginal cost curve, MC. As mentioned earlier, efficiency requires that this good should be produced to the point where the benefit to the society of producing an extra unit is equal to the extra cost to the society of producing it, that is, point Q_c in Figure 8.7. This is precisely what happens under perfect competition.

But if this market is serviced by a monopolist, the final equilibrium implies lower production, at Q_m in Figure 8.7. At this output, the marginal benefit to the society, BQ_m, is greater than the marginal cost to the society, DQ_m. This means that the society values additional units of this monopolized product more highly than it does the alternative products which these resources could otherwise produce. In other words, the monopolist's profit-maximizing output results in an under-allocation of resources; the monopolist finds it profitable to restrict output and, therefore, employs fewer resources than are justified from society's standpoint.

A Word of Caution

Just as our conclusion that perfect competition is efficient was subject to some words of warning (See Page 155) so too are the conclusions about the inefficiency of monopoly. Much of the case against monopoly depends on the crucial assumption we have made asserting that the monopoly has the same costs as a competitive industry. This assumption is highly debatable and has provided fertile ground for honest differences of opinion. To give you the flavor of this debate, let me mention two arguments for lower costs under monopoly.

1. A monopoly being a larger firm may be able to take advantage of economies of scale.

2. Due to higher profits the monopolist is likely to have more resources available for research and development and, thus, lower costs.

On the other hand, the following typical argument is presented to prove that costs are lower under perfect competition. It is argued that the keen rivalry of a competitive market penalizes the inefficient and, hence, provides great incentive to be innovative. A monopolist does not face this pressure as it has no rivals. Which view is more accurate? Honest economists will tell you that it is difficult to generalize and that a lot depends on the nature of the industry under consideration.

The above warning concerning the inefficiencies of monopoly was just that. It should by no means be taken as a defense of monopoly. The conclusion, that it leads to misallocation of resources, is generally correct. Further, when it is combined with the fact that monopolies usually entail excessive profits and contribute to inequality of income distribution in the society, it becomes a matter of public concern. Hence, the next logical step is to see what policies are instituted by the government to deal with monopolies. However, before we do so, let us develop another very important equipment set.

Alternate Welfare Measures

Thus far in the book we have relied on the concept of consumer's surplus and producer's surplus to make welfare judgements. Without question these are powerful concepts with the potential for tremendous insights into the functioning of public policies. Yet there are situations where it is easier to use an alternative set of welfare measures for making welfare judgements. In this section we develop them and term them Equipment Set #5.

This Equipment Set #5 consists of the concept of "total benefit" and "total cost." We know from chapter 5 that the demand curve gives us marginal utility or extra expected benefit of consuming each unit of a good. Thus the area $OWMQ_0$ under the demand curve D_0 in Figure 8.8 gives the total benefit of consuming OQ_0 amount of the good.

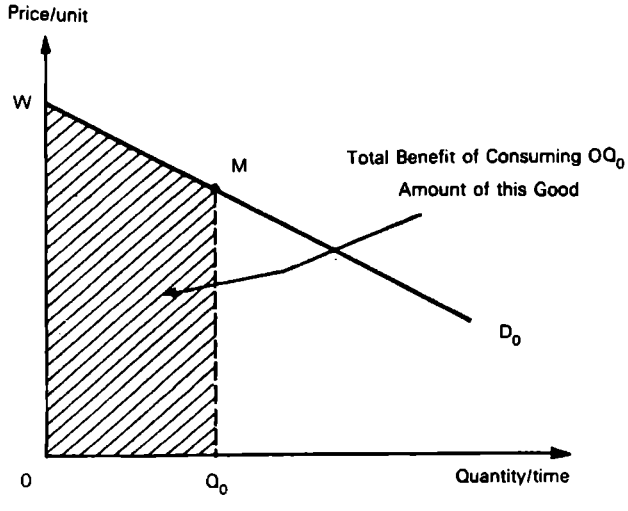


Figure 8.8

Similarly, now we know from chapters 6 & 7 that each point on the supply curve represents the marginal cost of producing that specific unit. Therefore, if we add up the cost of producing each of the OQ_0 units, we will get the "Total Cost" of producing OQ_0 unit represented by the area $OHWQ_0$ in Figure 8.9.

If we increase the quantity consumed or produced to Q_1 we can easily find out the extra benefit and extra cost associated with the Q_0Q_1 amounts with the help of Figure 8.10.

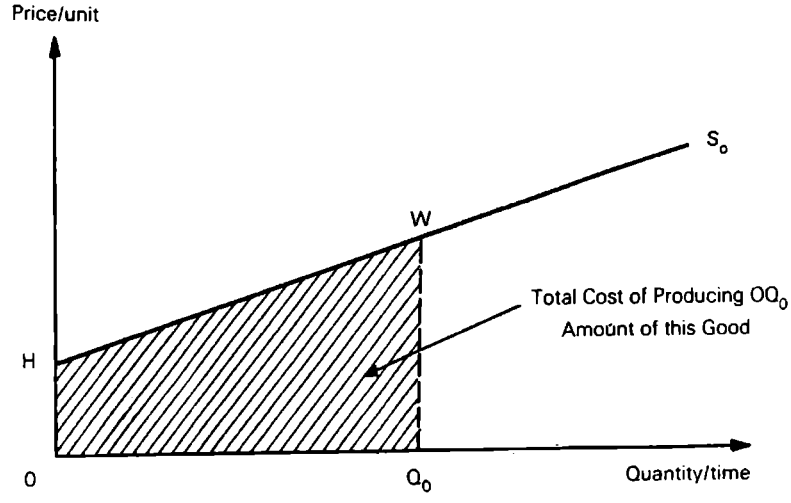
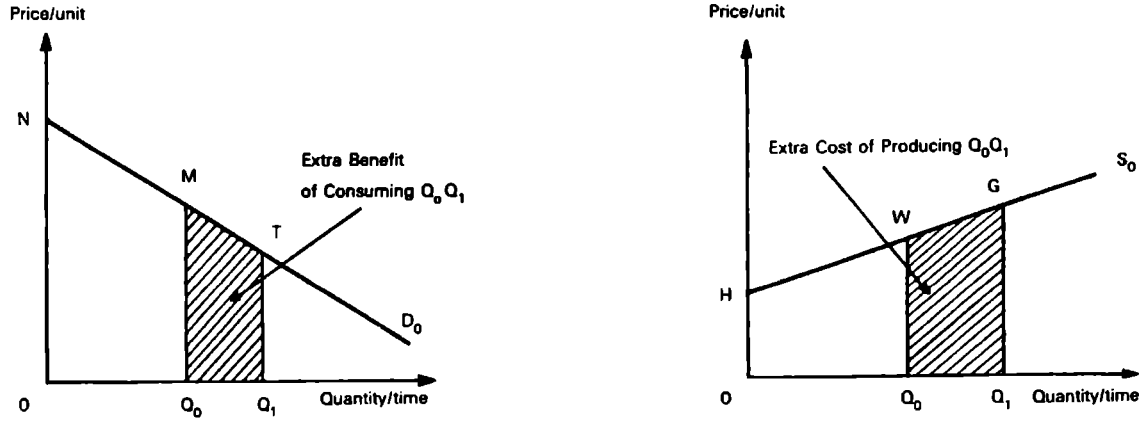


Figure 8.9



(A) **(B)**

Figure 8.10

The areas Q_0MTQ_1 and Q_0WGQ_1, in Figures 8.10(A) and (B) give the extra benefit and extra cost associated with increased consumption and production respectively. That is all you need to know regarding this Equipment Set to be able to use it.

To confirm that the above statement is true, let us apply these concepts to determine the welfare cost of monopoly. We start by reproducing Figure 8.7 as Figure 8.11. This figure shows the change in equilibrium price and quantity when a competitive industry is monopolized. Equilibrium price changes from P_c to P_m and equilibrium quantity changes from Q_c to Q_m.

Instead of focusing on change in consumer's surplus and producer's surplus, let us look at what is the extra benefit and extra costs of moving from Q_m to Q_c.

Extra Benefit	=	Q_mBCQ_c
– Extra Cost	=	Q_mDCQ_c
Net Benefit	=	+ BCD

That is, if we move from perfect monopoly to perfect competition, the society is better off by an amount represented by the triangle BCD. This is the same conclusion we arrived at by using analyses based on the concept of consumer's surplus and producer's surplus. Yet, this is far simpler than the earlier exercise and that is, indeed, its strength.

Incidentally, we did not get the same result by some rare and fortunate coincidence. In fact, both approaches will always give the same result. Proving the equivalence of these two approaches mathematically is a favorite chore of Ph.D students in economics. Mercifully, for practical applications we can simply go ahead and use whichever approach seems more convenient.

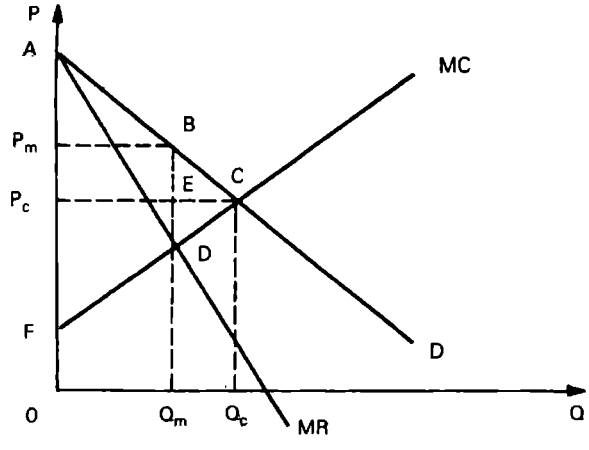


Figure 8.11

Government's Anti-Monopoly Policies

Anti-Trust Laws

Most governments make laws which attempt to prohibit the acquisition or exercise of monopoly power by business firms. The first American anti-trust law, the Sherman Anti-trust Act, was passed in 1890.

Government Ownership

In some countries, the government nationalizes big monopolies if such action is deemed to serve the larger public interest. These enterprises are subsequently run as public enterprises trying to maximize social welfare rather than private welfare (or neither).

Taxes

There are two types of taxes that can be levied on a monopolist to reduce the abnormal profits he may be earning.

1. First, there is a lump-sum tax, which does not depend on how much the monopolist produces or what price he charges, but is a fixed sum which has to be paid if he is to remain in business. The effect of such a tax is shown in Figure 8.12. The effect of such a lump-sum tax is to raise the ATC_0 curve, while leaving the MC_0 curve unaffected. The reason for this is that a lump-sum tax is just like a fixed cost, and so it affects only the ATC curve as its position depends on the magnitude of both the fixed and variable costs. The MC, on the other hand, depends on the changes in variable costs and hence remains unaffected by the amount of the fixed costs.

In Figure 8.12 we have shown a case where the lump-sum tax reduces the profit from P_mABC to zero. But it need not always be so.

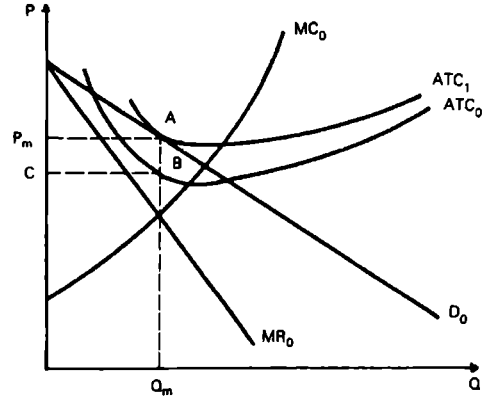


Figure 8.12: Effect of a Lump-Sum Tax on Monopolist's Profits

2. The second type of tax on a monopolist is referred to as a per-unit tax. In this case, the government says that it will charge a certain fixed amount for each unit sold. This has the effect of shifting the MC_0 as well as the ATC_0. Since the extra cost to produce each unit goes up by the amount of tax, MC_0 shifts up by the full amount of the tax. Figure 8.13 shows how such a per-unit tax reduces the profits of a monopolist.

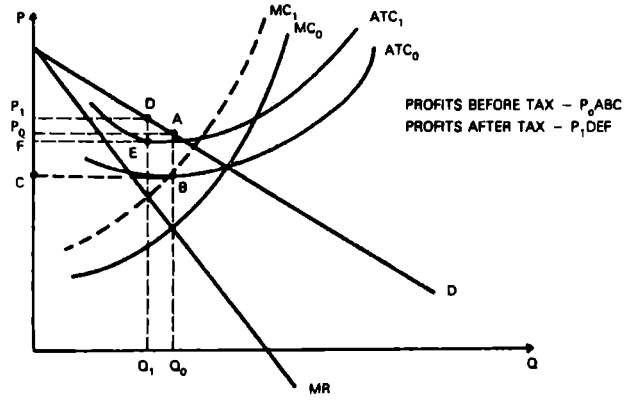


Figure 8.13: Effect of a Per-unit Tax on Monopolist's Profit

Price Control

Another way by which various governments have attempted to reduce the harmful effects of monopoly is public regulation. For example, suppose the long-run cost conditions in a particular industry are such that it is efficient for one large firm to serve the entire market rather than small competitive firms. Electric power, telephone and public transportation are some examples of such industries. In such a case, the society may permit a monopoly to be established, but a commission or some other public body is also established to regulate the monopoly's behavior. Among the many such regulatory commissions in the United States are the Federal Power Commission, the Federal Communications Commission, and the Interstate Commerce Commission. They regulate the behavior of firms with monopoly power in the electric power, telephone, transportation and other industries.

These regulatory commissions usually set a maximum price which a monopoly is allowed to charge. This maximum price is lower than the price an unregulated monopolist would charge, but it is intended to ensure a "fair return" to the monopolist. Figure 8.14 shows the effect of fixing such a maximum price. We find that once the price is fixed at P^*, the marginal revenue curve facing the monopolist becomes MR_1. It shows constant MR because each unit sold now bring in P^*. The new equilibrium is where this new MR meets the MC curve. At this equilibrium, the output produced is greater and profits smaller than the situation when the monopolist was not regulated. The output produced increases from Q_m to Q^*, and profits decrease from P_mABC to P^*DEF.

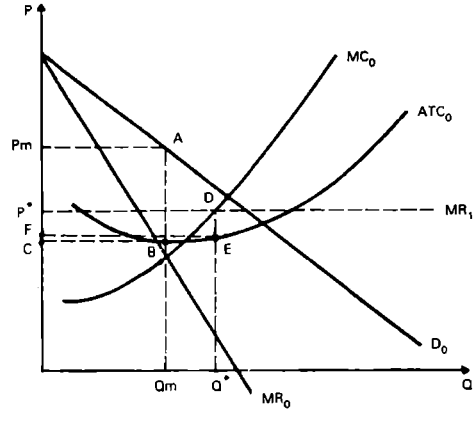


Figure 8.14: Effect of Price Regulation on a Monopolist

Before we end this chapter, let us examine a few more cases which illustrate the usefulness of the tools we have acquired so far.

CASE I: Price Regulation of an Underground Transportation System

Boston, Massachusetts' — MBTA, one of the country's oldest underground transportation systems, has announced that it is going broke and, hence, will cease operations of its trolleys effective May 1st, unless Federal, State, or Local governments come to the rescue and make up this year's record $2.3 million deficit.

However, the legislature has publicly declared its unhappiness over such persistent losses and has refused to grant any more money.

To break this deadlock, a hearing has been scheduled. The chairman of the underground transport system

has hired you as an economist to argue on his behalf at the hearings. The question is, how would you go about arguing the case and what arguments do you expect the economist from the other side to make?

Analysis

You could begin your argument by saying that the regulatory commission has fixed the price of a one-way ride on the system such that resources are used efficiently. In other words, the price is such that it will entail the volume of traffic for which the marginal cost of providing these services is equal to the marginal benefit of these services to the consumers. This is shown as Q^* in Figure 8.15. However, the problem with providing this volume of service is that the system incurs a loss equal to P^*ABC.

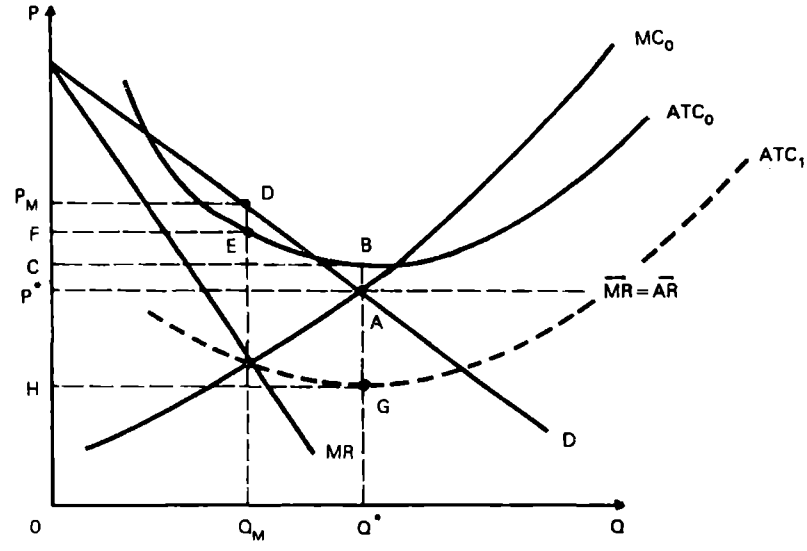


Figure 8.15

Now, if the price is not regulated then this system could indeed act as a monopolist and, instead of a loss, it could show a profit of P_MDEF. Of course, then, it would have to charge a price of P_m and provide a lower level of service equal to only Q_M.

You could point out that the choice is clear. If the legislators want a profitable government monopoly, they will have to let it function as a profit-maximizing private monopoly and let it charge a price of 90 cents and provide lower level of service equal to Q_M.

On the other hand, if the legislators consider this to be an essential service and want the price to be kept low so that more poor people can benefit from it, then they have to subsidize the losses which result from providing larger services at lower price. In other words, you should point out that the legislators cannot have their cake and eat it too.

Chances are that the economist from the other side will agree with your logic but may contest your facts. He is likely to argue that the reason for losses is the fact that your costs are very high due to inefficiencies of management. He will say that the ATC_1 curve in Figure 8.15 should be below ATC_0 and, thus, result in profits equal to P^*AGH even at the regulated price of P^*.

Therefore, the whole argument is likely to boil down to the actual determination of costs.

This type of pricing policy is called **marginal cost pricing.** This is very popular with policy makers as it is supposed to lead to efficient allocation of resources by ensuring that output is produced up to the point where the marginal benefit of the output is equal to the marginal cost of producing it.

While fine in theory, this marginal cost pricing policy raises difficult problems in practice. First, a lot of monopolies which are regulated exhibit decreasing costs because of economies of scale that result from large-scale production. Such industries have a downward sloping ATC (see page 124), and the MC lies below the ATC. (Why? Because whenever the average falls, it implies that the marginal must be below the average. See page 120 for the relation between ATC and MC.) The problem with such decreasing cost monopolies is that regulation requiring marginal cost pricing inevitably leads to deficits which have to be financed through subsidies. In Figure 8.16, marginal cost pricing leads to a deficit of P*ABC because MC is below ATC.

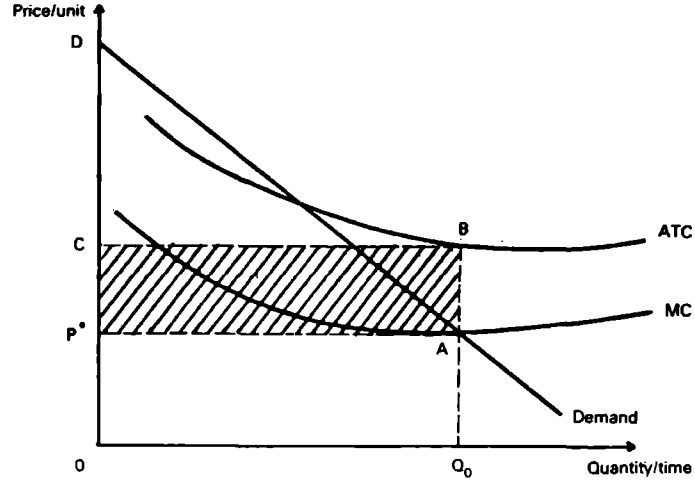


Figure 8.16

The other problem with such MC pricing is that it is difficult for the public to understand why a government committed to controlling the market power of monopoly should end up subsidizing it. One way out of this dilemma is suggested in the following case.

CASE II: Marginal-Cost Pricing in a Decreasing Cost Monopoly

The electric power company in the city of Atlantis is a regulated monopoly. It has been suffering losses because the regulatory commission has fixed the price at the level where MC cuts the demand curve to ensure efficient use of the resources in generating electricity. The city council, tired of annual subsidies to this power company, wants a better pricing policy. You have been asked, as an economist, to suggest an alternative pricing policy to the regulatory commission. What will be your response?

Analysis

There are three major options that you may want to highlights in your report.

(i) Option 1 — Two-Tier Pricing: You can suggest to the regulatory commission, on behalf of the city

council, that a two-part tariff (or as it is often called—two tier pricing policy) is one way to remedy the difficulties that arise from marginal-cost pricing in a decreasing-cost monopoly. The customers could be charged in two steps, as shown in Figure 8.16.

1. *First part*—divide the loss P*ABC equally among all users and charge them all an "entry" price equal to a per-capita share of the loss. This is called a lump-sum payment. It is independent of usage, and its sole purpose is to recover the firm's loss and allow it to break even. Usually, this takes the form of a "hook up" charge to connect the electric supply to customers' houses.

2. *Second part*—each user is charged the marginal cost price P* for each unit of electricity purchased. You could point out that such a two-part pricing policy has the merit of getting the efficient output Q* produced (because of the second part) and allowing the power company to cover costs (because of the first part). In Figure 8.16, revenue OP^*AQ_0 is received from customers as user charges, and revenue P*CBA is received as a "hook up" or "entry fee" that gives the individual the "right to purchase" units of electricity at marginal cost.

(ii) **Option 2—Average Cost Pricing:** The suggestion here is that the price be set equal to the average total cost and not the marginal cost. This will eliminate deficits. Why? Because as you know:

$$\text{Profit} = Q\,(P - A\,T\,C)$$

and if P = A T C, then Profit = 0 in the above equation.

This seems like a good alternative, so what's the problem? Your intuition should tell you that any departure from MC pricing rule will involve a welfare loss. The following diagram confirms that.

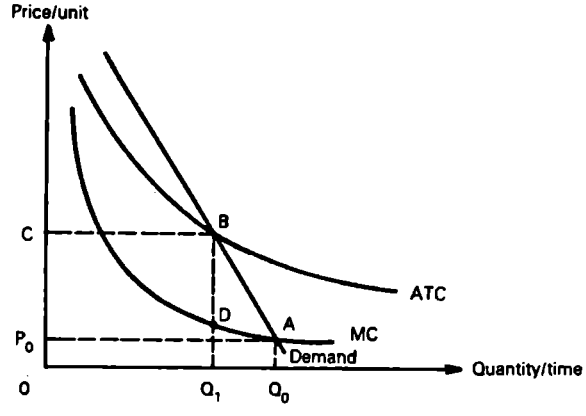


Figure 8.17

Decrease in consumer welfare	= (-) Q_1 B A Q_0
Resources saved	= (+) Q_1 D A Q_0
Net effect = loss in welfare	= (-) A B D

Does this mean that AC pricing is not a viable alternative ? The answer to this question will depend on the relative magnitude of the welfare loss arising due to the departure from the MC pricing rule and the welfare loss due to the deficit if we adhere to the MC pricing rule. The magnitude of the welfare loss due the deficits will depend on the proposed means of financing it. Most forms of taxes involve a welfare loss.

There is the possibility of yet another kind of problem with the AC pricing solution to the problem of deficits. It is conceivable that a particular public enterprise may face the demand and cost situation portrayed in Figure 8.18.

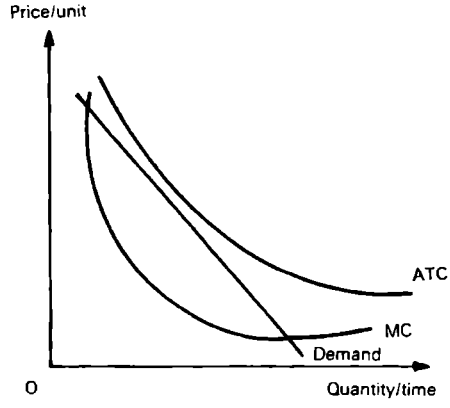


Figure 8.18

The problem here is that the entire demand curve lies below the AC curve. It is not possible to charge a price such that P = ATC. Incidentally, this problem is not unique to decreasing cost industries. It could exist in an industry with regular U-shaped AC curves.

The next suggested solution provides a way out of this problem as well as to the problem of deficits due to a MC pricing policy.

(iii) **Option 3 — Price Discrimination:** Price discrimination is said to occur when essentially the same commodity or service is sold at different prices, and these different prices do not reflect different costs of production. According to the advocates of this solution the utility depicted in Figure 8.16 should produce at Q_0 because that represents an efficient allocation of resources. However, instead of charging a uniform price, equal to MC, and incurring a deficit equal to A B C P', it should indulge in price discrimination.

If perfect price discrimination were possible the public enterprise could charge each consumer the maximum amount they would be willing to pay and collect an amount of revenue equal to the total welfare of the consumers OQ_0AD in Figure 8.16. So long as this total revenue is greater than total cost O C B Q_0 there will be no problem of a deficit. Similarly, in Figure 8.18 even though no single price can cover the total cost of production, this policy of price discrimination may save the day.

