Rodica A. BOIER

FUNDAMENTALS OF ECONOMICS

– MICROECONOMICS –

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CONTENT

WHAT IS ECONOMICS?

Definition of Economics

Economics is concerned with *the efficient allocation of scarce resources in order to attain the maximum satisfaction of the human unlimited needs (wants).*

Provided by nature and by investment made by successive generations, ***resources (factors of production)*** are *the inputs that society uses to produce output*, called *goods* (material, tangible goods, services, information). They are *scarce* because they are not abundant enough for everyone to be able to use all they want or need.

Outputs, on the other hand, are the *various useful goods and services that result from the production process and are either consumed or employed in further production*.

Society's permanent tendency is to demand more resources and goods than are available.

On the other hand, ***human needs (wants)*** are *unlimited.* Over time, wants change and multiply, and this tendency is inducted by the development of new products and by extensive advertising and sales promotion. Consequently, it is the presence of scarcity that motivate the study of the manner (ways) in which people and societies choose to allocate resources and goods. This is the central, theme of economics.

Four separate *factors* are the ingredients of all production: natural resources (land), labor, capital and entrepreneurship.

(1) Provided by nature and called by some economists *land*, ***natural resources*** contain the mineral in the ground, forests, waterfalls, arable land a.s.o. They are particularly important in determining its production due to their scarcity.

(2) ***Labor (human capital)*** adapts natural resources for human use. It refers to all the physical and mental talents of men and women which are usable in producing goods and services. That means the skills and the amount of work will also be important in determining production.

(3) ***Capital*** (investment goods) is any manufactured instrument of production: buildings, machinery, tools, equipments, raw materials, storage, transportation and distribution facilities.

(4) ***Entrepreneurship*** is the art and science of making such decisions and taking the risks involved in doing so. Entrepreneurship refers to the responsability to initiate production, to organize the factors of production, to operate the productive establisment, in order to make profits. The return to entrepreneurship is *profit*; entrepreneurs seek profit as their incentive for performing their functions.

The *entrepreneur* is the person responsable for operating a firm and making decisions about what it does and how it does it. The entrepreneur accomplishes four related *functions*:

- ► he *takes the initiative* in combining the resources of land, capital and labor in the production of goods land, capital and labor in the production of goods and services;
- ► he undertakes the *chose of making basic business* - policy decisions;
- ► he is an *innovator* by attempting to introduce on a commercial basis new forms of business organization;
- ► he is a *risk bearer* of invested funds, time, effort, and business reputation.

There is always a *close interaction* between the four factors of production. Their mixture in a specific process of production depands on the type of good or service produced.

Exchanges and Markets

Individual resources can't be put to every kind of use. Each one could be better at some destinations than at others. This means that resources ***specialize***. It is a major rule in every modern economy. By specialization, individual resources will be more productive or, in economic terms, more ***efficient***. Efficiency means the allocation of

resources to the uses that lead to the most desirable set of outputs to the uses that lead to the most desirable set of outputs to the society.

As a result of specialization the ***exchange*** was born. Specialized resources produce what they are best at and exchange some of their product for the things that are best produced by others. In this respect, it is the ***market*** who has the function to allocate resources by equating quantity supplied and quantity demanded. In short, allocation determines:

- ► *what* is to be produced;
- ► *how much* is to be produced;
- ► *for whom* is to be produced.

These are the *three main economic questions*.

Economic Problems, Principles, and Policies

Economic principles are formulated by the economists. These are useful in the establishment of ***economic policies*** thought to solve ***economic problems.*** It is precisely the concern for policy that makes economic theory so necessary and important. While economists can contribute the best theoretical and factual knowledge there is on a particular issue, the final decision on policy question often rests either on information that is not currently available or on tastes and ethical opinions about which people differ (the things we call "value judgments"), or on both.

Methodologycally, economists use in their studies both deductive and inductive methods.

► ***Induction*** entails the *distilling or creating of principles and theories derived from facts*.

► ***Deduction*** involves *stating hypothesis and then gathering facts to determine whether the hypothesis is valid*.