Now for price discrimination to be effective, several preconditions must exist. First, the enterprise must have a great deal of monopoly power. Otherwise, it will not be able to dictate prices. Second, it must be able to prevent a consumer from purchasing the product at a low price and selling it to another consumer at a higher price. As you can see the scope of such a policy is severely restricted in practice for many commodities, though not for electricity. Further, this policy implies a move towards a greater degree of centralization. And that may not be acceptable to many.

CASE III: Uniform Pricing Strategy for Peak and Off-Peak Demand Condition

In Gailsberg, the government owned Highland Electric Corporation (HEC) is facing a policy dilemma. For many years, HEC has been following a more or less *ad hoc* pricing policy. As a result, it finds itself saddled with an extremely complex tariff structure. In response to a highly critical report of an enquiry commission, which examined the HEC operations, the government has decided to review and rationalize the pricing structure of HEC. The following diagram captures the essence of cost and demand data available to government policy makers.

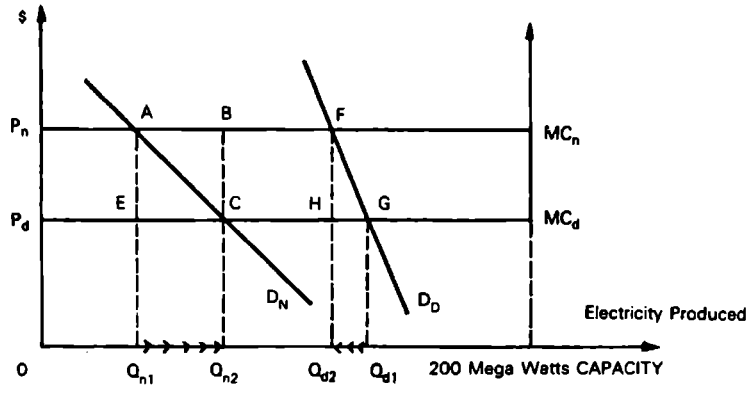


Figure 8.19

The situation facing HEC can be characterized as follows:

The consumption of electricity is higher during day time than at night. However, the cost of producing electricity is higher at night compared to that during the day. This is primarily due to the fact that night-time workers have to be paid a much higher salary in Gailsberg.

The policy makers are considering a wide range of options. Ideally, they would want to follow the marginal cost pricing rule and set prices at P_n and P_d for night and day consumption, respectively. However, this would require replacing the existing meters with very sophisticated ones, at considerable cost. Therefore, policy makers want to examine the possibility of setting a uniform price for the two periods — day and night.

In deciding on a particular uniform price, policy makers are considering the following questions among others:

a) If we have to set the uniform price at P_n or P_d, which would be preferable? Why?
b) What is the welfare cost of choosing this uniform price?

Please help shed some light on these question and help out the government policy makers.

Analysis

a) If we do not have any policy constraints, the respective prices for day and night ought to be fixed at P_d and P_n. However, if we set a uniform price for day and night consumption at either P_n or P_d, one market would be at the optimum point and the other will be distorted. Our choice between P_n and P_d will,

therefore, depend on which of these two prices leads to a smaller dead-weight loss.

If we choose P_n, there will be no distortion in the night-time market. The net loss associated with choosing P_n is derived : by examining the distortion in the day-time market as follows:

Benefit (Resources saved)	=	$HGQ_{d1}Q_{d2}$
Cost (Decreased Consumption)	=	$FGQ_{d1}Q_{d2}$
(NET LOSS)	=	FGH

If we choose P_d, there will be no distortion in the day-time market. The net loss associated with choosing P_d is derived by examining the distortion in the night-time market:

Benefit (Increased Consumption)	=	$ACQ_{n2}Q_{n1}$
Cost (Resources Used)	=	$ABQ_{n2}Q_{n1}$
(NET LOSS)	=	ABC

Since ABC is greater than FGH, it is better to choose P_n.

b) The welfare cost of choosing P_n will be FGH.

CASE IV: Marginal-Cost Pricing for Joint Products

Located in the Tarai archipelago of Southeast Asia, Mythonesia consists of a dozen large and 962 lesser islands. This geographical characteristic has made inter-island shipping an important industry in that country. Because of this industry's importance as part of developmental infrastructure and its relatively high capital intensity the maritime sector has received special attention in recent investment plans. Also, because of political tensions between the main island of Merva and the outer islands, there has been special interest in the inter-island shipping policy.

The shipping industry is quite diverse and, through regulations, is divided into 4 major sectors: a) Local shipping, with small ships legally limited to distances of up to 300 miles; b) "Olahu" shipping, sailing ships following the monsoons (recently increasingly motorized); c) Special bulk shipping; d) regular liner services. The total tonnage amounts to about 15 million tons and has been growing a little faster than the national output. The regular liner services account for about 70 percent of the total tonnage.

A recent report by the technical experts from the International Agency for Reconstruction and Development (IARD) has sparked off a fierce debate. The controversy involves the pricing policies for shipping services between two islands in a politically sensitive region. Following are the details of this case.

Purvayya and Dakhin are the islands in question. There is a substantial demand for beer, a product of Purvayya, in Dakhin. Beer accounts for virtually the entire cargo from Purvayya (approximately, 96 percent). The return cargo from Dakhin, mainly copra, is about 12 percent of the incoming cargo.

Historically, this route has never been serviced by regular liner service. However, in 1982 the Minister for Transport and Communications instructed the major public enterprise in inter-island shipping, Mythonesia

Transport Services (MTS), to start servicing this route. The Tariff section of the Bureau of Planning in the Ministry of Transport and Communications is responsible for preparing tariff schedules. They fixed the tariff rates based on the average cost of each trip between Purvayya and Dakhin.

The public enterprise MTS, has increasingly come under criticism because it has not been profitable and/or "well managed," and because Ministry officials believe the enterprise contributes insufficiently to the "goals" set for the industry. A recent visit by the IARD team on a mission to examine public enterprise policies criticized the enterprise operations of this Ministry of Transport and Communications. Following are a few excerpts from their report :

"Although it is apparently intended that MTS freight rates be based on average costs, it has been established above that the official tariff schedule does not match costs well. Further, actual rates deviate substantially from the official rates as evidenced by rebating. Suppose that these difficulties did not exist, If freight rates were made equal to average costs, would it be advisable to fix them everywhere at those levels?

If one is concerned with the efficient use of available resources, we think the answer must be no: it is a mistake to try to set uniform rates based on average cost calculations. Marginal costs are a better guide to avoid waste. And, especially since transportation services are provided to a great extent as joint products, marginal and average costs diverge...

To summarize, efficiency considerations provide no rationale for a fixed uniform freight tariff. There is also no clear reason to presume that uniform freight rates promote fairness as between income groups...

The main rationale for a regulated uniform freight rate schedule apparently arises from a desire for greater certainty and the uniformity which bureaucratic notions of even-handedness seem to demand. Regulated rates may also be viewed as setting maximum charges and thus offering protection for isolated shippers anxious to meet delivery commitments and forced to deal with a monopolist offering the only available transport service. Where traffic is sparse and competition absent there is definitely a case for prohibiting exorbitant freight charges. The case does not extend to general rate regulation, however, and, it does not imply the desirability of universal uniformity in rates..."

Question : Do you agree with the IARD analysis? Illustrate your arguments using graphs and economic tools which you have acquired so far. In particular, focus your answer on the following question:

a. What is meant by joint products? What pricing problems are associated with them?
b. How would you determine the optimal output and prices for MTS?
c. Is there a trade-off between efficiency and equity in deciding on the optimal pricing policy for MTS?

Analysis

Let us consider the optimum pricing policy for the inter-island shipping corporation MTS, owned by the Government. It operates between Purvayya and Dakhin islands in Mythonesia. The demand curve D_{out}

in figure 8.20 represents the demand for the shipping services for exporting beer from Purvayya to Dakhin. D_{in}, on the other hand, represents the demand for shipping services by the inhabitants of Dakhin for exporting copra to the Purvayya. The inter-island shipping PE has to determine not only how many trips to make but also what price to charge for the outbound and inbound trips.

This case illustrates a very commonplace problem of pricing joint products in a large number of public enterprises. Joint products are those products that are *produced together*. For example, beef and cowhide; wood and sawdust; petroleum crude and natural gas. In the case under discussion, the joint products are the "inbound trip" and the "outbound trip" made by MTS. Because, even if a ship has to be utilized only for the outbound trips, it has to make the inbound trip to come back after making the outbound trip. Put differently, the outbound journeys cannot be increased without increasing the inbound journeys.

It is easy to see the difficulty in applying the marginal-cost pricing rule in such cases of joint products. The marginal cost of producing outbound and inbound trips cannot be isolated. A ship that goes out, has to come back. The only relevant concept is a marginal cost for "the round-trip." According to the marginal-cost pricing principle, to maximize social welfare, the price should be fixed where demand for the product is equal to the MC for the product. However, in the case of MTS we have two separate demand curves—one for the outbound trip from the island of Purvyya by beer exporters and the other for the inbound trip by copra producers which originates from Dakhin for Purvayya.

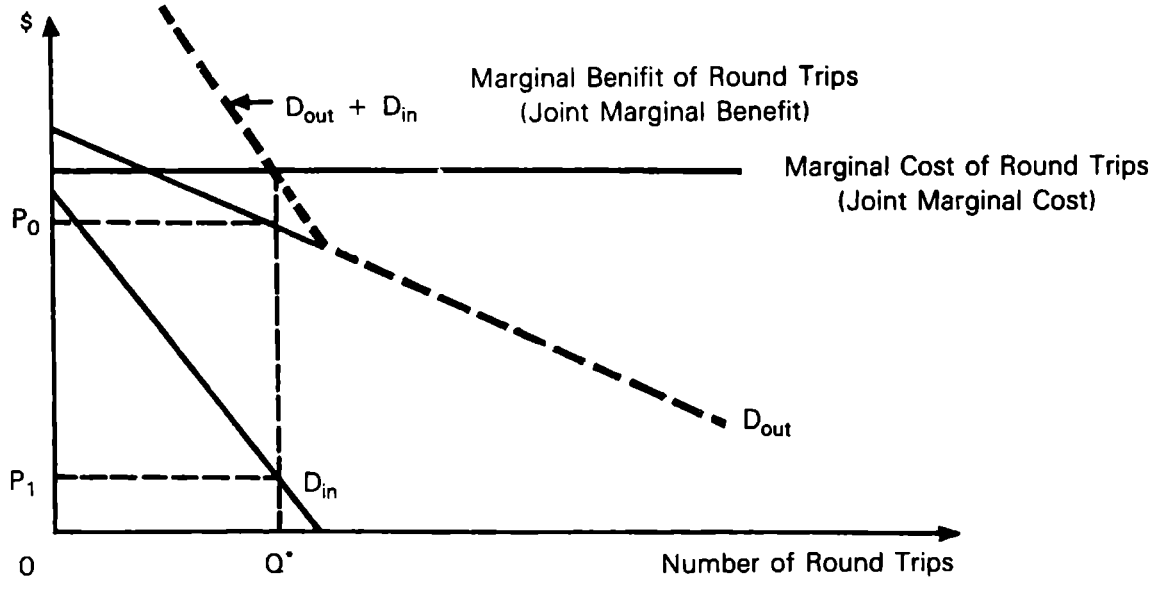


Figure 8.20

Therefore, we are faced with the problem of deciding the optimum number of round trips as well as the respective prices for outbound and inbound trips? In order to do this, we need to know the marginal benefit of each round-trip. This is, of course, given by the vertical summation of the separate demand curves for the outbound and inbound trips. Once we have the joint marginal-benefit curve, given by the thick broken lines in Figure 8.20, it is easy to determine the optimum number of trips. It would be at the intersection of joint marginal cost and joint marginal benefit at point Q^*. The prices for the outbound and inbound trips would be P_0 and P_1, respectively. Notice that neither price is equal to the joint MC.

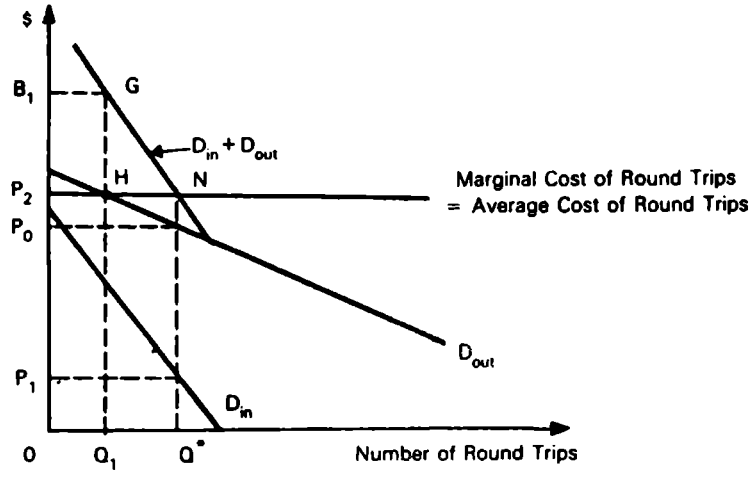


Figure 8.21

Let us compare the above outcome with a situation where a price equal to the AC is charged from both parties. Since average cost in this case is equal to the marginal cost, the final price will be P_2 and the equilibrium quantity will be Q_1. At this price only the beer manufacturer will be able to make use of the services provided by MTS, the copra producers will be priced out. Since copra producers are likely to be relatively poor, this further deterioration in their relative incomes will worsen equity.

Similarly, a decrease in output from Q^* to Q_1 will worsen efficiency. An increase in output Q_1 to Q^* would have contributed more to total welfare than to total cost from the society's point of view.

Extra benefit of moving from Q_1 to Q^*	=	Q_1GNQ^*
Extra cost of moving from Q_1 to Q^*	=	Q_1HNQ^*
Net Benefit		$+GHN$

By restricting the output to Q_1 the society is worse off by GHN.

In short, two-tier pricing is both more efficient as well as more equitable. Indeed, this is one of the rare occasions in public policy where there is no trade off between efficiency and equity.

This case has much wider applications. In fact, the most common application of these principles is in the area of electricity pricing also known as the "peak" "off-peak" pricing problem. The same generator produces electricity at day time (peak) and at night (off-peak). Thus the decision regarding electricity generation capacity and peak/off-peak prices are based on principles similar to the ones discussed above.

CASE V: Allocative Versus Technical Efficiency in Public Enterprises

Penzuela is an oil-rich country in Latin America. It enjoyed unprecedented prosperity during the oil boom. Suddenly, in the mid-seventies, it was blessed with a surge in government revenues due to higher oil prices.

In order to let this windfall bounty trickle down to the masses, the Penzuelan Government launched a major investment program. It announced its intentions to do so and also made it clear that it had an ideological preference for using the private sector to achieve this major increase in investment. The Penzuelan Government intended to only play a catalytic or supportive role. The policy package announced for this purpose consisted of concessional loans and incentive for setting up enterprises in remote regions of Penzuela to encourage balanced regional development.

After a year of announcing this policy, the Penzuelan Government found itself in a very disappointed and discouraged state. The only proposals from the private sector that came forward for the Government's consideration related to investment in the "consumer goods" industry. That too, only in predominantly luxury goods. The Government, on the other hand, had industries like steel, heavy-machinery, and machine tools, etc., in mind.

Therefore, willy nilly, the ruling party (Democratic Alliance) gave a go-ahead for the public sector to undertake the major responsibility for increasing the rate of investment. The result was a phenomenal growth in the size and scope of the public sector. This trend was further accentuated by the socialistic party (Social Democrats) when they came into power in the early eighties.

In the mid-eighties, however, Penzuela found itself in a serious quandary. The "oil" party was over and the bill for the spending binge was due. The situation was so bad that the Government of Penzuela invited experts from a well-known international agency, International Agency for Rapid Development (IARD), to do an indepth study of their economic situation and recommend a solution.

The IARD report was, of course, devastatingly scathing. It said the major cause for all problems facing Penzuela can be traced to the inefficient public sector in the country. Deficits of public enterprises were leading to inflation and the "debt-trap."

The IARD report said that the Penzuelan public enterprises are both "allocatively" as well as "technically" inefficient and the Government should make efforts to simultaneously eliminate both types of inefficiencies.The report said that all public enterprises must base their pricing policies on marginal cost principles. That is, if possible, prices should be equated to marginal costs for all public enterprises. In addition, efficiency norms should be fixed and enforced to make sure that enterprises are operating efficiently.

The Government forms a bi-partisan committee to look into the matter. This committee agrees with IARD as far as the diagnosis of the problem is concerned. However, its recommendation is slightly different. The committee argues that given the scarcity of policy making resources, it is impossible to do an effective job on two fronts. They suggest that it is much more rewarding to eliminate technical efficiency. The following line from their recommendation summarizes their argument:

> *"A five per cent improvement in technical efficiency will add more to society's welfare than a five per cent improvement in allocative efficiency."*

When asked by the press as to the basis or rationale for the above statement, the chairman of the bi-partisan Committee said "Our economists have done a rigorous analysis of this issue. I am not an economist and, therefore, I cannot prove this statement. All I know is that we have taken into account consumers' and producers' welfare and our chief economist has a degree from the Kennedy School of Government at Harvard University."

Questions

1. Do you agree with the bi-partisan committee's recommendation?
2. Can you think of other arguments to support or (demolish) oppose the committee's recommendation?
3. Please illustrate the crux of the committee's recommendation graphically using the concepts of consumer's and producer's surplus.

Analysis

Figure 8.22 is very helpful in examining the issues raised in the above case. When economists talk about efficiency, they usually have "economic efficiency" in mind. In order for a public enterprise to be economically efficient, it has to be both "technically" as well as "allocatively" efficient. Technical efficiency, simply stated, means that the public enterprise is producing a given level of output at the lowest possible cost. If the marginal cost curve, MC_1, in Figure 8.22, represents the least-cost way to produce various quantities of the output, then the divergence between MC_1, and MC_0 represents the degree of technical inefficiency. "The main purpose of reforms in public enterprise performance evaluation systems is to minimize this divergence between the two curves and, hence, reduce technical inefficiency.

Allocative efficiency, on the other hand, is concerned with whether the "right amount" of the good is produced and not whether the good is being produced at the "right cost." To be allocatively efficient, the marginal cost of producing one extra unit should equal the marginal benefit associated with that unit. This optimum point is given by Q_1 in Figure 8.22. The main concern of reforms in PE pricing policies is to fix a price equal to P_1 in order to induce the PEs to produce the optimum output equal to Q_1.

To examine the validity of bi-partisan committee's recommendations, let us now compare the two sources of economic inefficiency. In order to make this comparison valid, let us assume a 5 per cent inefficiency in both cases. In the case of technical inefficiency, this would imply that the marginal cost of producing a given quantity is higher by 5 percent at each level of output. In order to determine the welfare cost of this type of inefficiency to society, we must know the counter-factual story. That is, we must know compared to what are we calculating this cost. Obviously, if we assume the simultaneous existence of allocative as well as technical

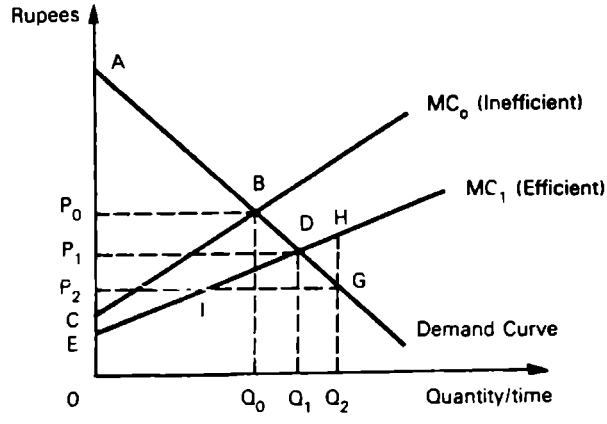


Figure 8.22

inefficiency, we will have a difficult time untangling their separate effects. Therefore, we shall first assume that the public enterprise price is being allocatively efficient. In other words, its price is always set at the intersection of the actual demand and marginal cost curves. This will enable us to focus on the impact of only one source of inefficiency, viz., technical efficiency.

Thus, we are comparing two situations: (a) a technically efficient scenario with the price at P_1 and the output at Q_1 (b) Technically inefficient scenario with price at P_0 and output at Q_0. The welfare analysis is summarised in Table 8.4. It shows that the welfare loss associated with technical inefficiency is equal to the area BDEC.

Table 8.4

		TECHNICAL EFFICIENCY	
		Efficient Scenario	Inefficient Scenario
WELFARE	Consumer's Surplus	A D P_1	ABO$_0$
	Producer's Surplus	E D P_1	C B P_0
	Total	ADE	A B C

Change in Total Welfare (CS + PS) = ADE − ABC = BDEC

To discuss the welfare loss associated with a 5 per cent allocative inefficiency, we have to, naturally, assume that the PE is technically efficient. A 5 per cent allocative inefficiency would translate to a price being fixed by the Government at P_2, which is 5 per cent lower than the optimum price of P_1. In other words, the error in fixing the "right" price is our proxy measure for the degree of allocative inefficiency.[1] At this price of P_2, the equilibrium will be at output level of Q_2. Therefore, our problem is to compare the net welfare cost to the society of moving from P_1 & Q_1, to P_2 & Q_2. Table 8.5 summarizes the welfare analysis associated with these points.

Table 8.5 shows that the net loss associated with allocative inefficiency is equal to HDG. Clearly, this loss is smaller than the one associated with technical inefficiency (BDEC). Therefore, one can conclude that efforts at improving technical efficiency are likely to yield much higher returns and, hence, should be the starting point of all reform packages for improving public enterprise efficiency.

[1] Stylized facts suggest that for political reasons public enterprises, in general, tend to have their prices set below the marginal cost of production. Therefore, a price which is 5 per cent lower than the optimum has been chosen for this illustration.

Table 8.5

		ALLOCATIVE EFFICIENCY	
		Efficient Scenario	Inefficient Scenario
WELFARE	Consumer's Surplus	A D P_1	AGP_2
	Producer's Surplus	E D P_1	P_2IE - HGI
	Total	ADE	A G P_2 + P_2IE − HGI

Change in Total Welfare (CS + PS) = ADE − $(AGP_2 + P_2IE - HGI) = HDG$

Not only are the potential pay-offs much larger in the case of reforms aimed at improving technical efficiency, they also ought to come before pricing reforms in terms of sequencing. One can think of several arguments to support this idea. For example, in Penzuela, as in other developing countries, there is bound to be a limit to the amount of resources that can be devoted to policy-making. To simultaneously start reforms in various public policy arenas may lead to spreading these resources very thinly. The end result may be failure on all fronts. Hence, a sequential approach seems more sensible.

In addition, pricing reforms without concomitant reforms in the performance evaluation systems can be both "illusory" as well as "transient." In order to explore this line of reasoning, we need to examine the context of these reforms.

It is a statistical reality that public enterprise deficits are a major cause of the Third World debt crisis. This realisation has spurred many professionals to suggest that the solution to the deficit crisis lies in raising PE prices to the MC levels to eliminate their deficits. When one examines this policy prescription, however, one confronts real difficulties.

First, the generation of surplus in public enterprises (PEs) as a consequence of an increase in administered prices does not imply better performance. The impression of improved performance is purely an **illusion.** Since all the important or significant PEs are in the core sectors of the Penzuelan economy, any increase in the prices of their outputs is likely to have a highly inflationary impact. Also, because the government is one of the major buyers of PE products in the economy, an increase in inflation would involve greater expenditure on the part of the government. In short, the government would be collecting money from one of its pockets and putting it right into the other.

As mentioned earlier, financial profits generated by attempts at "getting the price right" are often not only "**illusory**," as described above, they are also "**transient.**" In PEs, the moment deficits are eliminated or surpluses generated, as a result of price increases, there is often a tendency on the part of PEs to splurge. This tendency is often manifested in actions such as office renovations, hiring extra workers when there is already surplus manpower, unnecessary trips abroad and other non-essential activities. Very soon, the enterprise is back to square one. The surplus is squeezed out by an increase in "avoidable" costs and the enterprise is faced with another decision to increase prices. This vicious cycle can be more dangerous than the original deficits that prompted this cycle. Not only has the enterprise failed to control the deficits, but it also has become party to a net transfer of income from society at large to the public enterprise sector which is likely to exacerbate inequality.

It would be difficult for this kind of vicious cycle to exist if a performance evaluation system that controls costs of production is in place. Therefore, it is, again, preferable to start reforms by putting such a system in place. The policy of Memoranda of Understanding (MOUs) in India embodies the kind of performance evaluation system that is being referred to here.[2]

[2] For details on the Performance Evaluation System embodied in the new MOUs, see: **Memorandum of Understanding: An Approach to Improving Public Enterprise Performance**, International Management Publishers, New Delhi, 110 062, 1990.

Question for Class Discussion

Kenzania Sugar Company(KSCO) is the sole producer of sugar in Kenzania. It has the normal U-shaped average cost curve for sugar production. It is owned by a powerful business family with the objective of maximizing profits from the operations of KSCO. Right now the company is making positive profits.

(a) Draw a diagram for the present situation and explain why the company chose the output level and price that it did.

(b) Suppose the demand for sugar in Kenzania increases. What effect will this have on price, output and profits?

(c) Now suppose that due to the active lobbying efforts of an American style consumer group headed by Mr. Mustafa Nader, a Federal Sugar Commission is formed. This Commission is empowered to set the ceiling price of sugar. KSCO can produce any output that it wants, but it must not charge a price higher than the ceiling price chosen by the Commission.

If achievement of efficiency is the Commission's goal, what price should it set as a ceiling? Why? Given the ceiling price what output will the company produce? What will happen to profits?

(d) Now the Commission asks you, a person trained as an economist (and well known for robust common sense and ample good judgement), to explain whether or not society as a whole is better off.

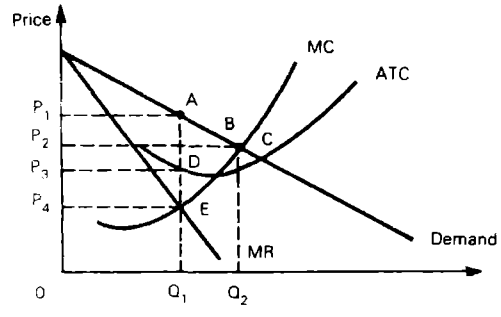
(e) What would happen if the Commission miscalculates the ceiling price and fixes it below the optimum price? Please indicate the effect on output and profits? Will profits be necessarily negative, that is, will there be losses?

Problems for Practice

1. Given the same cost and revenue schedules, a profit-maximising monopolist will produce:
   a. less output than a competitive industry.
   b. more output than a competitive industry.
   c. the same amount of output as a competitive industry.
   d. none of the above.

2. The quantity supplied by a profit-maximizing monopolist is:
   a. equal to the quantity demanded at the competitive market price.
   b. insufficient to supply the quantity demanded at the monopoly price.
   c. equal to the quantity demanded when price equals marginal cost.
   d. insufficient to satisfy the quantity demanded at the competitive market price.

USE THE FOLLOWING FIGURE TO ANSWER QUESTIONS 3 THROUGH 5



3. For the monopolist depicted in the figure above, the profit-maximizing price and output, respectively, are:
   a. OP_4 and OQ_1
   b. OP_1 and OQ_1
   c. OP_2 and OQ_2
   d. OP_3 and OQ_1

4. At the rate of output OQ_1 profit per unit is represented by the line segment:
   a. AQ_1
   b. DE
   c. AE
   d. AD

5. If the revenue and the cost data in the figure above were representative of a perfectly competitive industry, the equilibrium price and quantity, respectively, would be:
   a. OP_1 and OQ_1
   b. OP_2 and OQ_2
   c. OP_3 and OQ_1
   d. OP_4 and OQ_1

6. The profit-maximizing output of a monopolist is established by the intersection of the:
   a. Demand and MC curves
   b. Supply and MR curves
   c. MR and MC curves
   d. Demand and ATC curves

7. If at a monthly output rate of 500 units, ATC is $40 and price is $60, then total profit per month is:
   a. $1000
   b. $2000
   c. $10,000
   d. $30,000

8. If at a monthly output rate of 100 units, AVC is $2.50, price is $4 and AFC is $1, then total profit per month is:
   a. $25
   b. $50
   c. $100
   d. $500

9. A monopoly realizes larger profits than a comparable competitive industry by:
   a. setting a higher price at the competitive level of output, thereby increasing total revenue.
   b. producing a greater quantity at the competitive price, thereby increasing profits.
   c. producing at output levels with more favourable cost structures and charging the competitive market price, thereby increasing profits per unit.
   d. reducing market supply and pushing prices up.

10. Which of the following is NOT necessarily true of a profit-maximizing monopoly firm in equilibrium?
   a. total profit is maximum for the firm.
   b. there is less output than under competitive conditions.
   c. average costs are minimum at the equilibrium rate of output.
   d. the price is higher than under competitive conditions.

CHAPTER NINE

OTHER IMPERFECTLY COMPETITIVE MARKETS

CHAPTER NINE

OTHER IMPERFECTLY COMPETITIVE MARKETS

In this chapter we continue our study of other imperfectly competitive markets besides monopoly, which represents an extreme form of an imperfectly competitive market, a market where there is no competition at all. The market structures that we will now examine are referred to as monopolistic competition and oligopoly. But, first, we must provide a justification for devoting an entire chapter for studying these market forms. Do we really need all this extra material?

Remember that the basic motivation for studying these various market forms comes from the fact that we want to understand how supply decisions are made (in various markets). That is, how do producers decide, in various types of markets, what price to charge and how much to supply at that price? The important question then is whether the theories of perfect competition and monopoly developed in the last two chapters explain the supply decisions of producers in the real-world markets. Because if they do explain them adequately, then this chapter is not required, but if they do not, then the material covered in this chapter becomes essential for a complete understanding of how prices are determined in various markets.

Unfortunately, the markets encountered in the real world are seldom perfectly competitive or pure monopolies. For instance, Ford, General Motors, and Chrysler are the three "major" car companies. They are not singly or collectively monopolists nor are they firms in perfect competition. Yet, they are typical of many firms not only in the American economy but also other developed as well as developing countries. Similar comments apply to Coca-Cola and Pepsi-Cola. Therefore, though the theories of perfect competition and monopoly give us some extremely valuable insights and provide a launching pad for the study of more realistic market forms, they fail to adequately explain the supply decisions of producers in these more realistic market forms. This is our justification for the discussion in this chapter of supply decisions of producers under monopolistic competition and oligopoly. We begin with monopolistic competition.

MONOPOLISTIC COMPETITION

As mentioned earlier, monopolistically competitive industries have four major characteristics as follows:

1. A large number of suppliers
2. Each firm's product is slightly different from others in the industry

3. Entry or exit is relatively easy
4. A large numbers of buyers

Notice that the only difference between a monopolistically competitive industry and a perfectly competitive industry lies in the nature of the product bought and sold. In perfect competition, the product sold by each producer is very similar, whereas in monopolistic competition, each firm produces a differentiated product. The most important thing to note is that the products of two firms may or may not be intrinsically different, but the relevant thing is that in the eyes of the consumer they are different. Are there any intrinsic differences between various brands of pain relievers? Pharmaceutical companies spend millions of dollars each year to convince us that there are.

Given that the only difference between perfect competition and monopolistic competition lies in the fact that the latter has differentiated products, how are the supply decisions under monopolistic competition different from the supply decisions under perfect competition?

Equilibrium Price and Output under Monopolistic Competition

The profit-maximizing producer under monopolistic competition follows the same basic approach as the profit-maximizing producer under perfect competition. He will produce each unit of output for which the marginal revenue is greater than the marginal cost. Given our assumption that marginal costs of production do not change when a machine is operated in one market or the other, the basic difference between the two markets boils down to the differences in the shape of their marginal revenue curve.

Remember that in the case of perfect competition, a firm could sell as much as it wanted to sell at a constant market price. It was assumed to be too small to have any significant effect on the market price by increasing or decreasing its output. Further, since the product it was selling was very similar to that of its competitors, if it tried to raise its price, no one would have bought from it. And since it could sell as much as it wanted at the going price, obviously, it would not have made sense to sell at a lower price. The implication of this was that the demand curve facing the firm in perfect competition was a horizontal line and so was the MR curve, implying constant marginal revenue.

However, in the case of monopolistic competition, the firm has a little more market power. For instance, if Anacin increases the price of its pain reliever slightly, it is bound to lose customers to its competitors. But unlike perfect competition, it will not lose all its customers. The reason for this is that there are some customers who perceive Anacin to be better than Excedrin, Tylenol, etc., and they are likely to continue it even at this higher price. Similarly, if Anacin lowers its price, it is likely to entice some customers who were sitting on the fence and now find Anacin a better deal.

The crux of this story is that Anacin will sell more at a lower price and will sell less at a higher price, that is, the demand curve facing a firm in monopolistic competition slopes downward. The steepness of the slope depends on the characteristics of the product. If a product is highly differentiated — that is, if it appears to consumers to be completely different from competing products — demand will be relatively inelastic and the downward slope will be steep. Demand for the product will resemble the demand curve of a monopolist, since there are no close substitutes. A less differentiated product will have some acceptable substitutes, so its demand curve will be flatter — more nearly like a demand curve in perfect competition

An important implication of a downward-sloping demand curve—whatever its steepness — is that the marginal revenue curve will lie below the demand curve, as was seen in the case of a pure monopolist described in the last chapter. Given this difference in the MR curve under perfect competition and monopolistic competition, the task of seeing how price and output are determined under monopolistic competition is straightforward:

Short-Run Equilibrium: In the short run the equilibrium price and output are determined at the profit-maximizing point, where MC = MR. Selling price is determined from the point on the demand curve directly above the point where MC = MR. Profit per unit is the difference between price — or average revenue — and average cost, i.e., AR - ATC. In Figure 9.1 total profit is given by the area P_M ABC, equilibrium price is P_M and equilibrium quantity is Q_M.

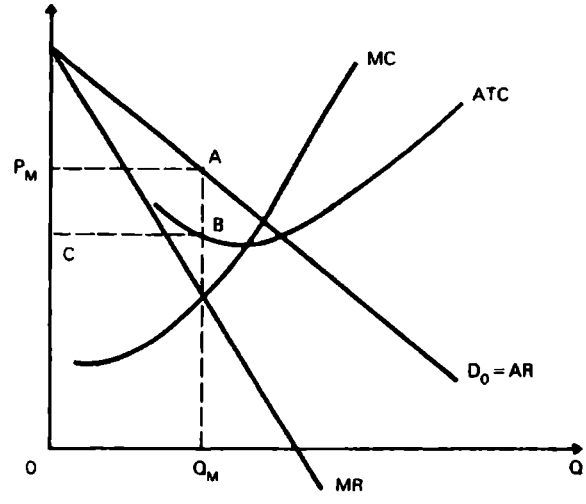


Figure 9.1: Short-Run Equilibrium of a Monopolistically Competitive Firm

Long-Run Equilibrium: In the short run a firm may receive economic profits or extranormal profits, as shown by P_MABC in Figure 9.1. However, unlike in monopoly, conditions in monopolistic competition permit relatively free entry of other firms. As more firms enter this market attracted by extra-normal profits accruing to the existing firms, they eat into each other's demand. The result is that the demand curves of individual firms begin to shrink until all extra-normal profits are competed away and the firms are making only normal profits, as shown in Figure 9.2.

Shortcomings of Monopolistic Competition

The outcome under monopolistic competition is similar to that under monopoly, in that the output is not produced to the point where the marginal cost of production is equal to marginal benefit to the society. That is, output is below the point where MC meets the demand curve (which reflects the marginal utility or marginal benefit to the society). Therefore, it creates inefficiencies similar to those created under monopoly (please refer to the previous chapter).

One particular criticism against monopolistic competition is very popular and is worth examining. We know that in the long run only normal profits are made and that AR = ATC. But since AR, or the demand curve, slopes downward, the ATC curve must also slope downwards at the point where AR = ATC. That is the only way

the two curves can just touch without crossing each other. This is significant. It means that firms are not producing at the minimum point of their cost curves. In other words, firms are producing below capacity and thus there is excess capacity. This excess capacity implies a waste of resources and this is often pointed out by the critics of this market form.

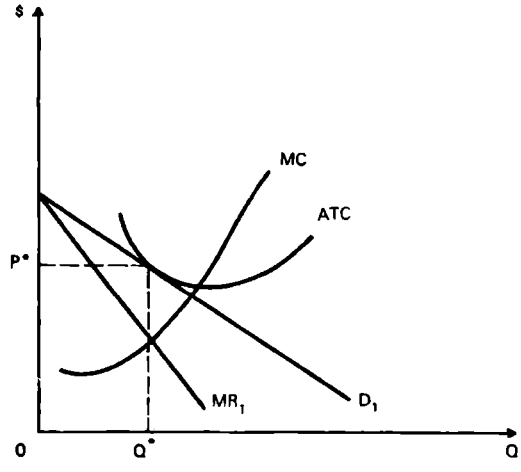


Figure 9.2: Long-Run Equilibrium of a Monopolistically Competitive Firm

Critics have also criticized the waste of resources in competitive advertising.

On the other hand, there are economists who argue that the economic inefficiencies created by this system are a price society has to pay for greater choice and diversity of products and services.

Further, these economists point out that there are two types of advertising, informative and persuasive, and only the latter is economically wasteful. Many would argue that informative advertising provides consumers with more accurate information so that better choices can be made and transaction costs involved in searching can be reduced. So informative advertising is not a waste of resources.

Well, once again, we are entering an area where the contribution of theory stops and the role of empirical investigation becomes important. Whether monopolistic competition is wasteful or not will depend on the product and country we are talking about. Generalizations, as always, are misleading. Therefore, let us now turn to oligopoly.

OLIGOPOLY

Oligopolistic markets have the following characteristics:

1. A relatively small number of firms dominate the market.
2. Barriers to entry exist in one form or another and prevent other firms from entering the market.
3. A large number of buyers.
4. Products may be differentiated as in the case of automobiles, or may be standardized as in the case

of steel or industrial alcohol.
5. Because there are so few firms in the market, rivals are generally aware of each other's pricing and output behavior.

As you can see from this description, oligopoly is a very difficult market to analyze. The theories of competitive, monopolistic, and monpolistically competitive markets as presented so far are quite standard and widely accepted in microeconomics. Unfortunately, economic analysis offers no standard portrait of oligopoly. In general, there are two major reasons why it is difficult to use formal economic analysis in explaining the price behavior of oligopolies.

1. Oligopoly encompasses a very wide variety of market situations, and this makes it difficult to come up with one theory explaining how a producer determines price and output under oligopoly. Perfect competition, monopolistic competition and pure monopoly refer to rather clear-cut market arrangements; oligopoly does not. It includes situations where two or three firms dominate an entire market, as well as the situation in which twelve or thirteen firms compete. It includes both product differentiation and standardization.

2. The element of mutual interdependence which fewness adds to the analysis is a most significant complication. To be specific, the inability of a firm to predict with certainty the reactions of its rivals makes it virtually impossible to estimate the demand and marginal revenue data faced by an oligopolist.

The above discussion should not be taken to mean that economic analysis has nothing to offer as far as oligopoly is concerned. On the contrary, economic theory has made a great deal of progress in this area, and a number of interesting models have been developed to explain oligopolistic behavior under different circumstances. In this chapter, we have enough space to discuss only two of the most interesting theories about oligopolistic pricing behavior. Each of these theories was developed to explain certain observed pricing behaviors under oligopolistic market structures. Therefore, at the beginning of the discussion of each of these theories we will first mention what it is exactly that the theory is trying to explain.

Theory of the Kinked Demand Curve

What is it trying to explain? Empirical studies of pricing in oligopolistic markets have often concleded that prices in such markets tend to be rigid. A classic example, which is often cited, occurred in the sulfur industry in the U.S. From 1926 to 1938, the price of sulfur remained constant at $18 a ton, despite great shifts in demand and production costs. This example is somewhat extreme, but it illustrates the basic point. prices in oligopolistic industries commonly remain unchanged for fairly long periods. It is this phenomenon that this theory is trying to explain.

Explanation: The two basic assumptions behind the kinked demand theory of oligopoly pricing are:

1. When a firm raises its price, other firms will not do so, but
2. When a firm lowers its price, other firms follow suit.

To see how these two assumptions give rise to a kinked demand curve, let us go to Figure 9.3, which depicts the situation of a typical firm in an oligopolistic market. Let us assume that point A represents the market equilibrium for this firm, with P_0 and Q_0 being the equilibrium price and quantity, respectively.

Next, we draw a demand curve D_1 for this firm keeping in mind the assumption that no other firm follows price changes made by this firm. This demand curve is so elastic because when the firm lowers its price, it gains a great deal in sales and when it raises its price, it loses a great deal in sales (as nobody else raises price). The marginal revenue corresponding to this demand curve is given by MR_1.

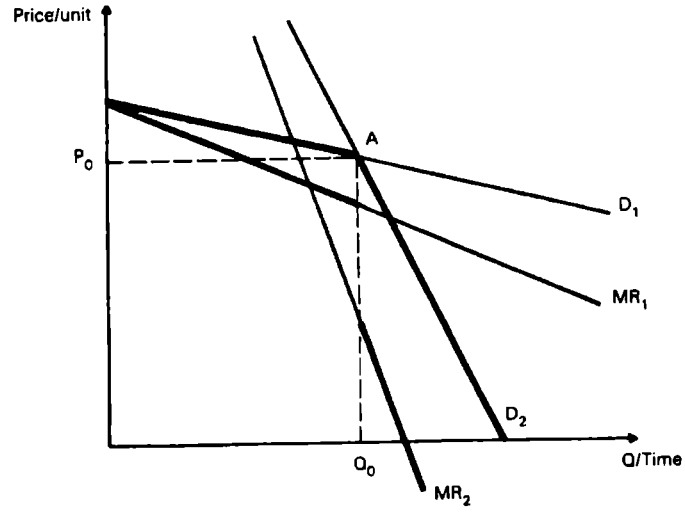


Figure 9.3: Kinked Demand Curve

On the other hand, demand curve D_2 represents the demand curve for the firm drawn on the assumption that rival firms match all price changes. It is so inelastic because if the firm lowers its price, all other firms do the same, and the firm's sales do not increase by much. Similarly, if the firm raises its price, so do its rivals, and little sales are lost. The marginal revenue corresponding to this demand curve is given by MR_2.

However, we know that this theory assumes that price decreases will be emulated by the rivals but that price increases will not. Therefore, for price increases above point A, only the darkened portion of the demand curve D_1 is relevant, and for price decreases the darkened portion of the demand curve D_2 is relevant. Thus the relevant demand curve based on the two basic assumptions is given by the kinked demand curve shown as consisting of the darkened portions of the two demand curves. The marginal revenue curve corresponding to this kinked demand curve consists of the darkened portion of the original MR curves which correspond to the relevant portion of the two demand curves D_1 and D_2. Note that the resulting MR curve has a discontinuity or a gap which can be treated as the vertical segment of the MR curve for all practical purposes.

Having derived the shape of the kinked demand curve and the corresponding MR curve, we are now in a position to explain the phenomenon for which this theory was created. In Figure 9.4 we show the kinked demand curve facing a firm in an oligopolistic market together with the marginal cost curve MC_0. The equilibrium output is determined at the point where MC = MR, i.e., at Q_0. The price he will charge is determined by going up to the demand curve at Q_0, and this price happens to be P_0.

Now suppose the costs of production go up, thereby raising the MC curve to MC_1. The question is, what happens to equilibrium price and quantity? The answer is that the equilibrium price and quantity remain unaffected because the new MC curve cuts the vertical segment of the MR curve.

Let us see what happens when there is an increase in demand. An increase in demand implies that at each price, quantity demanded is greater. In Figure 9.5 we see that the increase in demand is reflected in an outward shift of the kinked demand curve and the corresponding MR curve. Yet, we find it is possible that the MC curve may intersect with the vertical segment of the old, as well as the new MR curve, and thus leave the price unaffected. Thus, this theory explains why prices might be relatively sticky in oligopolistic markets even if cost or demand change. This is what we had set out to explain using this theory.

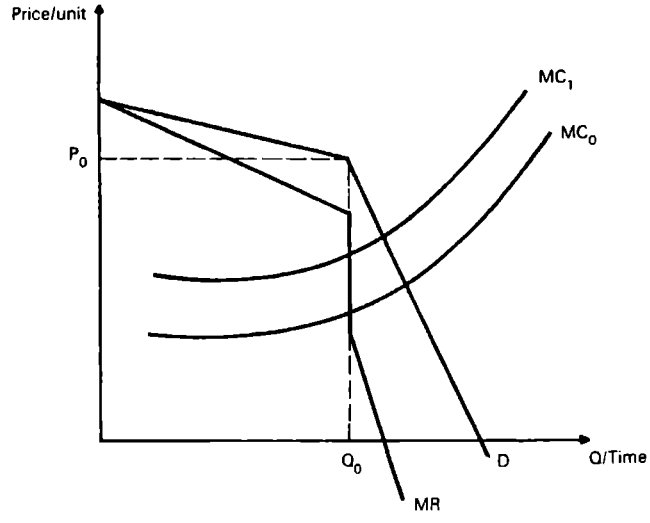


Figure 9.4: Explaining Price Rigidity when Cost of Production Increases

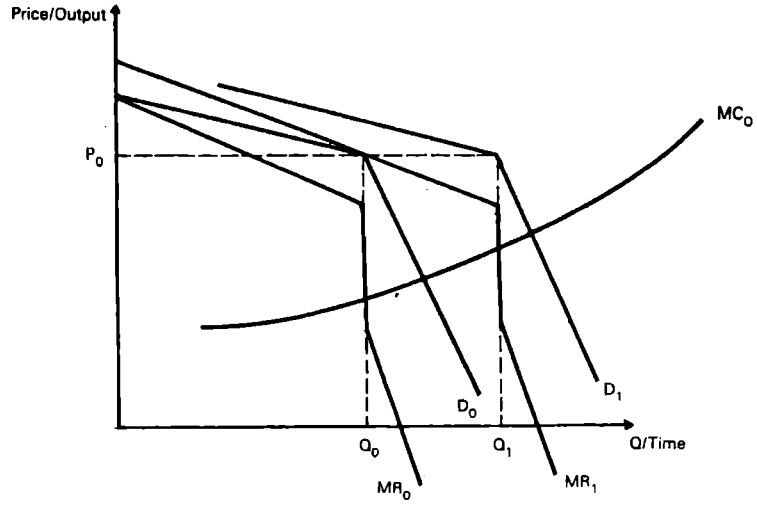


Figure 9.5: Explaining Price Rigidity when Demand Increases

Although the "kinked demand" theory seems to be based on reasonable assumptions about rivalry in oligopolistic markets, it has two major weaknesses. First, it does not explain how the oligopoly emerged and why others cannot enter this market. Second, it starts by assuming that the prevailing price is P_0, without explaining how it came to be so. In other words, the kinked demand theory explains price inflexibility but not the price itself. Let us now move on to the second theory which tries to explain another commonly observed price behavior in the oligopolistic market.

Theory of Oligopolistic Cartels

What is it trying to explain? Empirical studies have shown that very often when oligopolistic prices do change, firms are likely to change their prices together. That is, oligopolistic price behavior suggests the presence of incentives to act in concert or collusively in setting and changing prices.

Explanation: The oligopolists do not like the situation described by the kinked demand curve because of the implied uncertainty. Even though there is a tendency for the prices to be stable, the possibility always exists that a desperate firm may lower its price and start a new price war. Besides, the threat always exists that a new firm will surmount the barriers to entry and initiate aggressive price cutting. Further, the tendency toward rigid prices may adversely affect profits if inflation increases costs. Therefore, oligopolistic firms frequently behave collusively to avoid the uncertainties of non-collusive oligopoly.

There are various ways in which this collusion can take place, and, consequently, there are many theories explaining pricing behavior under each of these types of collusion. Collusion between oligopolists can be covert or overt, formal or informal. We have chosen to analyze the supply decision of oligopolists under one particular type of collusive arrangement known as a **CARTEL.**

A cartel is an organization of firms that jointly make decisions regarding prices and production for the entire group. For most Americans, OPEC (the Organization of Petroleum Exporting Countries) has made the term "cartel" a household word. Cartels, generally, require formal collusive arrangements on the part of member firms as OPEC does. However, if the industry is very concentrated, with two or three firms dominating the entire industry, then informal collusive arrangements are possible.

In most countries formal cartels are outlawed. However, numerous cartels exist today in the international market for such basic resources as copper, tin, oil, bauxite, diamonds, coffee, and chrome. Many of these cartels are controlled by the governments of the countries that are the largest producers.

A successful cartel usually has the following characteristics:

a. Members of the cartel must have control over the bulk of the good produced and sold, otherwise, it cannot afford to dictate prices in the market.

b. Control over the bulk of production needs to be concentrated in a few hands as it is much easier to reach agreement on common policies when the group is small.

c. The product of the cartel should not have any close substitutes.

d. Further, the products of the various members should be homogeneous and not differentiated as it will be much harder to agree on an array of prices than on just one.

e. Low elasticity of the demand for the cartel's product is essential as it provides it with substantial market power. It can raise total revenue by increasing the price.

f. Finally, some method is needed to monitor member compliance and prevent cheating.

Cartel Pricing Policies

To illustrate how equilibrium price and output decisions are made under a cartel-type arrangement, let us assume that a cartel is formed by three firms which dominate the market for a particular product. Although they maintain their own separate corporate identities, with their own plants and their own sales forces, suppose they decide to agree on a common price. The question to be answered is, in their collective interest, what is the best price to choose? The logical answer is that they should act like a monopolist and maximize their joint profits.

Figure 9.6 shows how this price can be determined using the tools we have already acquired. In Figure 9.6(A) we show the MC curve and ATC curve of one of the firms. To keep the diagram from becoming too crowded, we assume that the MC and ATC curves of the other two firms are similar to the one as shown in Figure 9.6(A). The next step is to add up the MC curves of the three oligopolists to get the combined MC curve for the industry shown in Figure 9.6(B). The highest profit is made where this combined MC curve meets the industry's MR curve at Q_0. (MR is calculated from the demand curve, D, for the industry.) The collusive price is set at P_0 as it would be in the case of a monopoly.