As techniques of investigation, both methods are complementary, rather than opposite.

THE ECONOMIC POLICY

The ultimate goal of economics is to design policies to deal with economic problems. Usually made and implemented by government, an ***economic policy*** is a *course of action that is intended to influence or control the behaviour of the economy*. It can be developed by the *government* - taxation, government spending programs, regulation of particular industries a.s.o., but also by *private business* - production organization, price level setting, new product development and launching on the market a.s.o.

Regardles its level, an economic policy has to follow *three steps* in order to be formulated:

- ► making a *clear statement of goals*;
- ► *designing alternative policies* to achieve the goal and recognizing their possible effects;
- ► *tracking the implementation* of chosen policies and evaluating their effectiveness.

The main *value judgements* may be briefly listed as follows:

► ***Economic growth***. A higher standard of living in the future is possible only on the basis of the production.

► ***Economic freedom***. It is the right of economic actors (managers, workers, consumers a.s.o.) to develop their own actions in a spirit of liberty.

► ***Economic efficiency.*** That means to get as much as we reasonally can out, of our productive efforts, or to get maximum benefits at the minimum cost.

► ***Price level stability***. It is allways desirable to avoid dramatic and/or rapid fluctuations (inflation/deflation) in the average level of prices.

► ***Full employment***. Appropriate jobs should be available for those people who are able and willing to work.

► ***Economic security***. Society should support any dependend person beign in a disperate financial situation.

► ***An equitable distribution of income***. Society has a responsability to help those people at the bottom of the economic ladder.

POSITIVE AND NORMATIVE ECONOMICS

The effectiveness of economic policies can be assessed in one of two ways, known as positive and normative economics.

Positive (descriptive) economics deals with facts, aims at understanding how the economy works, how things seem to be operating, and is devoid of value judgments. It is directed towards explaining the world *as it is*, and how various forces can cause it to change.

Positive economics attempts to set forth scientific statements about economic behaviour. For exemple: "Yearly inflation *is* 25%".

Normative economics deals with the way the world *has to be*. Being prescriptive, the normative economics involve value judgments and make statements about whether something is "good" or "bad". It embodies someone's value judgments about what the economy should be like or what particular action is recommended. For exemple: "Yearly inflation *has to be* reduced at 15%".

MICROECONOMICS AND MACROECONOMICS

Branches of Economics can be classified according to the approach or methodology that is used. There are two different levels of analysis at which the economists may derive laws concerning economic behavior: microeconomics and macroeconomics.

Microeconomics offers a detailed analysis of particular activities in the economy and concerns the interactions of the individual players in the economy: consumers, firms, and markets for individual goods and services. It looks at the individual markets that make up the market system and studies how producers (entrepreneurs or firms) and consumers (households or individual government agencies) interact with each other. For simplicity, it may neglect some interactions with the rest of the economy.

Much of microeconomics is positive analysis: empirical observation may be able to solve differences of opinion on positive questions.

Macroeconomics, in turn, as opposite to microeconomics, is concerned either with the economy as a whole or with their basic subdivisions. It considers the aggregate performance of all markets in the market system and studies the choices made by the large entities of the economy: the business sector, the household sector, and the government sector.

Macroeconomics also studies the monetary system, overall price levels and changes, the effects of government's expenditures, taxation and borrowing upon the economy, questions of gross national product, economic macro-disequilibriums such inflation, unemployment a.s.o.

There is still a *convergence* of microeconomics and macroeconomics: many topics and subdivisions of economics are rooted in both. By exploring behavior at the individual level and then aggregating up to the collective level, economists are developing the underlying foundations of macroeconomics. Consequently, the districtions between microeconomics and macroeconomics areas are flexible, and borders have some degree of relativity, becoming less and less clear.