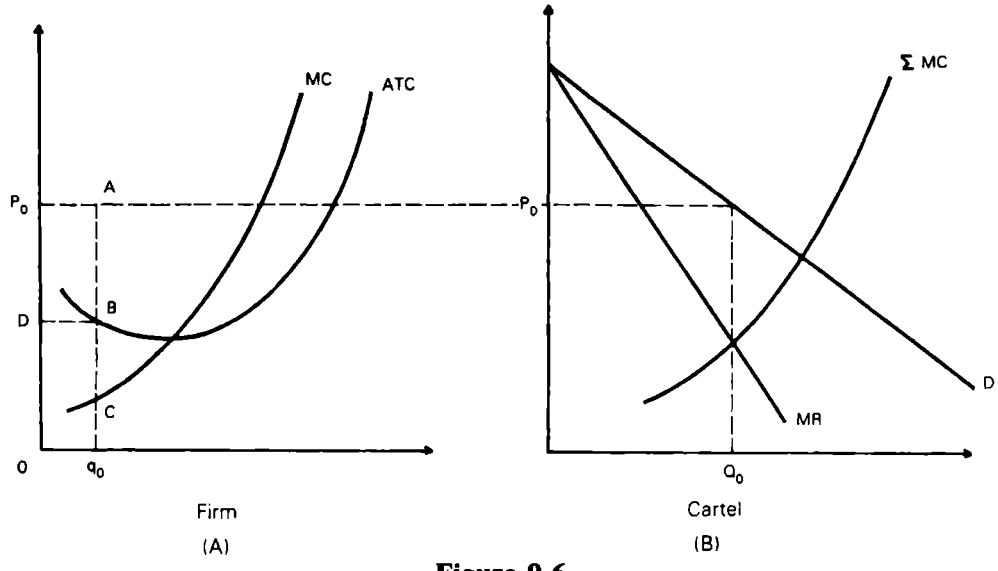


Figure 9.6

Once it has been decided that the cartel will sell only Q_0 amount at a price P_0, the next question is, How much should each member produce? This allocation of production is done in numerous ways, depending on the nature of the product and the market. A lot of cartels break down fighting over this issue of allocation. However, let us decide, for simplicity, that the cartel under discussion decides that each member should produce one third of the total amount, Q_0. Thus each firm produces an amount equal to q_0 ($= Q_0/3$) as shown in Figure 9.6(A), and each makes a profit equal to P_0ABD.

Incentives to Cheat (source of instability of the cartel): As can be seen from Figure 9.6(A), each member has an incentive to produce more than its quota of q_0. If the firm were to increase its production slightly (cheating in the eyes of fellow members), the extra revenue generated would be more than the extra cost. The reason for this lies in the fact that since price has been fixed at P_0, for each unit sold the oligopolist will get P_0 which is obviously greater than the MC at that output, which is q_0C. Therefore, by increasing its output beyond the agreed upon quota, the individual firms in the cartel can increase profit. But if this cheating becomes widespread, the total

industry output will increase well beyond Q_0, and it may become impossible to maintain the agreed-upon price of P_0. The result may be price wars and the collapse of the cartel agreement.

Whenever the factors helping the successful operation of a cartel (mentioned earlier) dominate this self-interest, the cartel survives. Otherwise, it usually comes to an end after a short and stormy existence.

EVALUATING OLIGOPOLY

Finally, let us end this chapter by commenting on the economic effects of an oligopoly. Since oligopolistic industries have considerable monopoly power, the case for and against them is similar to that for monopolies. Compared to the perfectly competitive industries, output will tend to be less and prices higher under an oligopoly. In equilibrium, the marginal benefit of producing an extra amount will be more than the marginal cost of producing this amount.

However, if there are large economies of scale present, and technological change requires massive expenditure on research and development, then consumers under an oligopoly may end up paying a lower price compared to the price under competitive markets. But all this is an empirical matter. Thus before condemning an oligopoly one has to know the specific product, the specific environment it is operating under, and the other alternatives available.

Questions for Class Discussion

Question 1

The success of OPEC in dramatically pushing up the price of crude prompted other less-developed countries to consider whether they too could organize cartels in other commodities. However, we have seen no such organizations in the past decade. Why? Even OPEC seems to be having trouble now and their recent London meeting got them nowhere. Why? More generally, you should ask yourself:

(a) When it is **feasible** to have a cartel?
(b) What must be done to **sustain** the success of the cartel?

Question 2

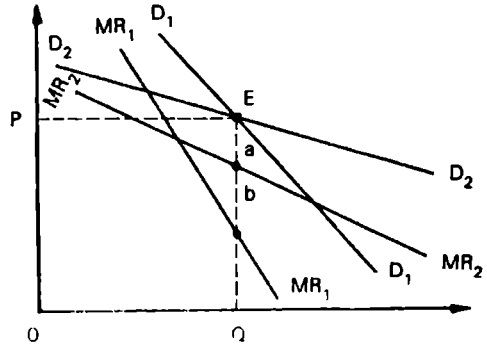
The pharmaceuticals industry is largely under the control of transnational corporations (or, multinational corporations as they are popularly known). Policy planners in LDCs have actively canvassed a switch-over from brand-name drugs to generics. What is the motivation for such a policy?

Problems for Practice

1. Monopolistic competition and oligopoly are alike in that:
   a. nonprice competition is common to both.
   b. strong mutual interdependence exists among firms in both market models.
   c. the kinked-demand analysis is applicable in both instances.
   d. the number of firms is approximately the same in both cases.

2. The kinked demand curve model of oligopoly:
   a. assumes a firm will ignore any price change it may initiate.
   b. assumes a firm's rivals will match any price change it may initiate.
   c. embodies the possibility that changes in unit costs will have no effect upon equilibrium price and output.
   d. assumes a firm's rivals will ignore a price cut but match a price increase.

Answer questions 3 through 6 on the basis of the following diagram for a noncollusive oligopolist. We assume that the firm is initially in equilibrium at point E where the equilibrium price and quantity are P and Q.



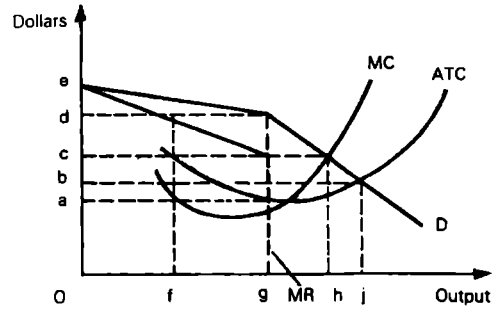
3. Which of the following statements is correct?
   a. Demand curve D_2 is based upon the assumption that rivals will match any price change initiated by this oligopolist.
   b. Demand curve D_1 and D_2 both assume that rivals will match any price change initiated by this oligopolist.
   c. Demand curve D_1 and D_2 both assume that rivals will ignore any price change initiated by this oligopolist.
   d. Demand curve D_1 is based upon the assumption that rivals will match any price change initiated by this oligopolist.

4. If it is assumed that the firm's rivals will ignore any price increase but match any price reduction, then the firm's demand curve wil be:
   a. D_2ED_2
   b. D_1ED_1
   c. D_2E
   d. D_1ED_2
   e. indeterminate

5. Given the assumption of question 4, the firm's marginal revenue curve will be:
   a. $MR_1b\ MR_1$
   b. $MR_2a\ MR_2$
   c. $MR_2ab\ MR_1$
   d. D_1ED_2

6. Given the assumption of question 4, over what range might marginal cost rise without disturbing equilibrium price and output?
   a. Qb
   b. Qa
   c. ab
   d. bE

Answer question 7 through 11 on the basis of the following diagram:



7. This diagram portrays:
   a. collusive oligopoly
   b. pure monopoly
   c. noncollusive oligopoly
   d. monopolistic competition
   e. pure competition

8. Equilibrium output is:
   a. Of
   b. Og
   c. Oh
   d. Oj

9. Equilibrium price is:
   a. Oa
   b. Ob
   c. Oc
   d. Od
   e. Oe

10. This firm's demand and marginal revenue curves are based on the assumption that:
    a. rivals will ignore a price increase, but match a price decrease.
    b. rivals will match a price increase, but ignore a price decrease.
    c. rivals will match both a price increase and a price decrease.
    d. rivals will ignore both a price increase and a price decrease.
    e. the firm has no immediate rivals.

11. In equilibrium the firm:
    a. is realizing an economic profit of bd per unit.
    b. is realizing a loss.
    c. should close down in the short run.
    d. is realizing an economic profit of ad per unit.

CHAPTER TEN

MARKETS FOR FACTORS OF PRODUCTION

CHAPTER TEN

MARKETS FOR FACTORS OF PRODUCTION

Remember that in Chapter 6 we embarked on a journey behind the supply curve to explore the factors that explain its shape. That is, we wanted to know how supply decisions regarding the price to be charged and the quantity to be supplied are made by producers. At this juncture, having examined supply decisions of producers under perfectly and imperfectly competitive markets, we may feel that we have come to the end of that journey. However, a moment's reflection will tell us that we have ignored (or, overlooked) a very important issue—pricing of factors of production.

In the previous three chapters we asserted that producers in all markets, perfectly competitive as well as imperfectly competitive, produce that quantity and charge that price which maximizes their profits. Further, we saw that profits depend on both the revenue as well as the costs of a firm. Revenues, in turn, depend on the amount of market power a firm has. Costs, on the other hand, depend on the efficiency of the factors of production (resources) and the price of these factors of production. Therefore, to summarize, one can say that the supply decision of a producer depends on:

1. His market power.
2. The efficiency of the factors of production.
3. The price of the factors of production.

However, in the previous chapters we have discussed points 1 and 2, and totally ignored point 3. We saw how the degree of market power explains the shape of the marginal revenue curve facing a perfectly competitive firm, a monopolist and an oligopolist. We also observed in Chapter 6 how marginal cost depends on the efficiency of factors of production in the short run and the long run. But in all these discussions, we ignored the effect of the price of the factors of production on the supply decision of the firm, by assuming that the prices of the factors of production remain constant. This omission was deliberate and was done for pedagogical reasons. If we had introduced the discussion of factor prices earlier, it would have impeded our understanding of an already complex analysis. However, no discussion of supply decisions can be considered complete without an explanation of how the factor prices are determined. A change in factor prices can change the costs of the firm, consequently changing the profits and ultimately affecting the supply decision of the firm. The time has now come to undertake this logical next step of explaining what determines factor prices.

Before we begin to analyze factor markets, let me give you another reason to justify spending time and effort on this topic. Remember that in Chapter 1, we argued that in a free enterprise economy or in a mixed economy the answers to the central problems, FOR WHOM the goods will be produced and HOW the goods will be produced, are determined primarily by factor prices. Since one of the important tasks of economics is to provide answers to the three central problems of an economy, it is essential for an economist to study the determination of the factor prices.

The above discussion should not be taken to mean that there is some kind of a dichotomy between product markets and factor markets. That is, we should not get the impression that while product markets and product prices determine the answer to the central problem of WHAT to produce, the factor markets and factor prices determine the answer to the central problems of FOR WHOM and HOW. The fact of the matter is that all markets are interconnected and hence, interdependent. What happens in factor markets affects the outcome of product markets and *vice versa*.

Figure 10.1 shows how factor markets and product markets are interrelated. This abstract diagram, giving a bird's-eye-view of an economy, is referred to as a **CIRCULAR FLOW DIAGRAM.** It shows two loops which represent flows in different directions. The inner loop, represented by dashed lines, shows money flowing in the clockwise direction. The outer loop, represented by solid lines, shows products and factors flowing in the counter-clockwise direction. To see how product markets and factor markets are related, let us examine each loop separately. We can start with either loop, and also from any point on the circular flow diagram, but we will always come back to the same point.

Let us examine the loop representing the money flow, starting from the product market. Depending on the product prices, producers receive some revenues for supplying goods in the product market. This money received by the producers is used for hiring factors on the factor markets. These payments on the factor markets constitute incomes for the consumers who supply the factors on the factor market. The level of these payments, and hence the incomes of consumers, depends on prices on the factor market. These incomes, in turn, are spent by the consumers on the product market. This completes the entire cycle. The money which originated from the consumers' pockets is back in their pockets.

The outer loop, on the other hand, shows the real products and factors of production flowing in a counter-clockwise direction from producers to users and back again. Producers supply products to consumers on the product markets and consumers, in turn, supply factor to producers on the factor market.

From the above discussion, it is clear that what happens in one market will necessarily affect the other market. For instance, if the price in the factor market increases, it will increase the incomes of the consumers and hence the demand in the product market. Or, if the price in the product market falls, it will reduce the revenues of the producers and hence reduce the demand in the factor markets.

Having seen the importance of analyzing factor markets, let us examine them more closely. As we have already observed, the price of a factor of production, like that of any commodity, is determined by the interaction of its demand and supply. The question then is, what determines the demand and supply of a factor of production? How are they different from the demand and supply in the markets discussed in the previous chapters?

As mentioned in Chapter 1 (page 3), factors of production can be classified as land, labor, capital and entrepreneurial ability. Obviously, we will not have time to discuss all these factors in detail. But since the general underlying principles are very similar for all factor markets, an in-depth study of one market will be sufficient for our present purpose. Since wages constitute the biggest chunk of the national income, it is natural to concentrate on labor markets. Let us begin our discussion of factor markets with perfectly competitive labor markets.

PERFECTLY COMPETITIVE LABOR MARKETS

The main question to be answered in this section is, how is the equilibrium wage and equilibrium level of employment determined in a perfectly competitive labor market? But first, we must explain what is meant by a perfectly competitive labor market. The concept of the perfectly competitive labor

market is analogous to the concept of the perfectly competitive product market. It implies that there are large numbers of workers who are willing and able to supply their labor services and, also, that there are a large number of firms that have a demand for these labor services. Further, we assume that the labor services offered by various workers are homogeneous. The implication of these assumptions is that in a perfectly competitive market nobody is large enough to affect the price of labor services, that is, the wage rate. And just like in the perfectly competitive goods market, the wage rate (the price of labor services) is determined by the interaction of market demand for labor and the market supply of labor. Therefore, the next logical step in explaining the determination of the wage rate is the explanation of the determinants of demand and supply of labor.

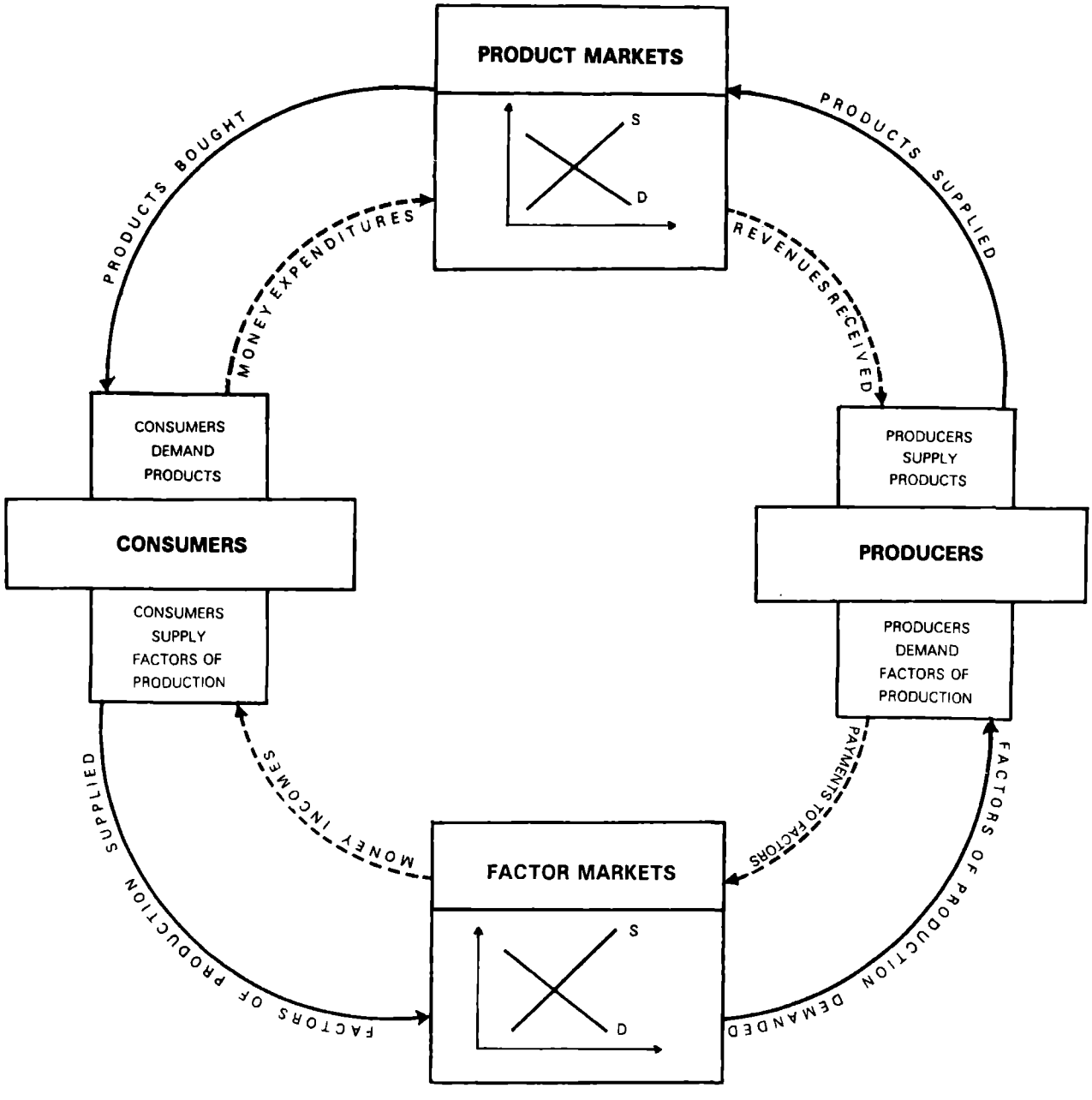


Figure 10.1: The Circular-Flow Diagram

Demand for Labor

The demand curve for labor curve (or schedule) shows how much labor will be demanded by firms at various wage rates. Therefore, our task now is to explain what determines how much labor will be hired by a firm at a given wage rate. And the best way to see this is to put yourself in the shoes of a manager who has to make this kind of decision. Let us suppose that you have been hired as a manager by a small firm called Rollon, which makes inexpensive roller skates. How would you decide how many workers to hire to maximize profits? The principle is quite straightforward. You should hire a worker so long as the additional revenue he generates for the firm is more than the additional cost of hiring him. That is, you should hire every worker for whom the marginal revenue of hiring is more than the marginal cost of hiring.

The next logical question is, on what do the marginal revenue and marginal cost of hiring depend? The marginal revenue of hiring, or the extra revenue a worker produces when he is hired, depends on two things. First, it depends on the amount of additional goods the extra worker produces, given fixed quantities of machinery and raw materials available; that is, on the marginal product of the worker. The greater the marginal product of the worker, the greater the additional revenue he or she makes possible. The second factor determining the additional revenue generated by hiring a worker is the price at which the extra goods he produces are sold. The higher the price of the product produced by a worker, the higher the marginal revenue of hiring him.

The marginal cost of hiring a worker, or the additional cost of hiring a worker, depends on the wage rate; that is, the amount that has to be paid to the worker.

Given all this, how much labor should you hire for Rollon, when the production data for use of labor in Rollon is given in Table 10.1? Let us see how much extra revenue is generated when you hire the first worker. The extra production resulting from hiring the first worker is ten pairs of roller skates. And since each pair of roller skates sells for $10, the extra revenue this worker generates is $100. This is also known as the **marginal revenue product, MRP.** Let us assume that, the extra cost of hiring him, i.e., the wage rate per day is $30. Therefore, it makes perfect sense to hire this first worker.

Similarly, when the second worker is hired, the total product increases from 10 units to 19 units. That is, the extra product due to this worker (the marginal product) is 9 units. The extra revenue generated, the marginal revenue product, is equal to $90 (= 9 X $10). This amount is also greater than the marginal cost of hiring this worker, which is $30, and so this worker should also be hired.

By repeating this procedure you can see that workers should be hired to the point where the wage rate is equal to the marginal revenue product. In the case of Rollon, you should hire 6 workers, because when the wage rate is below the marginal revenue product, hiring an additional worker increases profits since total revenue goes up by more than total cost. Beyond the point where marginal revenue product and wage rate are equal, hiring an additional worker decreases profits because the output he produces cannot be sold for enough to pay his wage.

It follows from the above statement that if the wage rate were $50 per day, then you should hire only 5 workers. At this wage rate hiring the sixth worker will decrease profits. Similarly, at different wage rates you can now figure out how many workers to hire by finding out for which worker the MRP is equal to the wage rate. It follows from this that the **demand for labor schedule and the marginal revenue product of labor schedule are one and the same.** Diagrammatically, in Figure 10.2, the MRP curve represents the demand curve for labor for your firm.

Table 10.1

(1) Quantity of labor QL	(2) Total product TP	(3) Marginal product MP	(4) Product price PP ($)	(5) Total revenue TR ($)	(6) Marginal revenue product MRP($)	(7) Price of labor PL ($)
1	10	10	10	100	100	30
2	19	9	10	190	90	30
3	27	8	10	270	80	30
4	33	6	10	230	60	30
5	38	5	10	380	50	30
6	41	3	10	410	30	30
7	42	1	10	420	10	30
8	42	0	10	420	0	30
9	40	-2	10	400	-20	30

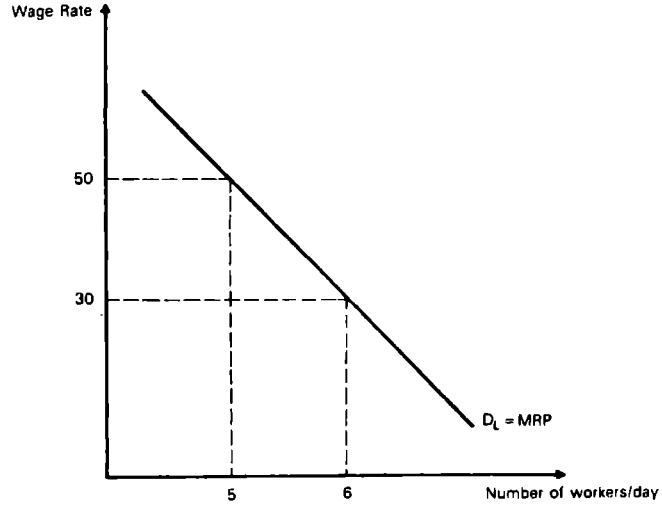


Figure 10.2: Demand for Labor Curve of Rollon

Now, to get the market demand curve for labor, we have to add up the demand for this kind of labor by all firms. Diagrammatically, this is done by a process of horizontal summation of demand curves of all the

individual firms, by a process similar to that for product demand curves discussed earlier in this book. This is shown in Figure 10.3.

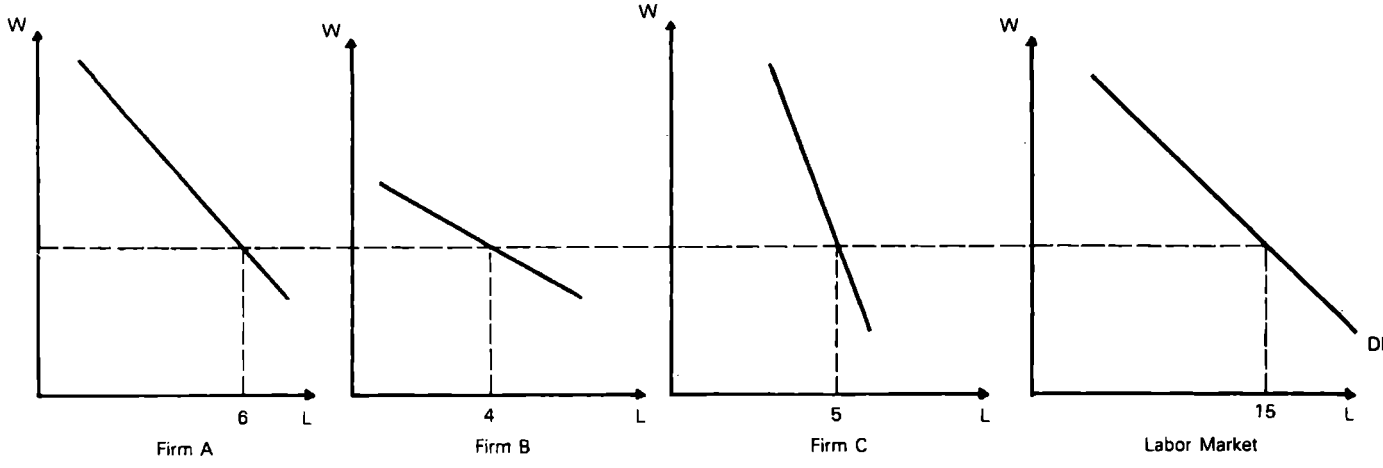


Figure 10.3: Derivation of Market Demand for Labor from Individual Demand Curves.

Shifts in Demand for Labor: Once again we have to distinguish between a movement along the demand curve and a shift of the demand curve. When the wage rate changes the quantity of labor demanded changes. That is, we move from one point on the labor demand curve to another. This is referred to as the **movement along the demand curve.**

However, when the entire demand curve shifts, it is referred to as the **change in labor demand** as opposed to a change in the quantity of labor demanded. The question then is, what will cause a shift in the demand for labor? Since the demand for labor curve is the same thing as the MRP curve, this question boils down to, what causes the MRP curve to shift? The MRP curve, we know, is the product of the marginal product (MP) and the price of the product P_P, given fixed levels of other resources employed. Therefore, changes in any one of the following four factors will cause the demand curve for labor (MRP) to shift:

1. A change in the demand for a product and, subsequently, its price.
2. A change in production technology and hence in the marginal product of workers.
3. A change in the level of other factors employed along with labor.
4. A change in the number of firms that employ labor.

Supply of Labor

The supply curve of an individual shows how many hours the individual is willing to work at a particular wage rate. Suppose you are offered a job at $6 per hour and are asked to work as many hours as you please at that wage rate. And suppose you decide to work for 10 hours a week at that salary. The reason you do not want to work more than 10 hours is that you have other things to do which you do not want to sacrifice at this wage rate.

Now, if you are offered a wage rate of $12 per hour, chances are that you will give up some activities you value less than $12 per hour and find more time to work, say 15 hours a week. Similarly, at $20 per hour, you may want to work 40 hours a week.

The moral of the story is that the higher the wage rate, the more you are likely to work. Therefore, your supply curve for labor will be upward-sloping like the one shown in Figure 10.4.

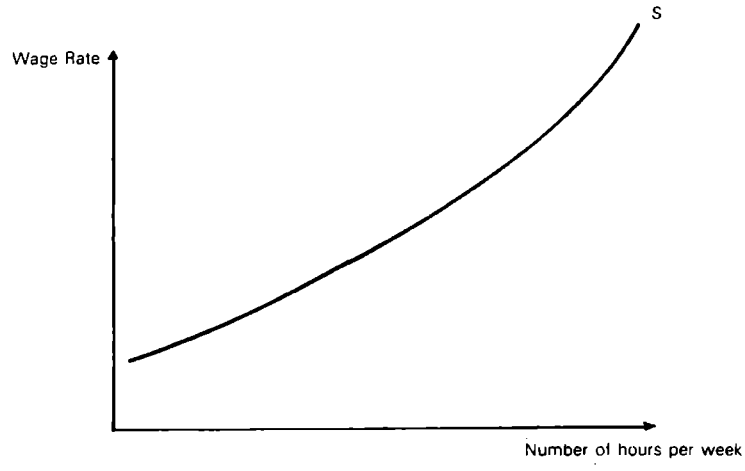


Figure 10.4

It is important to note that beyond some point you may actually reduce the number of hours worked as the wage rate increases. This may be so because you may want to have more time to enjoy the fruits of your labor. The result may be a backward-bending supply curve, as shown in Figure 10.5.

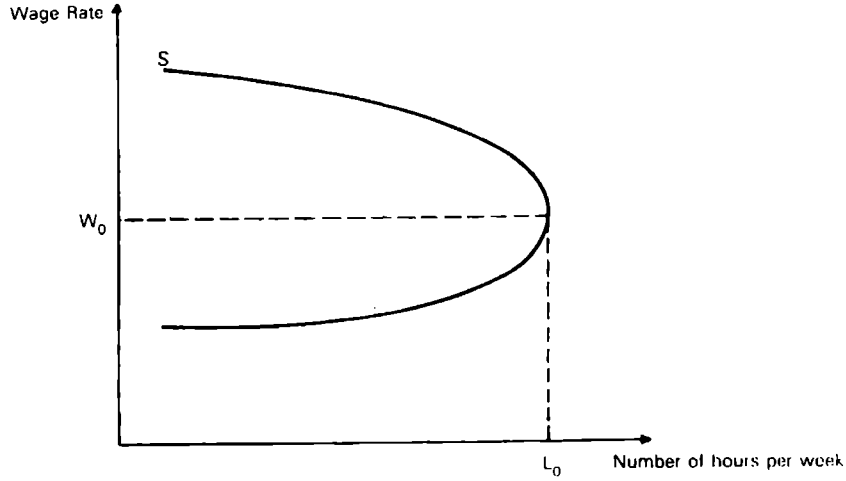


Figure 10.5

To get the market supply curve from the individual supply curves, we have to horizontally sum all the individual supply curves as shown in Figure 10.6, where the supply curve of three individuals has been added to get the market supply curve of labor.

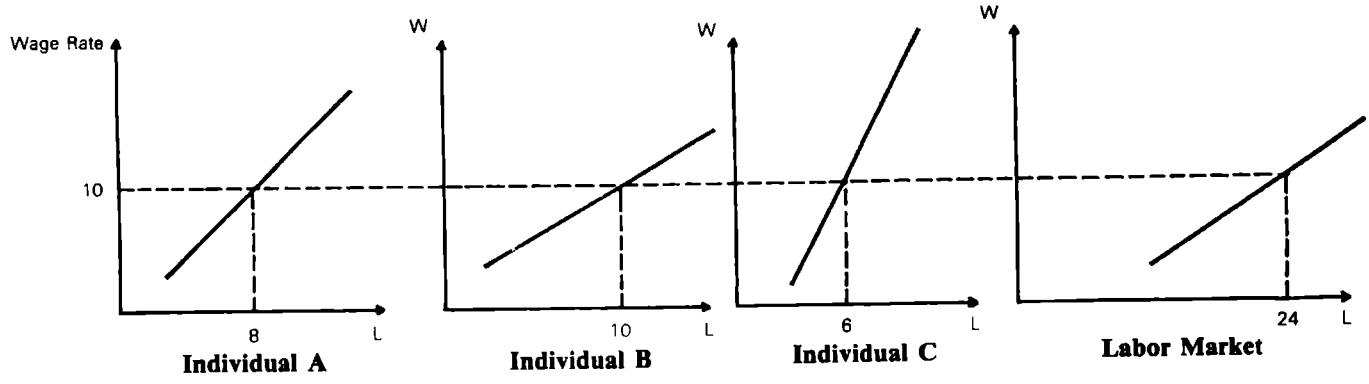


Figure 10.6: Derivation of Market Supply for labor from Individual Labor Supply Curves

Labor Market Equilibrium

We have seen that the market demand curve for labor is downward sloping and that the market supply curve is upward sloping. By bringing these two curves together we can see that the equilibrium would occur where these two curves intersect. Figure 10.7 shows the equilibrium wage to be W and equilibrium employment equal to E.

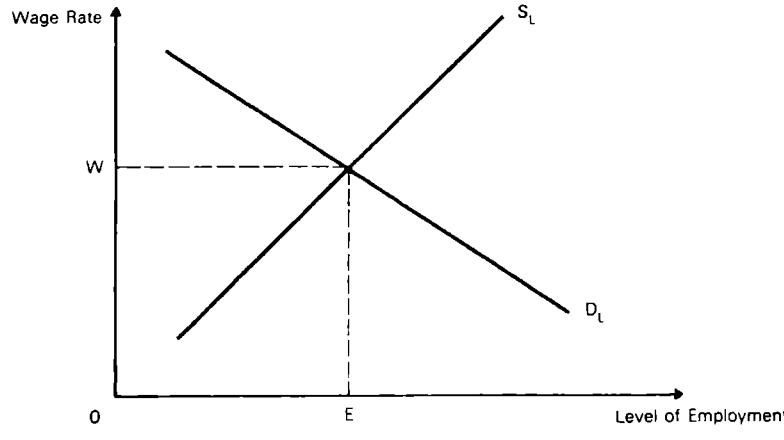


Figure 10.7: Labor Market Equilibrium

Going by the usual reasoning, we can show that this is an equilibrium in a competitive labor market. Suppose the wage were below W. Then the number of workers employers wish to hire would exceed the number willing to work in this particular occupation. Competition between employers for the available labor would bid wages up toward W. Conversely, if the wage were above W, more workers would seek employment in the occupation than the employers wish to hire. This labor surplus would force the wage rate down to W.

Just as in the product markets, the main use of the labor demand-supply apparatus is to trace the consequences of a change in market conditions. Therefore, much of the discussion on the effect of changes in product demand and product supply and their various combinations is relevant for analyzing the effects of changes in labor demand and labor supply and their various combinations (Please review page 44).

Let me deal with two cases to show how this labor demand-supply apparatus may be useful for analyzing some labor market problems.

CASE I: Effect of Economic Factors on the Market for Office Workers

What would be the effect of the following factors on the equilibrium wage and equilibrium level of employment in the market for office workers?

a. A rise in the proportion of girls finishing high school from 50 per cent to 75 per cent, and the fact that these graduates have a strong preference for office work over factory work.

b. An increase in the efficiency of the office workers because of higher levels of training and education.

Analysis

Figure 10.8 shows the initial equilibrium in the market for office workers.

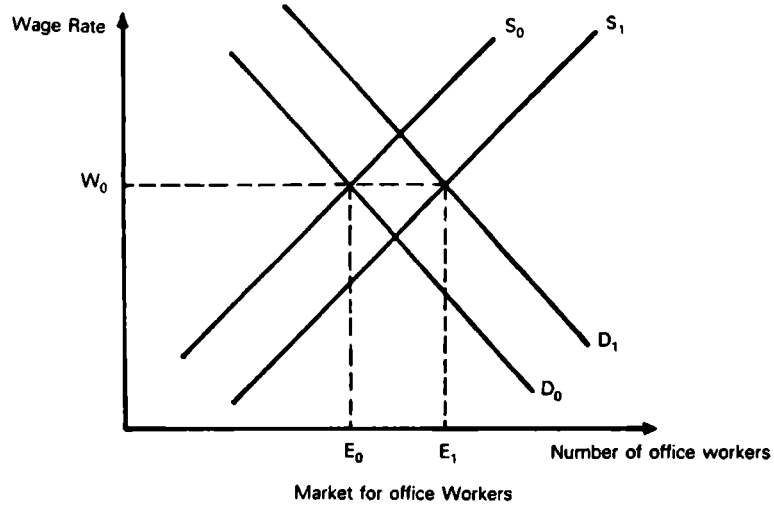


Figure 10.8

The effect of an increase in the number of girls graduating from high school with a preference for office work is an increase in the supply curve of office workers.

The increase in efficiency increases marginal productivity, and hence the MRP curve or the demand curve for labor.

The combined effect of an increase in the supply curve and an increase in the demand curve is that we can only predict that the level of employment will increase and cannot say much about the level of wages unless we know the precise magnitude of the shifts in the curves.

CASE II: Effect of Minimum Wage Law on Labor Market

A large number of countries have legislated minimum wage laws. The objective of these laws is to ensure that people receive a living wage and thus to reduce the poverty problem. Analyze the economic impact of these laws. Do they achieve their stated objective?

Analysis

Figure 10.9 shows the impact of minimum wage laws on a typical labor market. Let W_0 and E_0 represent equilibrium wage and equilibrium level of employment before the imposition of minimum wage laws.

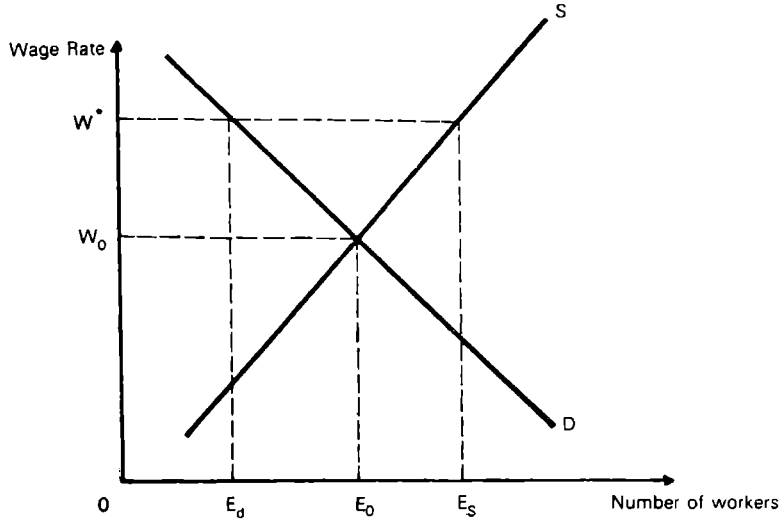


Figure 10.9

Now, if the government imposes a minimum wage law on this labor market and fixes the legal minimum wage at W^*, the employer will wish to employ only E_d workers, whereas E_s workers would be willing to work at this wage rate.

The question then is, do workers in this labor market benefit? The answer is both YES and NO. Certainly, the workers who continue to be employed benefit, but what about the E_dE_0 number of previously employed workers who now find themselves unemployed? Who are these individuals who lose their jobs as a result of the minimum wage legislation? In the American context, the answer tends to be blacks and other minority groups who tend to be "last hired, first fired," and teenagers, who lack work experience and skills.

There is another question to be considered: Does the minimum wage rate increase the total labor income in this market? The answer is, NOT NECESSARILY. The total income of the workers before the minimum wage

in the labor market shown in Figure 10.9 was $W_0 \times E_0$. After the minimum wage, it became $W^* \times E_d$. And whether $W^* \times E_d$ is greater or less than $W_0 \times E_0$ will depend on the elasticity of demand for labor in this market.

IMPERFECTLY COMPETITIVE LABOR MARKETS

In the previous section, we examined how equilibrium level of employment is determined in a perfectly competitive model. That analysis is very useful in explaining the functioning of many labor markets which can be characterized as perfectly competitive; for instance, in large cities the markets for secretaries, salespersons, delivery people, etc. However, there are a number of labor markets which cannot be called perfectly competitive markets.

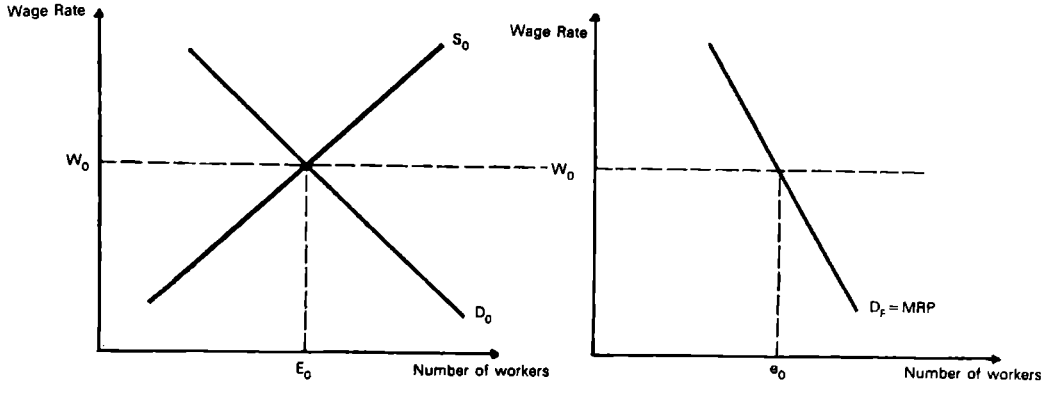
(i) **Monopsony in the Labor Market:** Such a labor market arises when there is only one employer in the labor market but many workers. An example is a large textile mill in a small New England town. The word monopsony is derived from the roots **mono,** single, and **opsonia,** buying. It means a single buyer in the market, which obviously violates the condition of a large number of buyers necessary for the existence of perfect competition.

(ii) **Monopoly in the Labor Market:** This type of labor market is characterized by a large labor union which controls the supply of the workers to the numerous employers.

(iii) **Bilateral Monopoly:** In this kind of labor market, a union of workers faces a monopsonistic employer.

Monopsony in the Labor Market

The main question is: How much labor will a monopsonist firm hire and what wage rate will it pay? But before that, let us see the difference between a monopsonist and a perfectly competitive employer. The difference between a monopsonistic labor market, where there is one buyer, and a perfectly competitive market, where there are a large number of buyers, lies in the fact that a monopsonist has control over the wage rate in the labor market, whereas, an employer in a perfectly competitive market does not. In a perfectly competitive labor market, once the wage rate is determined by the interaction of market demand for labor and market supply of labor, the individual employer can hire as many or as few workers as he chooses without affecting the market wage rate. The situation in a perfectly competitive labor market is depicted in Figure 10.10.



(A) Labor Market **(B) Individual Firm**

Figure 10.10

The equilibrium wage, W_0, in the market is determined at the point of intersection of the market demand and supply for labor, as shown in Figure 10.10(A). At this wage rate, an individual firm can hire as many workers as it finds profitable to employ without affecting the wage rate, because each firm is assumed to be very small compared to the total market. The firm, as discussed in the previous section, will hire workers to the point, e_0, where the wage rate is equal to the MRP; that is, where the wage line W_0W_0 meets the demand for labor curve, D_F, of an individual firm.

However, a monopsonist cannot employ as many or as few workers as he chooses without affecting the wage rate. This is because a monopsonist is the sole employer and his actions affect the market. Therefore, when a monopsonist hires a worker, his marginal cost of hiring the worker does not remain constant, unlike the case with the perfectly competitive employer. To see why this is so, look at Table 10.2. If this firm wants to hire one worker, it will have to pay \$6. But suppose the firm wants to hire two, how much will it have to pay?

Table 10.2: Marginal Cost of Hiring Workers for a Monopsonist in the Labor Market

(1) Number of workers	(2) Wage rate (\$)	(3) Total labor cost (wage bill \$)	(4) Marginal cost of hiring workers(\$)
1	6	6	6
2	7	14	8
3	8	24	10
4	9	36	12
5	10	50	14
6	11	60	16

Looking at the supply schedule in column 2 of Table 10.2, it is clear that it will have to pay a wage of \$7 to attract two people to work for it. Then, what is the marginal cost of hiring this second worker? If the monopsonist can pay \$6 to the first worker and \$7 to the second worker then, obviously, the additional cost (or the marginal cost) of hiring this worker would be \$7. But this kind of discriminatory wage is not possible as it will hamper morale, and may lead to labor unrest. So to hire two workers, the monopsonist will have to pay \$7 to both the workers. By doing so, his wage bill increases from \$6 to \$14. The additional cost of hiring this second worker is \$8, which is more than the wage rate when two workers are hired. The reason for this should be clear. To attract the second worker he must pay \$7, and the first worker must get an additional \$1. Similarly, the marginal cost of hiring the third worker is \$10. Eight dollars must be paid to attract this worker from elsewhere, in addition to the \$1 raises to the first two workers.

The important point to note is that the marginal cost of hiring each worker is higher than the wage rate necessary to attract him, as can be seen by comparing columns 2 and 4 in Table 10.2. Diagrammatically, this implies that the marginal cost curve of hiring labor will lie above the supply curve, as shown in Figure 10.11.

Once we have the information on the monopsonist's marginal cost of hiring workers, we can predict how he will determine the wage rate as well as the employment level. In figure 10.12, the MRP curve of a

monopsonist is super imposed on the marginal cost curve of hiring labor and the labor supply curve facing him. As we know, the profit maximizing rule is to hire every worker that adds more to revenue than to costs. For that one should hire every worker for whom the marginal revenue of hiring him (given by the MRP curve) is more than the marginal cost of hiring him. In Figure 10.12 this implies that a monopsonist will hire Q_m workers and pay a wage rate of W_M to attract this number of workers.

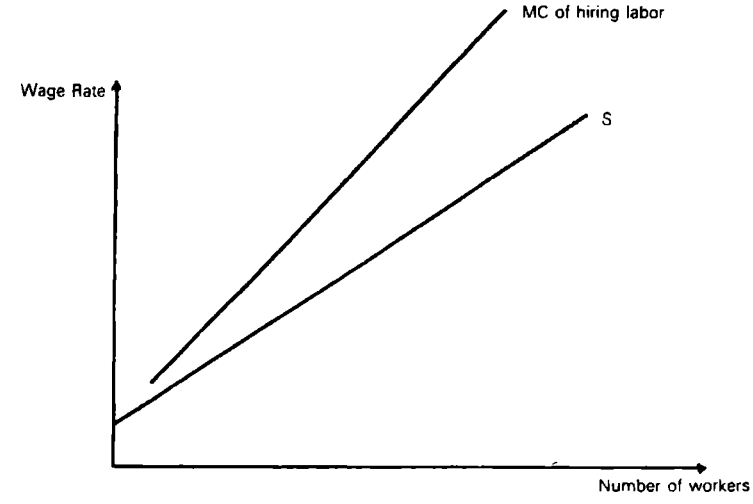


Figure 10.11: Marginal Cost of Hiring Workers for a Monopsonist in the Labor Market

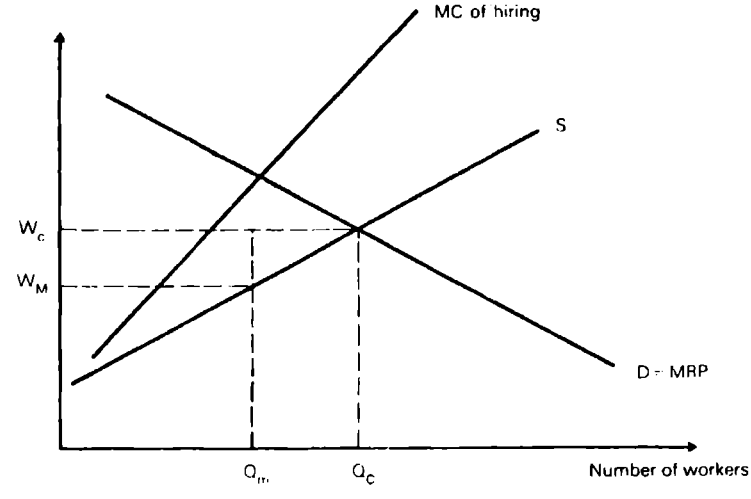


Figure 10.12: Hiring Decision of a Monopsonist in the Labor Market

Let us contrast this outcome with the one that would have occurred in this market under a perfectly competitive labor market. With competition in the hiring of labor, the employment would have been greater (Q_c) and the wage rate higher (W_c). Other things being equal, a monopsonist maximizes his profits by hiring a smaller number of workers and thereby paying a less-than-competitive wage rate.

It goes without saying that the above theory of a monopsony in labor markets is equally applicable to a situation where instead of one single employer we have many employers but they collude to act like a

monopsonist. In other words, this analysis is also applicable when employers are organized in such a way that they are able to coordinate their actions in the labor market, behaving as a single buyer.

However, employers are not the only ones who can organize themselves so as to control the wage rate in labor markets. Workers, too, organize, forming unions for the purpose of avoiding competition among individual workers as labor suppliers and replacing it with cooperative action by workers. It is the analysis of such unionized labor markets that we take up next.

Monopoly in the Labor Market

In analyzing how equilibrium wage and employment levels are determined in such labor markets, we shall assume, for simplicity, that the unionized workers sell their services to unorganized, competing employers. We shall leave to the next section the analysis of what happens to wage and employment in a labor market where organized labor faces organized employers.

The tricky part about analyzing unionized labor markets is that there is no single assumption we can make about what it is that the union is trying to maximize. For instance, when dealing with capitalist firms we postulated that their main objective is to maximize profits. But for a labor union there is no simple equivalent of profit. Instead, there are two goals, one to seek higher wages and, the other, to seek more jobs. Often, these two goals conflict. The final equilibrium wage and employment, thus, depends on the attitude of the union leadership toward these two goals. Let us see what happens under these two different assumptions.

a. Employment Maximization: Point E in Figure 10.13 shows what the equilibrium wage and employment will be if the union wants to maximize employment. To see that W_0 and L_0 represent the employment maximizing wage and employment combination, all you have to do is to try some other wage rates. For instance, if the wage rate was W_1, then the employment would be given by L_1 on the demand curve. Granted that more than L_0 workers would be willing to work at this high wage rate, but the question is, how many workers would employers be willing to employ at that wage? Similarly, at W_2 the employment level will, once again, be L_1. The situation is now reversed. Employers would like to employ more than L_0 workers but the question is how many workers would be willing to work at that wage rate? You can try a few more wage rates until you are convinced that point E, where the demand and supply curves for labor intersect, is the employment maximizing point.

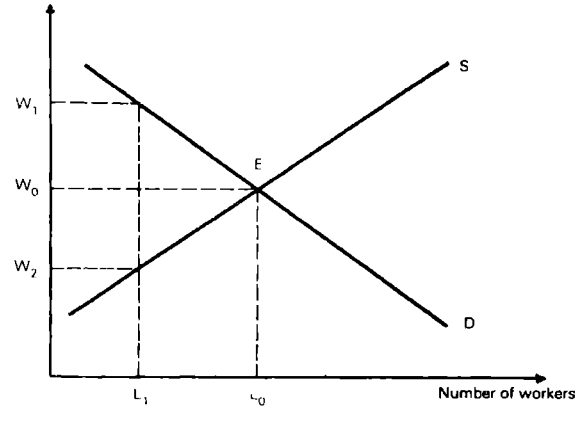


Figure 10.13

b. Income-Maximizing Wage: We know that a strong union that has the monopoly over the labor supply can fix any wage, but how many workers will be hired by the employers will be determined by the corresponding point on the demand curve. Since the total labor income is equal to wage x employment, the objective of the labor unions would be to fix such a wage that will maximize this amount. Let point I represent such a point on the demand curve in Figure 10.14.

The problem with fixing the wage at W_1 to maximize labor income ($= W_1 \times L_1$) is that it implies less than maximum possible employment. People who get the jobs at this high wage of W_1 are lucky but the other union members who find themselves unemployed because of this high wage are going to complain. In fact, at W_1, we can see from Figure 10.14, L_2 workers will be willing to work and the union leaders will have a tough time preventing them from undercutting the union wage of W_1 to prevent their own unemployment. One way out may be to ration the available work among all workers by setting a limit to the number of hours worked per day.

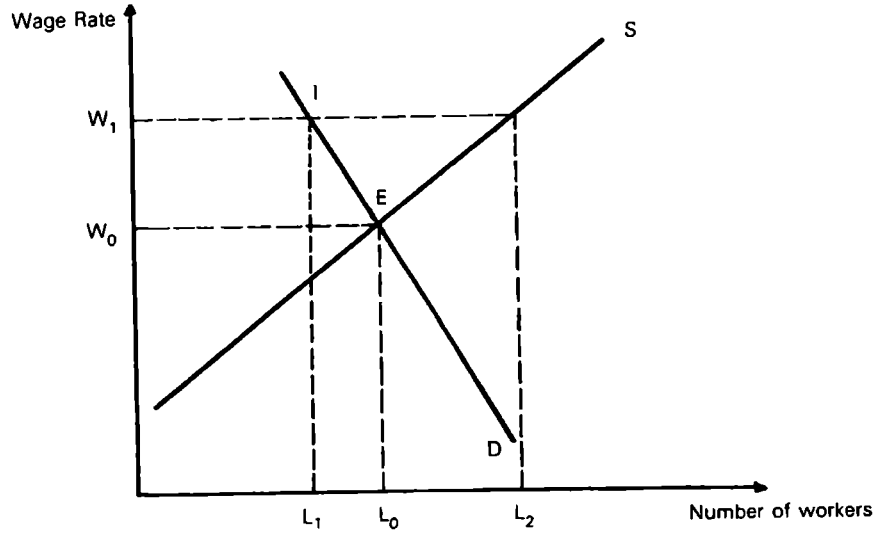


Figure 10.14

Bilateral Monopoly

We now come to the case in which an organized labor force, under a union, faces a monopsonistic employer or organization of employers. Such an economic confrontation between monopolists on both sides of the labor market is called a **bilateral monopoly.** Since no group has absolute power, the wage and employment decisions are usually hammered out in collective bargaining sessions between the union and the employers. It is difficult to predict the outcome of such negotiations *a priori.*

However, the above discussion should not be taken to mean that economic theory has nothing to say about such a situation. Even though economic theory may not be able to predict the precise outcome of the negotiations, it can still give us valuable information about the range within which the final outcome will lie. In Figure 10.15 we can see this range. If the monopsonist employers had their way, the wage would be W_m and employment L_m.

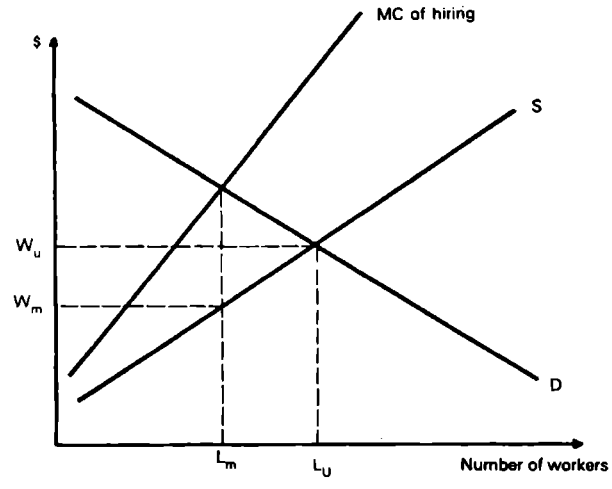


Figure 10.15

Whereas, if the employment maximizing union had its way, employment would be L_u and wage, W_u. Therefore, W_u - W_m and L_u - L_m represent the ranges within which the final outcome of wage and employment will lie.

Finally, we must mention a very important factor involved in analyzing the process of wage determination in labor markets where both sides are organized. There is the possibility that the employers might turn down union demands, and counter them with a "take it or leave it" proposal of their own. When this occurs, the outcome of the bargaining process is impossible to predict. The failure of negotiations between PATCO, the air traffic controllers' union, and the government during the Reagan Administration is a good example of this. Our analysis can identify only maximum and minimum limits within which a settlement can take place, but the exact outcome depends on the relative bargaining strength and skill of the two sides involved.

Before we end this chapter, let us consider a case which demonstrates the effect of minimum wage legislation in a monopsonistic labor market.

CASE III: Effects of a Minimum-Wage Law in a Monopsonistic Labor Market

In the small nation known as Beracia, 80 per cent of copper mining is done by the Beracian Copper and Nickel Corporation (BCNC). One of the BCNC mines is located in the small, remote township of Olam. Being the only employer in that area, it has enjoyed considerable monopsonistic powers in the labor market for copper miners in Olam and has, traditionally, paid extremely low wages.

To mitigate the poverty of the copper mine workers, the government of Beracia has legislated a minimum wage law requiring all copper mine owners, including BCNC, to pay a minimum wage of W^* per worker. The local newspaper, The Olam Chronicle, has opposed the imposition of this minimum-wage law on the grounds that it will cause substantial unemployment in the town, making some workers well-off at the expense of others. Evaluate the editorial position of this newspaper.

Analysis

The editorial position of the Olam Chronicle would have been sound if the labor market was a perfectly competitive one (see CASE II). However, the imposition of a minimum wage in a monopsonistic labor market is a different ball game.

In Figure 10.16, we begin by showing the monopsonistic wage and employment levels W_m and L_m, before the imposition of the minimum wage. Now suppose a minimum wage of W^* is installed, and it requires that for each worker hired, BCNC has to pay W^*. In other words, the new MC of hiring workers is a horizontal line as shown in Figure 10.16. And since we know that employers will hire every worker whose marginal revenue of hiring (given by the demand curve) is more than the marginal cost of hiring, the equilibrium will be at point E_1. At this equilibrium, wage and employment are clearly more than before, thus showing the unsoundness of the Chronicle's editorial.

However, this does not mean that this is the only possible outcome. For instance, if the minimum wage had been fixed at W_1 instead of at W^*, the level of employment, L_1, would be lower compared to that in the unregulated monopsonistic case. Thus, if the minimum wage is fixed at any level above the W mark, the result is bound to be a decrease in employment, and under those circumstances, the editorial position of the Olam Chronicle would be justified. However, the editorial claiming the inevitability of a decline in employment cannot be considered sound as it overlooks the possibility of increased employment.

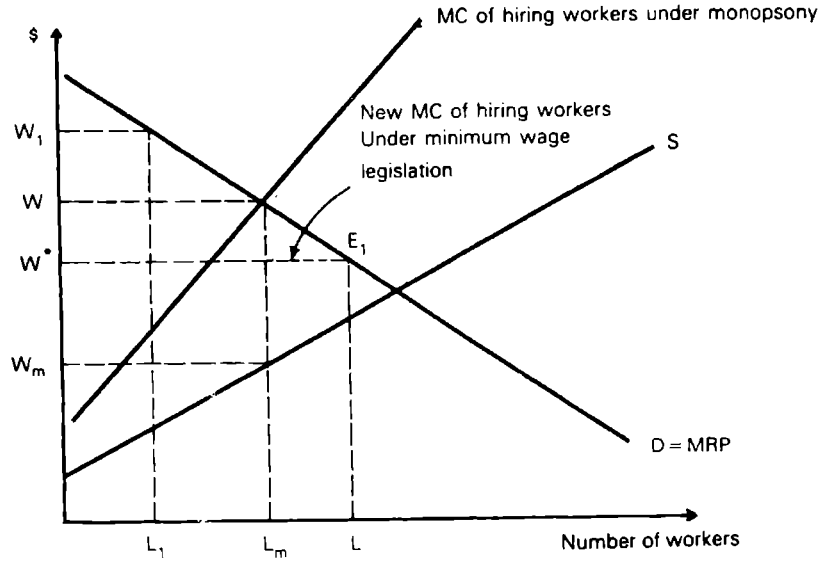


Figure 10.16

Questions for Class Discussion

Imagine that you are working for a very small public enterprise which manufactures bread. It was the first enterprise of its kind in an underdeveloped region of India. The main purpose was to provide inexpensive and nutritious (vitamin enriched) bread to the masses. Since the western style bread was not part of the local diet, no other enterprises were set up initially.

With time, people's tastes changed and bread became a very popular item. Several small private enterprises have been set up and the competition in the market for bread in this region is fierce. The Government has decided that there is no need for the public enterprise to sell this enriched bread at a loss. The labor unions have warned that closing the enterprise would be politically suicidal for the local politicians. Therefore, the decision has been made to run the public enterprise with the sole objective of generating as much profit as possible from its operations.

It is known in the ministry that you know economics. The Secretary to the government wants you to advise the manager as to how many workers to hire in order to maximize profits. You are supplied with the following data:

Number of Workers	Total Output/hour
1	6
2	13
3	22
4	33
5	41
6	46
7	49
8	51
9	51
10	48

(a) Assuming perfectly competitive markets with the price of bread at $1, and the wage rate at $5/hour, what would you advise?

(b) Suppose that due to a stringent regulation relating to nutritional standards, the cost of producing the bread becomes unremunerative. Most of the private enterprises move out of the market, leaving the public enterprise with significant monopoly powers in the bread market. The new data is as follows:

Number of Workers	Total Output/hour	Price
1	5	1.70
2	13	1.50
3	22	1.35
4	33	1.20
5	41	1.14
6	46	1.07
7	49	1.00
8	51	0.95
9	51	0.95
10	48	1.02

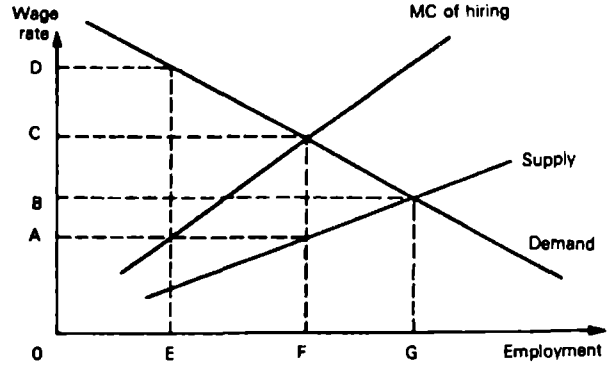
What will be your advice regarding the number of workers to be hired?

(Remember the latest instructions require you to act as a profit maximizer... this is referred to as the RECOGNITION LAG, i.e., the time that passes before the government realizes that there is a new situation and a corrective policy action is required.)

Can you think of other such lags involved in public policy making?

Problems for Practice

Answer questions 1 through 4 on the basis of the following diagram:



1. If this labor market is purely competitive, the wage rate and level of employment respectively will be:
   a. OA and OF
   b. OB and OF
   c. OB and OG
   d. OC and OE
   e. OD and OE

2. If this labor market is monopsonistic, the wage rate and level of employment respectively will be:
   a. OA and OF
   b. OB and OF
   c. OC and OF
   d. OD and OE
   e. OB and OG

3. Now assume that an union is formed to bargain with the monopsonistic employer of question 2. To what level can this union increase the wage rate without causing the number of jobs to decline below that which the monopolist would otherwise have provided?
   a. OA
   b. OB
   c. OC
   d. OD
   e. OD minus OA

4. If the union of question 3 seeks to maximize the number of jobs available for its members, what wage rate will it seek to impose on the monopsonist?
   a. OA
   b. OB
   c. OC
   d. OF
   e. OD minus OA

CHAPTER ELEVEN

EXTERNALITIES

CHAPTER ELEVEN

EXTERNALITIES

Let us begin this chapter by reviewing what we have accomplished in the previous ten chapters and what needs to be done next (and, of course, why it needs to be done). In Chapter One, we said that the resources at the disposal of any society are limited and that the wants of the society are generally unlimited. Because of the resulting scarcity of resources, a society cannot satisfy all its wants. Therefore, a way has to be found to decide which of the several wants will be satisfied (the questions of WHAT?, HOW? and FOR WHOM?). In other words, a way has to be found to allocate scarce resources among the numerous wants of a society. One way is to let the prices of goods and resources, determined in the markets, decide how the resources will be allocated. In the previous ten chapters, therefore, we examined how goods and resource prices are determined in various types of markets.

While examining the determination of prices of consumer goods and resources, we observed that, in general, prices determined in competitive markets allocate resources efficiently while prices determined in imperfectly competitive markets lead to an inefficient allocation of resources. For instance, on page 153 of this book, we have shown why prices determined in a perfectly competitive goods market will lead to an efficient allocation of resources. On the other hand, on page 178 we have shown why an imperfectly competitive market (monopoly) leads to inefficiency in the allocation of resources. And since resources are scarce, very few societies can tolerate this inefficiency in the allocation of resources. Therefore, they take a number of policy measures to correct these inefficiencies.

However, imperfectly competitive markets are not the only reason why scarce resources may be allocated inefficiently. There is another very important reason, which our discussion so for has over looked. And since resources are scarce, we cannot afford to ignore any factor which may create inefficiencies in the allocation of our scarce resources.

To show this source of inefficiency, I will have to briefly recapitulate the reasoning given on pages 153-155 to show why perfectly competitive markets lead to an efficient allocation of resources. Figure 11.1 shows a perfectly competitive market in equilibrium, with P_0 and Q_0 as equilibrium price and quantity, respectively. At the equilibrium quantity Q_0, the utility to the consumers of additional units (or willingness of consumers to pay for additional units) of a good, as reflected in the demand curve, is equal to the cost of producing additional units of the good, as reflected in the supply curve. That is, at equilibrium, the extra or marginal benefit (utility, satisfaction) derived from consuming the last unit of output is just equal to the extra or marginal cost of producing that last unit.

Now to show that Q_0 represents the "right" or efficient allocation of resources, all one has to do is to take two points, such as Q_1 and Q_2 in Figure 11.1, and show that the society will be worse off at all such points.

Let us start with Q_1. The extra cost of producing the Q_1^{th} unit of the good to the society, Q_1B, is greater than the extra benefit (utility) to the society of consuming the Q_1^{th} unit of the good, which is Q_1A. Therefore, its production imposes a net cost on the society. This is true for all units between Q_0 and Q_1because for all of them the extra or marginal cost of producing is more than the extra or marginal benefit of consuming. We know this from the fact that the supply curve (reflecting marginal costs) lies above the demand curve (reflecting marginal benefits) for units in excess of Q_0. Therefore, these units should not be produced. On the other hand, for the Q_2^{th} unit, the extra cost of producing, Q_2C, is less than the extra benefit, Q_2D, of consuming it. There is a net gain or benefit to the society in producing it. This is true for all units between Q_2 and Q_0. This is so because for these units of output the demand curve (reflecting marginal benefits) lies above the supply curve (reflecting marginal costs). This net gain is obviously foregone if production involves only Q_2 units of output. Therefore, these additional units should be produced. The crux of the above discussion is that the society loses by producing more than Q_0 or less than Q_0. Thus Q_0 represents the output which ensures the "just right" (or "efficient" or "optimum") allocation of the resources of the society.

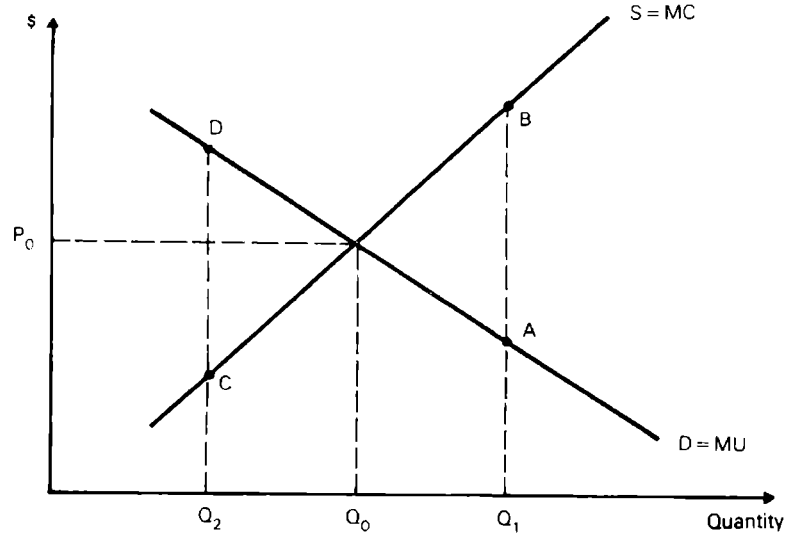


Figure 11.1

The above reasoning is commonly used to show that the pursuit of individual interests in a perfectly competitive market will automatically lead to an efficient allocation of resources. However, **it makes a very important hidden assumption that all the benefits and costs associated with the production and consumption of each product are fully reflected in the market demand and supply curves.** For instance, in the previous paragraph we said that Q_1B in Figure 11.1 reflects the extra cost to the society of producing the Q_1^{th} unit of a good. But since the supply curve in the market reflects extra (or marginal) cost of producing the Q_1^{th} unit to the producers, it implies that there is no difference between the extra cost to the society and the extra cost to the producer of producing the Q_1^{th} unit. Now, this is a strong assumption to make. In real life situations, one can think of a large number of cases where the cost of producing a product is different for private producers and for society. The most obvious example is of a private producer of some chemical. The costs of producing the chemical for a producer are the ones he has to pay for, such as wages, cost of raw materials, and cost of machines. And the supply curve reflects these costs. However, there are some costs borne by other members of the society which he doesn't have to pay. For instance, when the producer dumps toxic wastes into

a lake or river, swimmers, fishermen, boaters and the communities that get their water supply from it suffer costs which in a perfectly competitive market (with no government regulation) are not paid by the producer of the chemicals.

When we have a situation like this, is it appropriate to say that the market supply curve reflects the marginal cost to the society of producing the product? More accurately, it reflects only the costs borne by the producers (the private costs) and not the costs inflicted on others in the society (the social costs). Similarly, a distinction has to be made between private benefit and social benefit. The market demand curve reflects private benefit and not social benefit. Social benefits and social costs are also known as spillover benefits and "spillover costs." A spillover occurs when some of the benefits or costs associated with the production or consumption of a good spill over to a third party, i.e., to parties other than the immediate buyer or seller. You may also find spillovers being described as **externalities** because they are benefits and costs accruing to some individuals outside or external to the market of the product in question.

Since many contemporary economic issues, such as pollution control and environmental protection, involve the concept of spillovers and externalities, it is absolutely essential for us to study them. The tools acquired so far will not help too much and, hence, we have to acquire Equipment Set #6, which consists of the following concepts:

1. External (benefits) economies
2. External (costs) diseconomies

We have already alluded to them in our discussion, but the time has come to study this equipment set more rigorously. First, we will see what are the implications of these concepts. How do they modify the demand and supply apparatus? Then, we will examine their effect on the allocation of resources, and finally, study what governmental policies can be adopted to correct for their existence.

EXTERNAL COSTS (DISECONOMIES)

An external diseconomy of production occurs when an action taken by a producer results in uncompensated cost to others. For instance, when a petroleum refinery pollutes the air with smoke or a paint factory creates distressing odors, the community bears the spillover or the external costs for which it is not compensated.

The question we have to answer is, how does the existence of such external costs affect the allocation of resources? To answer this question, let us begin by examining the modifications that have to be introduced into the usual demand-supply apparatus to take into account the existence of external costs of production. In Figure 11.2, we show the market for tomatoes. Suppose farmers use chemical sprays on their tomato crops and then irrigate their fields, causing some of the pesticide to wash into adjacent properties and nearby lakes or streams. If this pesticide is absorbed by the marine life and works its way up the food chain, it can inflict a cost on other members of the society, including those who do not even consume tomatoes. Let us assume that all farmers generate external costs of $1 per pound of tomatoes.

When such spillover or external costs occur, that is, when producers are able to shift some of the cost due to production onto the community and not pay for it, their production costs are lower than would otherwise be the case. In other words, the supply curve, S_p, of the farmers in our example does not include or capture all the costs which can legitimately be associated with the production of the tomatoes. It understates the total cost of production as it shows the costs incurred by the farmers only and, therefore, lies below the supply curve,

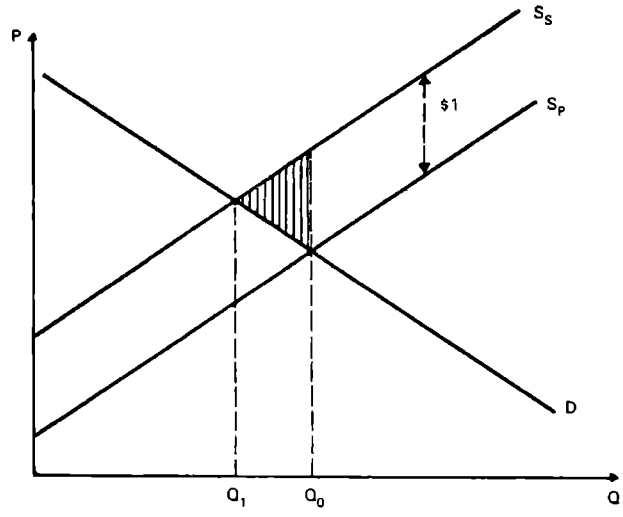


Figure 11.2

S_s, which would include all external costs inflicted on the society. This supply curve, inclusive of the external cost of $1 per pound, represents the true marginal cost of producing tomatoes.

As explained earlier, the optimum allocation of resources requires that the good be produced until the marginal cost of producing it is just equal to the marginal benefit of producing it. That means that output Q_1 should be produced to achieve efficient (or optimum) allocation of resources. This is so because S_s represents the actual marginal cost to the society of producing tomatoes and the demand curve D represents the marginal benefit (utility) of consuming tomatoes to the society. However, as we know in perfect competition the market equilibrium will be at Q_0, where the market demand meets the market supply curve. The result is, therefore, that the equilibrium output is larger than the optimum output Q_1. In other words, resources are over-allocated to the production of tomatoes. For each unit of output between Q_1 and Q_0, the extra cost to the society of producing tomatoes is greater than the extra benefit to the society. This is so because for these units the S_s curve (reflecting marginal costs to the society) lies above the demand curve D (reflecting marginal benefits to the society). There is a net loss to the society on each of these units, and the total loss to the society is shown by the shaded triangle.

EXTERNAL BENEFITS (ECONOMIES)

Externalities or spillovers may also take the form of benefits. The production or consumption of certain goods and services may confer social or spillover benefits on third parties or society at large for which payment or compensation is not required. For example, if I maintain my house and lawn, it benefits me and my neighbors by improving the value of their property. If you and your family are inoculated against a contagious disease, your neighbors share in the benefits since their chances of contracting the disease decline. However, they do not have to pay for the benefit they derive from your family getting inoculated.

The main question to be answered is, how does the existence of such external benefits affect the allocation of resources? To answer this question, we begin, once again, by examining the modifications that have to be introduced in the usual demand and supply apparatus to take into account the existence of external benefits. In Figure 11.3 we show the market for education, with D_p and S as the demand and supply curves of education.

Let us see what the D_p curve represents. We know from Chapter 2 that a demand curve represents the maximum willingness of the consumers to pay for a given quantity (Definition 2 of the demand curve). The willingness to pay for something depends on the benefits it confers on the individual or the utility it provides to

the individual. In the case of education, the benefit to the individual is in terms of increased future incomes and the sheer pleasure of intellectual stimulation. In Figure 11.3, P_0 represents the maximum willingness to pay for Q_0 amount of education. The maximum willingness to pay for Q_0 amount of education depends on the benefits this education is expected to confer on the individuals getting educated. But what about the benefits education confers on the society? For example, the economy as a whole benefits from a more versatile and more productive labor force, on the one hand, and smaller outlays in the area of crime prevention, law enforcement, and welfare programs, on the other. Significant, too, is the fact that political participation correlates positively with level of education. For example, the percentage of persons who vote increases with the level of educational attainment.

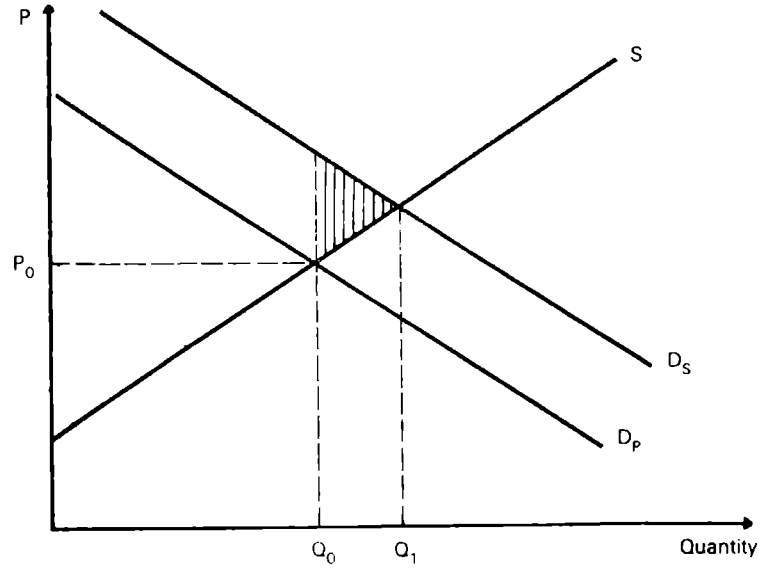


Figure 11.3

Thus the market demand curve for education D_p, which reflects only private benefits, understates the total benefits to the society from education. In other words, the market demand curve fails to capture all the benefits associated with the provision and consumption of goods and services which entail external benefits. Thus D_p in Figure 11.3 indicates the benefits which private individuals derive from education; D_s is drawn to include these private benefits as well as the additional spillover or social benefits accruing to society at large.

As explained earlier, the optimum allocation of resources requires that goods and services be produced until the marginal cost to the society of producing them is just equal to the marginal benefit to the society of producing them. Since D_p represents the marginal benefit to the society of having education and S represents the marginal cost to the society of providing education, the optimum allocation of resources would require producing education until Q_1. However, if the market for education were left to its own, the equilibrium would be at Q_0, where the market demand and supply curves intersect. The result is that resources are under-allocated in providing education if the free market is relied upon to allocate resources. For each unit between Q_0 and Q_1 the extra benefit to the society of education is greater than the extra cost to the society of providing it. This is so because, for these units, the D_p curve (reflecting marginal benefits to the society) lies above the S curve (reflecting marginal costs to the society). There is a net gain to the society on each of these units. Therefore, by producing Q_0 instead of Q_1, the society will forego the net gain on all these units, and the total loss would be equal to the shaded area.

On the other hand, by increasing production to Q_1 it can increase the net welfare of the society by the amount represented by the shaded area.

From our general discussion of external costs and benefits two very important generalizations emerge:

1. When external costs are significant, the market will **over-allocate** resources to the production of that good or service. The equilibrium output will exceed that output which represents efficient allocation of resources.

2. When external benefits are important, the market will **under-allocate** resources to that commodity. The equilibrium output will fall short of the optimum output.

Since a large number of goods and services involve external costs and benefits, the next logical question is — what actions might the government take to correct the over-allocation and under-allocation of resources resulting from these external costs and benefits associated with certain goods and services?

GOVERNMENT POLICIES TO CORRECT FOR EXTERNAL COSTS AND BENEFITS

Policies to Correct for External Costs

The most glaring examples of external costs are the many ways in which our environment is being polluted. The air we breathe, the water we drink, and the soil we live on are being polluted at an unprecedented rate. We are sitting on a time bomb which is ticking very fast. Discharge of plant nutrients into lakes is stimulating the growth of weeds and algae to the point where lakes fill up with solid matter. Heavy discharge of organic sewage into rivers is reducing the oxygen content of the water to the point where they are becoming "dead" streams, incapable of supporting fish or other forms of life and incapable of self-purification. Atmospheric pollution in some of the larger cities could reach the point at which life in these areas would become impossible.

It is obvious that something has to be done to control this onslaught on our habitat. But before asking what can be done to control pollution, it is necessary to define our objectives. Since pollution is bad, should the society aim for complete elimination of any form of pollution? It is, of course, very tempting to suggest that we should aim for a completely pollution-free society. However, the issue is not so simple. Problems arise from the fact that pollution is usually a by-product of some activity which is useful for society. For instance, a chemical factory produces toxic waste as a by-product of useful chemicals. An automobile, while producing harmful gases, also provides useful services to its users. Therefore, complete elimination of all forms of pollution would imply also sacrificing the production and consumption of many goods and services that seem necessary if we are to attain and sustain the high standard of living most of us desire. In other words, pollution has both costs and benefits attached to it. By eliminating pollution, we eliminate both benefits and costs. So, it clearly does not make sense to eliminate all pollution without regard to the benefits sacrificed. Let us illustrate this problem. In Figure 11.4 we show the market for a chemical widely used in medicines.

For each unit of this chemical produced there is X amount of pollution associated with it. From our analysis in the previous section, we know that optimum resource allocation requires producing Q_1 amount of this chemical, and not reducing its production to zero. This is because for all units between zero and Q_1, the marginal benefit to the society of producing this chemical is more than the marginal cost (inclusive of pollution) to the

society of producing it. Therefore, optimum allocation of resources implies that we are prepared to tolerate some amount of pollution because we feel that this chemical has some benefits which we value more than the costs of the pollution created. The total cost of pollution associated with the optimum allocation of resources is ABCD. And the answer to our original question about whether to eliminate pollution completely is; we should not eliminate pollution completely but only to the level associated with the production of Q_1 units of the chemical.

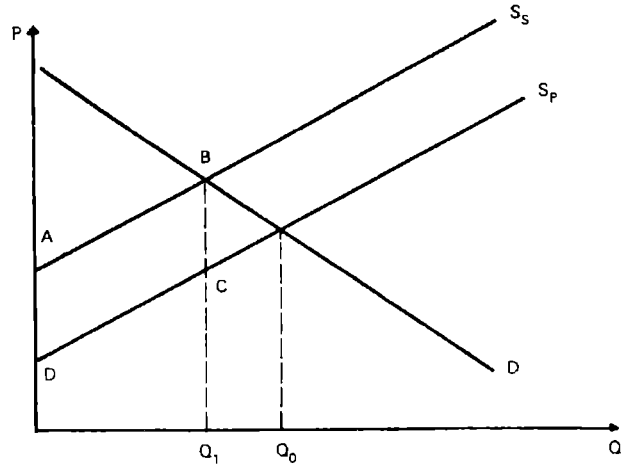


Figure 11.4: Optimum level of Pollution

The next question then is, what policies can the government formulate to reduce the level of production to Q_1 from Q_0, the free-market equilibrium output? The following are some of the commonly adopted policies to reduce pollution to an optimum level.

Moral Persuasion: The basic idea behind this approach is to encourage or exhort people to consider social costs along with private costs while making their decisions. The hope is that this will make the market supply curve look like S_s, and the market equilibrium will be automatically set at Q_1.

This approach has the advantage of being the least disruptive to the market system and of educating and sensitizing people to the nature of environmental problems. However, it is usually ineffective because of two main reasons. First, it is difficult to change basic human nature —making people put society's interest before self-interest. Second, it is often difficult to determine what is best for the society. If we are to choose common social interest over self-interest, we must have some way of evaluating that social interest.

Anti-pollution Legislation: One of the most direct solutions to the pollution problem is to pass legislation against it. Cities may pass laws which prohibit or control pollution. In that case, the firms producing chemicals will have to bear the costs of properly disposing of toxic wastes; they may have to buy equipment to neutralize toxins. Such legislation forces the chemical firms, under threat of legal action, to bear all costs associated with production. In other words, external costs can be made internal costs by such legislations. The effect of this is to shift the market supply curve S_p toward S_s as in Figure 11.4. Once the market supply curve reaches the position represented by S_s, the market equilibrium is automatically attained at Q_1.

This approach has the advantage of producing immediate, visible results. Waiting for the markets to adjust to incentives and disincentives and moral persuasion may be too slow, while enforcing direct legislation can be

done more quickly. However, it has some disadvantages. First, legislation calling for blanket regulations may create inefficiencies. For instance, if every chemical factory has to build its own waste treatment facilities, there may be unnecessary duplication of effort. A 1967 study of pollution in the Delaware estuary showed that it would cost $100 million to clean up water if each polluter did so on an individual basis. But one treatment plant, placed down-stream, would cost only $61 million while obtaining the same results.

Another objection to this approach is the expense and difficulty of enforcement. A large bureaucracy needs to be created to administer the program. There will be additional costs in prosecuting offenders once caught. Some offenders may decide to pay an occasional fine rather than mend their ways. Finally, this regulatory agency may become a captive agency of particular special interest groups.

Special Pollution Taxes: Another, somewhat less direct, action is for the government to levy a special tax which approximates the external costs per unit of output. In effect, through this tax, the government tries to push back onto the polluting firm those external costs which the private firms would tend to ignore. It is another way of internalizing the external cost. Suppose the government estimates that the pollution created per unit of output is X, and it imposes a tax on the chemical industry, as shown in Figure 11.4. The result would be that the private supply curve of this chemical industry will shift up to the position indicated by S_s. The equilibrium in the market will be Q_1, and the existing over-allocation of resources to this industry will be corrected.

This policy has several advantages. It is relatively easy to administer, since all we have do is find out the total output of the firm. It provides the largest polluter with the greatest incentive to reduce pollution. And it generates revenue for the government, which can be used to further clean up the environment.

However, it is sometimes difficult to estimate appropriate charges or taxes, and miscalculations, however slight, can have very serious consequences.

Having examined three major policy approaches toward pollution, the question arises as to which one is the "best"? We have seen that each policy discussed has its particular advantages and disadvantages, and it would be naive to claim one policy as "best" for all situations. The "best" policy will depend on the nature of the product, the environment, and the efficiency of the administration involved.

How Much Environmental Cleanliness?

In the previous section, we examined the issue of preventing the pollution from crossing optimum levels in the future. But what about existing pollution? Should we leave it and concentrate on controlling future levels of pollution? Or should we clean up the environment completely?

Let us briefly see what our economic analysis tells us about these questions. Cleaning up the environment has both a cost and a benefit. Therefore, we should clean our environment only as long as the benefit of doing so is greater than the cost. In Figure 11.5, let MB reflect marginal benefit of cleaning the environment and MC reflect the marginal cost of doing so. It should not take you too much effort to realize that the desired amount of cleanliness is represented by Q^*. If we tried to clean up beyond that point, then the extra cost would be more than the extra benefit of doing so.

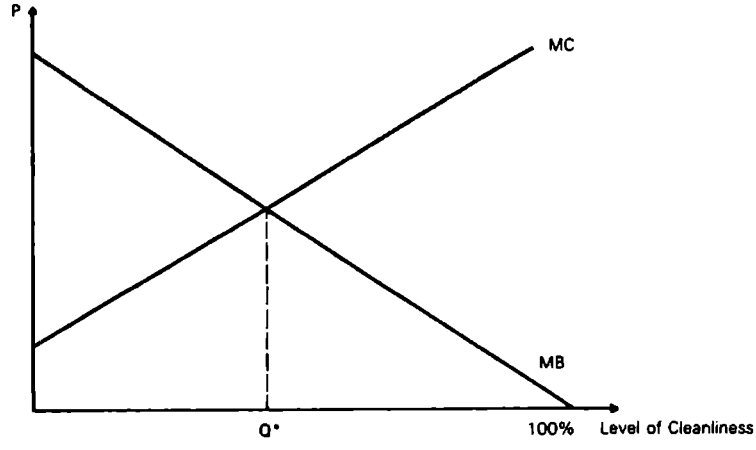


Figure 11.5: Optimum level of Cleanliness

Policies to Correct for External Benefits

As shown earlier, whenever substantial external benefits are associated with a good or service it tends to be under-produced if left to the market forces. In other words, there is an under-allocation of resources in goods with substantial spillover benefit. To show what government policies can be implemented to correct this under-allocation of resources, let us examine the case of education, the classic example of a service with substantial external benefits. Figure 11.6 shows the market for education. If the market is left on its own, the equilibrium level will be Q_0 amount of education. However, as we have shown earlier in the chapter, the optimum amount is Q_1. Therefore, the aim of the government policy should be to increase the amount of education provided from Q_0 to Q_1. The following policies are usually adopted to achieve this goal.

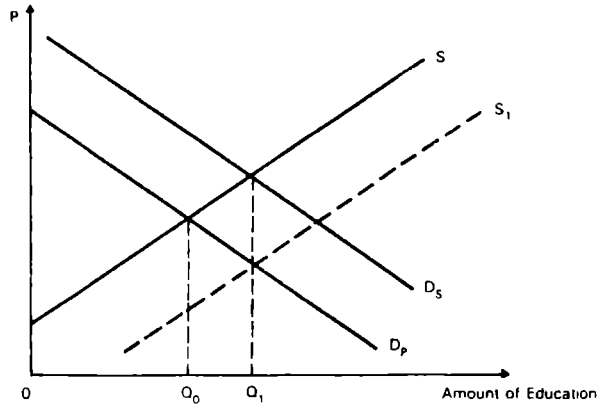


Figure 11.6

Subsidies to Schools: Subsidies are diametrically opposite of taxes; taxes impose an extra cost on producers, whereas subsidies provide extra revenue to them. It is possible for the government to provide a subsidy for

each student a school accepts. The effect of this policy is to shift the supply curve of education from S to S_1. This implies that the equilibrium in the market will be at Q_1, the optimum amount.

Scholarships, grants and other forms of financial aid: The effect of such financial aid schemes is to boost the incomes of the students and their parents. We know that an increase in income shifts the demand curve to the right. Thus the demand curve D_p will shift toward D_s, bringing the market equilibrium into accord with the optimum Q_1.

Government ownership: Another alternative open to the government is to simply finance or run its own schools and colleges. This is precisely the idea behind the operation of public schools and state universities. This way the government can ensure the optimum amount of education, Q_1, with certainty.

As with the policies to correct for external costs, each of the above three policies has its advantages and disadvantages. Which policy is "best" will usually depend on many factors. It is difficult to say on a *prima facie* basis which one will be the best policy. A knowledge of the specific context is essential.

What we have said in the case of education applies to all goods and services which have large spillover effects.

Problems for Practice

1. Externalities are:
   a. Events that are external to, or outside of, the economy.
   b. Costs absorbed by private producers.
   c. Actions taken by firm to reduce their costs.
   d. The difference between social costs and private costs of market activity.

2. Social costs are:
   a. The full resource costs of an economic activity.
   b. Usually less than private costs.
   c. The costs of an economic activity borne by the producer.
   d. Incurred only by firms in a socialist economy.

3. Private costs are:
   a. Costs borne by a third party as a result of pollution activities of producers.
   b. Externalities
   c. The costs of an economic activity directly borne by the immediate producer or consumer.
   d. Typically greater than social costs.

4. Which one of the following costs includes externalities?
   a. Private costs.
   b. Social costs.
   c. The firm's marginal cost of production.
   d. The firm's average total costs of production.

5. When social costs differ from private costs:
   a. The production process should be permanently stopped.
   b. External costs exist.
   c. Social welfare is maximized.
   d. The market mechanism leads to a desirable allocation of resources.

6. In order to maximize social welfare, the firm's production of a certain good should occur at the level of output where:
   a. Price equals social marginal revenue.
   b. Social marginal cost equals the firm's marginal revenue.
   c. Marginal revenue equals price.
   d. All pollution is entirely eliminated.

7. The optimal amount of pollution prevention is generally between zero and 10%, but could be zero if:
   a. the marginal cost of prevention is zero.
   b. the marginal cost of prevention is above zero but below the marginal benefit of prevention.
   c. the marginal cost of prevention exceeds the marginal benefit of prevention at some levels of prevention.
   d. the marginal cost of prevention exceeds the marginal benefit of prevention at all levels of prevention.

8. It would be appropriate to eliminate all pollution in an industry only if:
   a. the pollution is harmful to human health.
   b. anti-pollution measures are costless.
   c. marginal social benefit is less than marginal private benefit.
   d. government costs are all direct costs.

9. If a firm's net marginal social benefit exceeds marginal net private benefit, the appropriate government policy is likely to be:
   a. a prescriptive rule
   b. an effluent charge
   c. a subsidy
   d. a price ceiling below the market level.

10. If at the existing level of pollution prevention, the marginal cost of prevention exceeds the marginal benefit of prevention, the government should:
    a. raise effluent taxes.
    b. decrease pollution control activities.
    c. increase pollution control activities.
    d. prosecute more polluting firms.

CHAPTER TWELVE

NORMATIVE ECONOMICS

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NORMATIVE ECONOMICS

The general style of this book so far has been that of a repair manual, and we have tended to treat economists as mechanics. However, this is not strictly true. Economics is much more than studying a repair manual, and economists are not just mechanics. If my car breaks down and I take it to a mechanic, chances are that his diagnosis will be exactly the same as that of another equally qualified mechanic. If there is one mechanical problem there should be only one mechanical solution. On the other hand, if you ask two equally eminent economists to give advice on a particular problem, there is a good chance that they will differ from each other.

The questions which come naturally to the mind are, why is there so much disagreement among economists? How is such disagreement possible? Isn't economics a science? The answer to these questions lies in the distinction between the positive and normative aspects of economics. As mentioned in Chapter 1, positive economics consists of statements, assertions or theories that are concerned with what is, was or will be. Normative economics is concerned with what ought to be. For instance, the question of what determines the level of prices falls under the realm of positive economics, whereas, the question of what ought to be the level of prices is a normative issue. While every economist will agree that prices in a competitive market are determined by the interaction of market demand and supply, there will be a lot of disagreement about what the price level ought to be. Some may contend that the prices are too high and that the government should put a ceiling on them. Others may argue that high prices are necessary to limit the consumption and increase the quantity supplied. It is in the very nature of normative issues that there will be disagreements. People will have different opinions on questions about what ought to be, depending on their ideological biases. However, in our discussions so far, we have been concentrating on the positive aspect of economics and have neglected the normative aspect. Therefore, the main purpose of this chapter is to rectify this imbalance in our treatment of microeconomics. This chapter will try to show how economists tend to mix economic analysis and their own ideological biases.

To achieve this objective, we will begin with a summary of the salient characteristics of the main ideologies of the contemporary world. Then we will examine a case which shows that the differences in economic logic and interpretation of evidence are not so much a reflection of the ability of economists as they are of the expression of their strongly held social and political opinions.

THREE MAIN IDEOLOGIES

The most commonly used categories to classify various economists and economic theories are: Conservative, Liberal and Radical. These are the labels used by journalists to classify all economists and their

theories. Though these broad categories are easy to use, they are very hard to define. The reason for this is that each label hides a number of differences by putting them under one umbrella. For instance, there is not one official conservative position on every single issue, nor are all conservatives always in agreement. The same is true for liberals and radicals. As the British economist Joan Robinson once observed, an ideology is like an elephant — you know one when you see it. Besides, we can know the difference between an elephant and a cow or a horse without having to use their definitions. Therefore, we will not attempt to give rigid definitions of the three main ideological positions, but merely to describe the salient characteristics of each.

It is also worth nothing that these labels—Conservative, Liberal and Radical—are used very differently in different countries. For Example, in the post-Gorbachev Russia, people supporting free-market reforms are being referred to as "radicals," whereas the old guard communists are being called "conservatives." Therefore, in the interest of brevity, we will discuss these issues only in the American context.

The Conservative Ideology

The foundation for modern conservative beliefs lies in the following two ideas:

1. A free market fueled by competitive zeal can solve all problems.
2. Individual rights and individual freedoms must be unlimited and uninfringed.

The philosophical underpinnings for their belief in the benevolence of *laissez-faire* economic systems is provided by the writings of Adam Smith. The following quotation from Adam Smith's **The Wealth of Nations** written in 1776, sums up the reasons for the conservative obsession with the free enterprise system:

> *Every individual endeavors to employ his capital so that its produce may be of greatest value. He generally neither intends to promote the public interest, nor knows how much he is promoting it. He intends only his own security, only his own gain. And he is in this led by an invisible hand to promote an end which was no part of his intention. By pursuing his own interest he frequently promotes that of society more effectually than when he really intends to promote it.*

Another common bond between conservatives is their emphasis on individualism and individual freedom. This sentiment is best reflected in the following quote from Milton Friedman, the modern-day *guru* of all conservatives:

> *We take the freedom of the individual...as the ultimate goal in judging social arguments....In a society, freedom has nothing to say about what an individual does with his freedom; it is not an all embracing ethic. Indeed, the major aim of the (conservative) is to leave the ethical problem for the individual to wrestle with.*

Most conservatives are not in full agreement on all issues nor are all as articulate or logically consistent as Friedman. However, a modern conservative can be more readily identified by what he opposes rather than what he stands for. For instance, conservatives are usually:

1. against social security
2. against food relief
3. against pure food and drug regulation
4. against compulsory licensing and qualifying of doctors
5. against minimum wages
6. against auto safety standards
7. against compulsory and free public schooling
8. against a post office monopoly

You may wonder if a person today can seriously be against all the things mentioned above. If you read Professor Friedman's works, or his regular column in **Newsweek** magazine, you will find every one of these provocative view points cogently defended.

A few years back, many people dismissed the conservative viewpoint as mere "crackpot economics" of "voodoo economics." Now it is a different story. The conservative ideology seems to dominate the seats of power in America.

The Liberal Ideology

In some ways, it is much harder to characterize a liberal than a conservative or a radical. There are some liberals who favor only a moderate level of government intervention and there are others who advocate a massive role for government planning in the economy. In between these extremes, there lies a whole liberal spectrum.

However, in spite of great diversity among the liberals, there is a unifying philosophy common and unique to them. This common bond among the liberals can be summarized in the following basic points:

a. First, all liberals are defenders of the principle of private property and the business system. These rights, however, are not absolute rights as we observed in the case of conservatives. Liberals believe that individual claims to property or ability to act freely in the marketplace are subject to the following second liberal principle.

b. The social welfare or the interest of the entire economy supersedes individual interest.

Therefore, to the liberals, government interference with, and occasional direct regulation of, certain aspects of national economy is perfectly justified so long as the benefit to the whole society from such intervention outweighs the harm done to individual rights. The forms of intervention may vary but they all have one common goal — to tinker and manipulate in order to produce greater benefits.

While conservatives believe that a free market can solve all problems, liberals believe it cannot. For instance, conservatives believe that the problem of inequality of wealth and incomes will be solved automatically as the benefits of the greater wealth created by free markets "trickle down" to the poorer sections of society. Liberals, on the other hand, believe that this will never come about automatically. The rich will get richer and the poor will get poorer unless government does something.

The following quote from John Maynard Keynes, the *guru* of modern-day liberals, summarizes the liberal attack on the conservative position:

> *"It is not true that individuals possess a prescriptive "natural liberty" in their economic activities. There is no "compact" conferring perpetual rights on those who Have or those who Acquire. The world is not so governed from above that private and social interest always coincide. It is not a correct deduction from principles of economics that enlightened self-interest always operates in the*

> *public interest. Nor is it true that self-interest generally is enlightened; more often individuals acting separately to promote their own ends are too ignorant or too weak to attain even these. Experience does not show that individuals when they make up a social unit, are always less clear-sighted than when they act separately." (John M. Keynes, "The End of Laissez-faire," in* ***Essays in Persuasion*** *1963, page 68.)*

With the onset of the Great Depression, the people's faith in the power of free markets to solve all economic problems disappeared. It was the concerted effort on the part of government which brought America out of chronic depression. More specifically, it was the New Deal policies of Franklin D. Roosevelt (FDR) which pulled America out of the Depression and laid the foundation of the modern "liberal" era. Ignoring the vicious attacks upon him from the conservative media, FDR, through a series of legislative acts and presidential decrees, laid the rules to ensure that "free markets" would work in the public interest.

It was natural that liberal policies gained popularity in the post-Depression era because they seemed to be successful. However, today their popularity is in doubt. Today, liberals are a lot less visible in the American economics profession, or at least, they are a lot less vocal in identifying theirs as a "liberal" position. The recent economic woes of America have been taken as the failure of liberal policies.

The Radical Ideology

While conservatives and liberals have their differences they both believe in the capitalist system, that is, in the existence of markets and the right to own and acquire property. The conservatives believe that an unregulated capitalist economy is the best answer to most problems, and the liberals believe that a regulated capitalist economy is required to maximize social welfare. However, the radical economists believe that all economic problems are a result of the existence of the capitalist system, regulated or unregulated. According to them, any system based on private property and competition cannot properly answer the fundamental economic questions of, WHAT, HOW and FOR WHOM. These economists argue that decisions should be made collectively, through government. Under capitalism, all of these fundamental decisions are made by elite groups of capitalists, who manipulate and exploit the masses of workers.

Furthermore, the radicals are pessimistic about the prospects for the reform of the capitalist system from within, for the simple reason that those who benefit most from the *status quo* dominate and control the system. They see corporate giants and government proceeding hand-in-hand to exploit, parasitically, the powerless workers who make up society. The radicals argue that the success of political parties in realizing and maintaining power depends upon the financial support of wealthy corporations. Therefore, government follows policies which are responsive to the needs of the big corporations.

The existence of giant corporations would not be that much of a problem if appropriate public surveillance through anti-trust or regulation were to yield socially satisfactory results. However, the regulatory commissions which are designed to control monopolies are ineffective for the simple reason that they are controlled by the very corporate monopolies they are supposed to regulate.

Similarly radicals allege that anti-trust legislation is applied half-heartedly—if at all—to large corporations. At best, blatant violations of anti-trust laws by giant corporations result in harmless admonitions or token penalties.

Radical economists have been around for some time. The roots of the radical critique of capitalism can

be traced back to Karl Marx (1818-1883), who is the intellectual guru of radicals. However, the recent growth of this movement can be attributed to two factors.

1. The radicalization of university campuses in the late 1960's, which occurred primarily in response to the Vietnam war and racial injustice; and,

2. the apparent inability of capitalistic society to solve a number of chronic problems such as unequal distribution of income, unemployment, inflation, deterioration of the environment and wasteful use of our resources.

The critics of radical ideology point out that the radical view of the economy is a grossly distorted caricature of reality and is inconsistent with common sense observation. For instance, critics ask, if the degree of labor exploitation depends directly upon the degree of monopsony power possessed by a firm, why is it that large corporations generally pay the highest wages? How can radicals reconcile the existence of social security and welfare systems, Medicare, and minimum wage legislation with their conception of the government as a handmaiden of giant corporations?

Finally, critics of radical ideology point out that the radicals are only attempting to demolish the existing system without actually providing a viable alternative.

This completes our brief survey of the three dominant economic ideologies of our times. Most economists can be classified as conservative, liberal or radical on the basis of our discussion so far. The time has now come to examine a case to see how the policy prescriptions of economists are affected as much by their training as by their beliefs. Two economists, using the same equipment sets, can come to different conclusions about the policies to be adopted to solve an economic problem, depending on their individual ideological persuasions.

In the following case we will not try to show which ideological position is the "right" one. Our endeavor is to give you a flavor of the real world where such disagreements are common. Hopefully, after this case you will be in a better position to appreciate the fact that economic policies are as much a matter of heart as of head.

CASE I: Automobile Safety — Whether to Protect or Not

For a long time in America, people believed that when a customer made a purchase, he became fully responsible for its use, misuse and safety. This philosophy was characterized by the admonition, *caveat emptor*: "Let the buyer beware." Under this doctrine, buyers could sue sellers for fraud or deception, but the burden of proof was on the buyer, and the seller was presumed not liable until proven guilty of fraud or some similar violation of law. The foundation of this approach lay in two assumptions. First, consumers know what is good for them. Second, competition between sellers will ensure that consumers get what they want without being cheated. For, if a seller tried to dupe a consumer, the consumer was likely to transfer his precious dollars to another seller, and as the word spread, so would other consumers.

This approach worked fine as long as the products involved were simple and there were large numbers of sellers vying for the consumers' dollars. But as life (and products) became more complex, all this changed. Nothing illustrates this change better than the question of automobile safety. An automobile is a fairly complex machine and not all consumers are in a position to evaluate which one is safe or unsafe. Further, there are only a few large sellers of automobiles and so consumers have limited choice.

The turning point in the history of consumer protection came in 1916, when a landmark case reversed the basic assumption of *caveat emptor*. In MacPherson vs. Buick Motor Company, the automaker was held liable for the personal injuries of MacPherson, who was injured when a wheel collapsed because it was manufactured with defective wood. The court concluded that a manufacturer should be held liable if a product is negligently manufactured. The entire field of product liability law was built upon this case and the concept of *caveat emptor* has disappeared from the scene. Today, writers in the field often refer to the new concept of *caveat venditor*: "Let the seller beware." The law of product liability has evolved into a complex legal field, with numerous government agencies protecting the consumer. The most well known area of operation of such agencies is automobile safety. Whatever the actual success in producing safer automobiles, the activities of the various governmental agencies and consumer groups have certainly had economic effects in the automobile industry. The question is, **Precisely what have these economic effects been?**

Analysis

As we shall see shortly, the answer to the above question depends on one's ideological persuasion.

The Conservative View: 1. The past few years' agitation by a few consumer-interest groups and rulings by a growing army of federal and state bureaucracies have forced automakers to undertake major engineering changes in car production. From seat belts to bumpers to impact resistant frames, auto manufacturers have had to meet a series of deadlines in installing safety devices. The net effect of this compulsory installation of auto safety equipment is an increase in the cost incurred by automakers. The impact of this is shown in Figure 12.1. The supply curve shifts to the left and the equilibrium price increases and equilibrium quantity decreases. Consumers lose out on two fronts. First, they are using fewer automobiles and, second, the higher prices are forcing them to forego some other products.

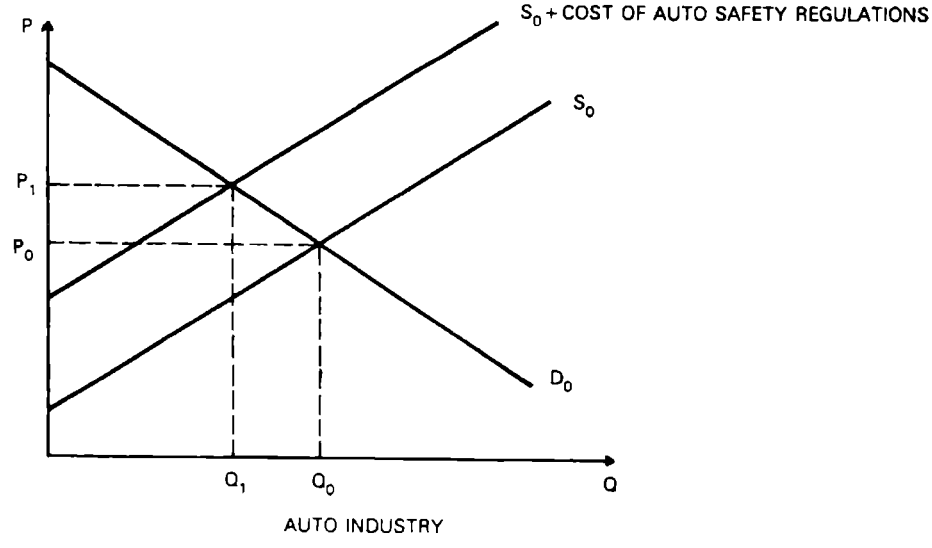


Figure 12.1

2. Since the larger automakers are able to adjust more quickly and efficiently to auto safety regulations, their hold on the market increases. This leads to the wholly undesirable effect of increasing industrial concentration.

3. In addition to these direct costs of regulation, the consumers and producers also have to bear the burden of increased taxes to finance the operation of these regulating agencies.

4. Government enforcement of auto safety standards denies consumers the right to own unsafe autos if they want to. The owner who wants safety should be able to buy it —collapsible steering wheels, padded dashboards, air bags, and the whole works. However, the consumer who values personal safety less than some other purchase should be free to make the choice. Conservatives would like to know the limits of such government protection. Will each home have a food inspector peering into the kitchen pots and checking for cholesterol and fat intake? Not only does the consumer have to bear the extra cost of rigid auto safety standards but he loses considerable personal freedom as well.

5. Finally, safer automobiles may not reduce accidents to the extent predicted. Some recent studies of the effects of auto safety devices and their impact on the overall accident and injury rate have produced several startling results. The evidence supports the contention that enhanced safety of vehicles leads to changes in the behavior of drivers. Housed in safer vehicles, drivers often become more reckless. Accident rates rise, highways become less safe for other drivers, and pedestrian deaths increase.

The Liberal View: 1. It is simply not true that consumers know what is good for them. In the famous Ford Pinto case, would it have been reasonable to expect that the consumer should have known about the fuel tank problem? By the time consumers became aware, it was already too late for the many who died because of their fuel tanks catching fire due to defective engineering.

2. Then there are social costs (external costs) — costs incurred by the society that are not paid by the sellers. The use of unsafe cars not only harms the user but inflicts injury on the society at large. It leads to higher insurance rates, greater court charges and heavier expenditures on roads, accident prevention, and enforcement. In Figure 12.2 we see that an unregulated market with social costs will lead to the production and consumption of Q_0 amount of automobiles. As we know from the previous chapter this implies overallocation of resources. The optimum allocation of resources would be at Q_1, and auto safety standards, by shifting the private supply curve to a higher position, helps us reach that optimum point Q_1.

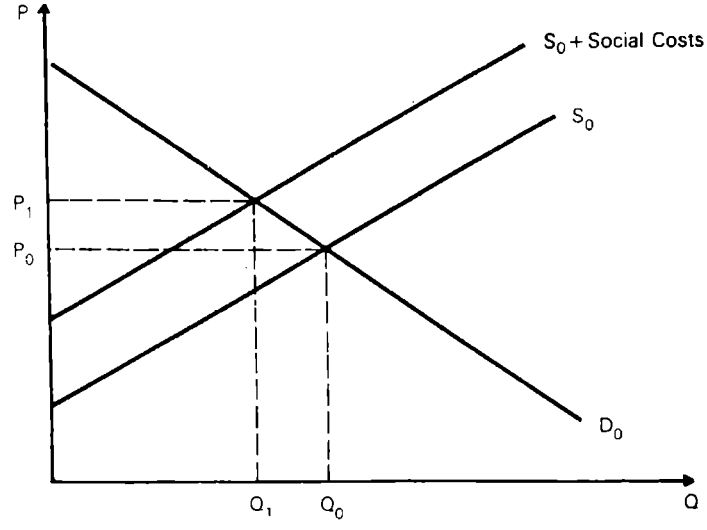


Figure 12.2

3. Most of the advertising undertaken by giant automakers is not informational. It attempts to manipulate consumer wants. And hence it has become essential for the government to intervene to protect consumers from false advertising and poorly made cars.

4. The increased cost to the consumers is extremely small compared to the benefits of safer autos to the society at large.

5. It is true that "recalls" ordered by the Highway Safety Bureau do reduce the profits of the automakers. However, the answer to this problem is better workmanship and engineering on the industry's part and not relaxed consumer protection.

The Radical View: 1. The capitalist economic system is based on making profits. Therefore, it is natural that the automakers will make unsafe automobiles as long as that increases their profits.

2. Conservatives and liberals may debate the merits of "free" and "regulated" markets, but the problem lies with the nature of the capitalist system itself. The giant corporations create artificial demands and teach the citizens that the ultimate goal of life is to obtain material goods; the more the better. It is unimportant whether auto safety will succeed or not, but what is more important is the question, what kind of a system do we have which produces these problems in the first place?

3. In spite of the constant complaints from automakers about the regulatory agencies, they are hard pressed to show real economic loss as a direct result of safety efforts. With the exception of current recessionary conditions, the profits of the automakers have been going higher and higher.

4. The real solution lies in changing the system, so that the users of goods have control over their production. That, of course, is possible only by abolishing the capitalist system.

The above survey of ideologies and their impact on policy prescription should make it clear that economics is both a science and an art. Therefore, to become a good economist, you have to go beyond the mastery of techniques and concepts embodied in equipment sets. As a word of advice to those who want to pursue economics further, I would like to end with the following words of John Maynard Keynes:

> *The study of economics does not seem to require any specialized gifts of an unusually high order. Is it not, intellectually regarded, a very easy subject compared with the higher branches of philosophy and pure science? Yet good, or even competent, economists are the rarest of birds. An easy subject, at which very few excel! The paradox finds its explanation, perhaps, in that the mastereconomist must possess a rare combination of gifts. He must reach a high standard in several different directions and must combine talents not often found together. He must be a mathematician, historian, statesman, philosopher—in some degree. He must understand symbols and speak in words. He must contemplate the particular in terms of general, and touch abstract and concrete in the same flight of thought. He must study the present in the light of the past for the future. No part of man's nature or his institutions must be entirely outside his regard. He must be purposeful and disinterested in a simultaneous mood; as aloof and incorruptible as an artist, yet sometimes as near the earth as a politician.*

ANSWERS TO END-OF-CHAPTER QUESTIONS

CHAPTER ONE

Answers to Problems for Practice

1. a	2. c	3. a	4. a	5. d	6. c
7. b	8. c				

CHAPTER TWO

Answers to Problems for Practice

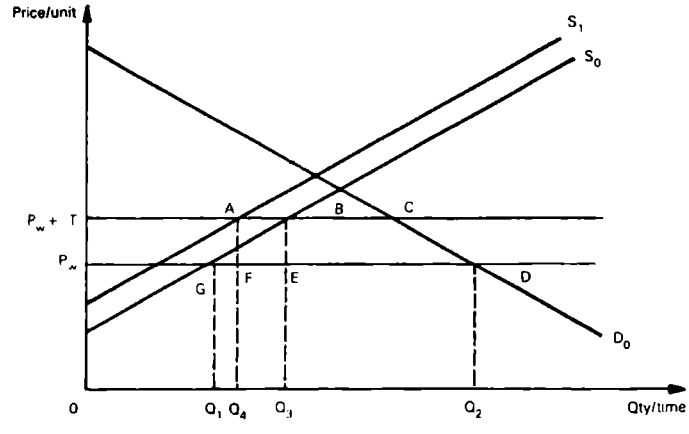
1. d	2. b	3. b	4. a	5. c	6. c
7. d	8. c	9. d	10. d	11. c	12. d
13. a	14. c	15. c			

CHAPTER THREE

Answers to Questions for Class Discussion

Question 1

The following figure illustrates arguments of the Malandian representative.



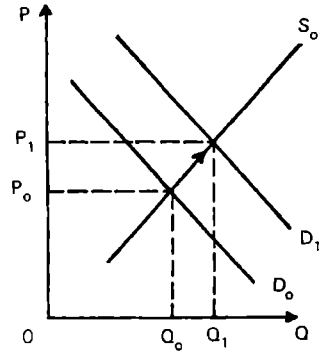
Malandian Imports

The result of imposing a tarrif is protection of the domestic market and an increase in the quantity supplied in Malandia from Q_1 to Q_3. This is the so called "production-increasing effect" of a tariff on a manufacturer's final output. This effect is the same for both less developed countries (LDCs) and the more developed countries (MDCs).

However, in the case of LDCs the anxiety to protect all markets leads to a tendency to impose tariffs on basic inputs as well. This causes the supply curve S_0 to shift left to S_1, which neutralizes the production increasing effects mentioned earlier. In the above figure the extent of neutralization is Q_3Q_4. In other words, the net (combined) effect of both forces is an increase in production equal to Q_1Q_4 in LDCs. The speaker suggests that since in MDCs usually there are very few tariffs on inputs, the same amount of tariff on a product provides much better protection in these countries. For example, a tariff equal to T provides protection to the extent of Q_1Q_3 in MDCs. Whereas, the same tariff would, typically provide much smaller protection equal to Q_1Q_4 in LDCs. On the basis of the above analysis, you can decide whether you want to agree with the speaker.

Question 2

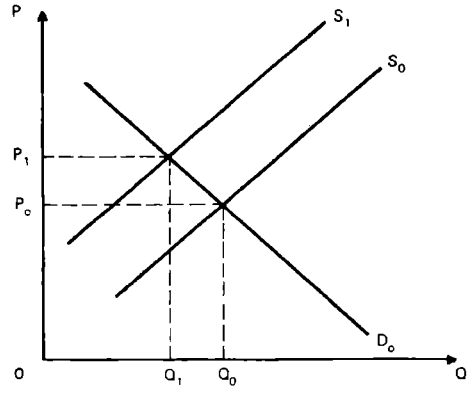
Mr. Radesari is obviously mixing up the "shift of the demand curve" with a "movement along the demand curve." He is observing two points of intersection between a constant supply curve and two different demand curves as depicted in the following figure:



Market for Gold

Question 3

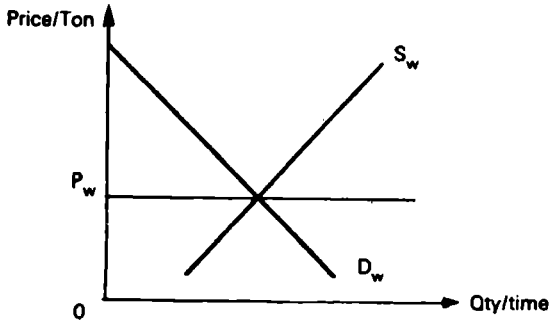
One cannot agree with this analysis completely. The first part is correct because a fishermens strike will, indeed, shift the supply curve to the left. This is due to reduction in the number of suppliers—a non-price determinant of supply. However, the rise in price form P_0 to P_1 will only lead to a lower **quantity demanded** and not lower **demand** as argued by the **The Ruritania Gazette.**



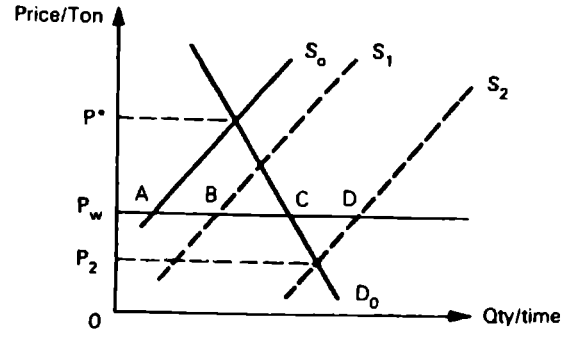
Fish Market in Ruritania

Question 4

The answers to this question are based on the following figure:



World Market for Steel



Domestic Market in Importania

S_0 – Original supply curve
S_1 – Supply curve including "normal" subsidy
S_2 – Supply curve including "too much" subsidy

(a) The subsidy will lead to:

1. a reduction in imports from AC to BC.
2. no change in the price of steel which will remain at the world level, P_w.
3. a higher level of domestic employment associated with greater level of domestic quantity supplied.

(b)

1. Workers will benefit from increased employment.
2. Producers will gain from higher profits.
3. Government will suffer due to the extra burden of subsidization.
4. Tax payers will have to bear the burden of taxation to raise money for the subsidy.

(c) If the government of Importania oversubsidizes then the net result will be an export equal to CD. Notice, however, the domestic price will still remain at P_w.

(d) If international trade is banned, domestic price will drop to P_2.

Government often do this to reduce the price of steel in order to promote industrial development and contain inflation.

Answers to Problems for Practice

1. c	2. c	3. c	4. a	5. c	6. a
7. b	8. d	9. a	10. b	11. b	12. c
13. c	14. b	15. a	16. a	17. c	18. b
19. d	20. c	21. c	22. e	23. a	24. c
25. d					

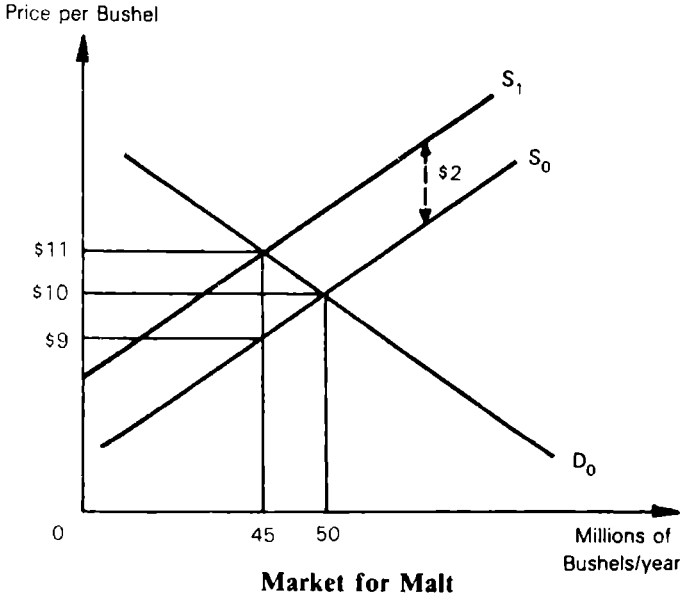
CHAPTER FOUR

Answer to Question for Class Discussion

Believe it or not the autonomous research institute is right. The issue under discussion is one of the classical theorems in the public finance literature. According to it, it makes no difference if the politicians in Kawambique label the tax a tax on the producer of malt or consumers of malt.

The most common mistake people make in analyzing the comparative effect of these two taxes is to involve the whiskey market. Malt is an input in the production of whiskey, and only if there is a change in the equilibrium price of malt, will there be a change in the equilibrium situation in the whiskey market. As we shall see below, the change in the method of collecting taxes makes no difference to the final outcome in the malt market.

Let us start with an initial equilibrium in the malt market with the price equal to \$10 per bushel and an equilibrium quantity of 50 million bushels per year. If we now put a tax equal to \$2 per bushel on the sale of malt, we get a situation depicted in Figure A and Table A. The explanation for the this has been given on page 52 and hence we need not repeat it here.



Market for Malt

Figure A

	Before Tax	After Tax
Distilleries (Consumers)	10	11
Farmers (Producers)	10	9

Table A

Now, suppose the tax is imposed on distilleries, who are the buyers of malt. That is, for each bushel of malt they purchase they have to pay a $2 tax to government. The key to analyzing this case is in understanding the reason why the demand curve for malt will shift down vertically by $2 at all levels as shown in Figure B.

	Before Tax	After Tax
Distilleries (Consumers)	10	11
Farmers (Producers)	10	9

Table B

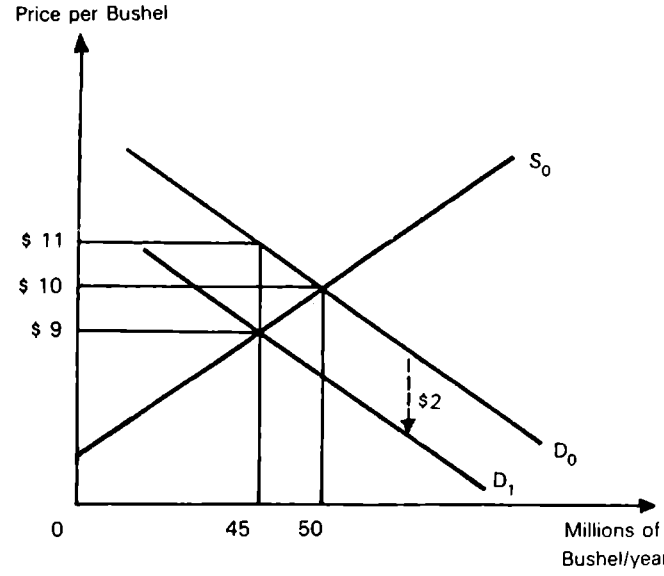


Figure B

The demand curve, as we have seen in Chapter 2 (page 21), shows the maximum amount people are willing to pay for a given quantity. If the government decides to collect $2 from the consumers of malt, then the consumers will be willing to pay $2 less to the farmers. Thus, D_1 represents what the distilleries are willing to pay the farmers when they are responsible for paying $2 on each bushel. Thus the equilibrium price of $9 in the market shows what distilleries pay the farmers. The total price paid by distilleries is $11, ($9 + $2). Thus the final incidence of the tax turns out to be the same in both cases.

If we assume a different set of elasticities of demand and supply, we will get a different distribution of the burden or tax, instead of an equal distribution. However, the distribution of tax burden will remain the same whether the tax is levied on distilleries or farmers. Since the final equillibrium price and quantity do not depend on the type of tax, there will be no change in welfare implications, equity and efficiency of imposing one or the other.

Answers to Problems for Practice

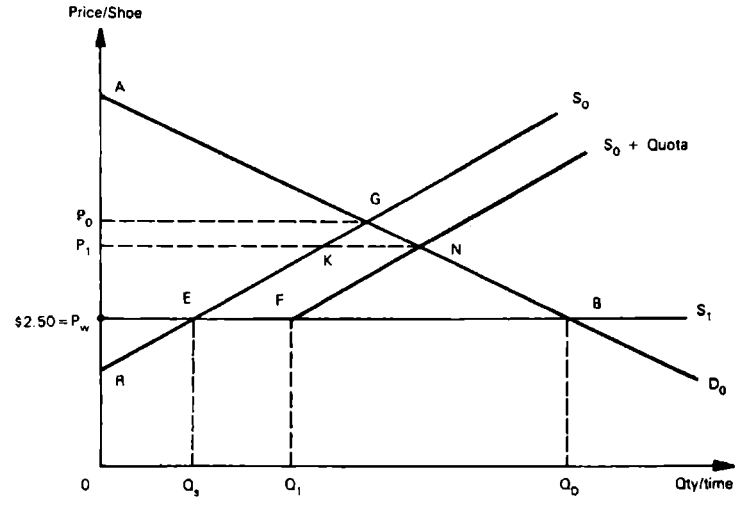
1. a	2. a	3. b	4. a	5. c	6. b
7. a	8. d	9. c	10. c	11. d	12. a
13. d	14. c	15. d	16. b		

CHAPTER FIVE

Answer to Question for Class Discussion

The following figure illustrates the welfare analysis that might have been done by Ms. Marla Hills. This figure is a simplified depiction of the facts of the case:

	Before Quota (Free Trade)	After Quota	Change
Consumer's Surplus	A B P_w	A N P_1	P_1 N B P_w (−)
Producer's Surplus	P_w E R	P_1 K R	P_1 K E P_w (+)
Importer's Surplus	0	E F N G	E F N K (+)
		NET CHANGE	F N B (−)



American Shoe Market

The extra employment provided is given by Q_sQ_1 and as shown above the net welfare loss is equal to FNB. The figure of 68,000 must have been arrived at by dividing FNB with 33,000.

Answers to Problems for Practice.

1. c	2. b	3. a	4. d	5. d	6. c
7. c	8. d	9. c	10. e	11. b	12. c
13. a					

CHAPTER SIX

Answers to Problems for Practice

1. c	2. c	3. a	4. d	5. d	6. d
7. b	8. a	9. a	10. d	11. a	12. b
13. a	14. c	15. d	16. c	17. d	18. d
19. d	20. b				

CHAPTER SEVEN

Answers to Question for Class Discussion

Mr. Radeesri is obviously mixing up economic profit and accounting profit.

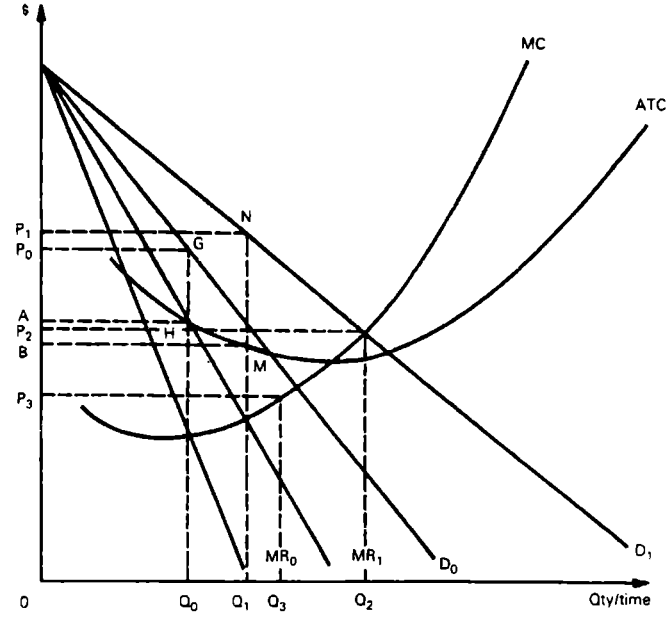
Answers to Problems for Practice

1. c	2. d	3. a	4. c	5. b	6. a
7. d	8. c	9. b	10. a	11. d	12. c
13. b	14. c	15. c	16. a	17. d	18. d
19. c	20. b	21. b	22. c	23. d	24. b
25. b	26. a				

CHAPTER EIGHT

Answer to Question for Class Discussion

The answer to this question is based on the following figure.



(a) KSCO ought to choose P_0Q_0 as equilibrium price and quantity because MC intersects MR_0 at this point.

(b) The effect of an increase in demand will be higher profits. At the new equilibrium the profits would be P_1NMB as opposed to P_0GHA earlier.

(c) The government should set the price at P_2 to achieve allocative efficiency. Profits will decrease substantially but remain above normal profit level.

(d) Reasons for this have been discussed in the text.
(e) At a ceiling price equal to P_3 the output would decline and KSCO would make a loss. Whether it continues to produce in the short run will depend on whether P_3 is able to cover average variable costs.

No, it is not necessary that there will always be a loss. If P_3 were such that it covered ATC, KSCO could still make a profit.

Answers to Problems for Practice

1. a	2. d	3. b	4. d	5. b	6. c
7. c	8. b	9. d	10. c		

CHAPTER NINE

Answers to Questions for Class Discussion

Question 1

The answer to this question is given in the text.

Question 2

The motivation behind this policy is to change the nature of the pharmaceuticals industry from a monopolistic to a competitive one. By doing so, the hope is to avoid all the disadvantages associated with monopolistic competition.

Answer to Problems for Practice

1. a	2. c	3. d	4. d	5. c	6. c
7. c	8. b	9. d	10. a	11. d	

CHAPTER TEN

Answers to Question for Class Discussion

(a) The enterprise ought to hire 6 workers because at this point the wage rate is equal to the Marginal Revenue Product.

(b) Under the changed circumstances, the enterprise should hire only 5 workers.

Answers to Problems for Practice

1. c	2. a	3. c	4. b

CHAPTER ELEVEN

Answers to Problems for Practice

1. d	2. a	3. c	4. b	5. b	6. b
7. a	8. b	9. c	10. b		

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