KEY CONCEPTS

Economics
Human needs (wants)
The three economic questions
Economic facts

Resources
Relative scarcity of resources
Factors of production
Land (natural resources)
Labor (human capital)
Capital (investment goods)
Entrepreneurship
Specialization
Efficiency
Exchange
Market
Economic problems
Economic principles
Economic theory
Economic policy
Induction
Deduction
Abstraction
Positive economics
Normative economics
Microeconomics
Macroeconomics

THE MARKET ECONOMY SYSTEM

THE ECONOMIC SECTORS

Real-world economics are arrayed between the two extremes: pure (laissez-faire) capitalism and command economy.

► ***Pure (laissez-faire) capitalism*** is characterized by the private ownership of resources and the use of a system of markets and prices to coordinate and direct economic activity.

► ***Command economy*** is characterized by public ownership of virtually all property resources and collective determination of economic decisions through a central economic planning. They are distinguished by the degree to which government influences and controls economic activity ***(economic role of the goverment)***.

One of the ways in which economy can be viewed is to make inside it the distinction between the private sector and the public sector.

The ***private sector***, made up of firms and households, *makes its own economic decisions according to its own private views of the operating markets, its own needs and desires, and its economic ability to satisfy them*. Although they make their decisions themselves, firms and household, as elements of the private sector, are influenced by the operations of the markets in which they participate.

When between buyers and sellers in the market take place with little or no government interference, a *private* or a *free market* exists.

Firms take decisions concerning the use of resources in order to *produce output* as good and services. All firms together determine the market supply of goods and services. The *theory of the firm* studies the economic forces that influence what they produce, how much they produce, and what combinations of resources are used to produce it.

As consumers, firms buy factors of production in input markets: raw materials, equipment, labor, etc., which they combine in production. Firm's decisions are based, upon the principle of *profit maximization*. The firm's goal is to performe its operations so that it makes the highest possible profit from them.

On the other hand, households take *consumption decisions:* what to consume and how much of it to consume. Their collective action determines market *demand* for goods and services. But households also act as producers in that they provide and sell labor, which is one of the inputs used by firms. The economic goal of the household is to *maximize utility* as a measure of the satisfaction and enjoyment received from the consumption of goods and services.

The ***public sector*** *contains the economic activity of government who influences decisions made by individual firms and households*. Allocation of *public goods* is not necessarily influenced by markets, because some public goods cannot be distributed by market forces.

Government secures most of its income through various kind of taxes and other sources. Taxation has effects upon households' incomes and firm's profits, and sometimes upon market prices. Government also takes decisions concerning the services and facilities it provides and pays for.

THE MIXED ECONOMY AND GOVERNMENT ROLE

The ultimate objective of economics is to develop policies to deal with society's issues. In this respect, there are two *key questions* in economics:

► *why* things happen like this?

► *what* should be done?

Before formulating policies, economists must first make every effort to understand how the economy has worked in the past, how it works today, and how it seems to work in the future. The centre of attention is usually the government's policies when studying economic policies.

There is a controversial role of the government regarding its intervention in the economy. Main questions are here:

► which are the circumstances in which government should take an active role?

► which is the appropriate amount and when is it best for government to leave decisions to the private participants in the economy?

Private markets should be liberated from the tyranny of government control, said ***Adam Smith***, the author of *An Inquiry into the Nature and Causes of the Wealth of Nations*, published in 1776. Government intervention usually makes things worse, and, consequently, government should be cautious in interfering with the operations of the private market. In pursuit of their private interests, individual producers would make the goods that consumers want. There is "the invisible hand" of the market that causes the producer to promote the interests of society.

At the other extreme, ***John Maynard Keynes*** published in 1936 his *General Theory of Employment, Interest and Money*, which put the laissez faire tradition in economics under attack. It was the time of:

► *depression* – a decline in the total output, income, employment, and trade, usually lasting 6 months to a year, and marked by widespread contractions in many sectors of the economy;

► *inflation* – an increase in the average level of prices.

In this situation, according to Keynes, government has the duty to turn the unemployment back to work by building public investments, such as roads, post offices, dams a.s.o.

No contemporary society falls completely into either of these extreme categories. All societies are rather mixed economies, with elements of market and command in different percentages. In a ***mixed economy***, government plays an active role in:

► *strengthening and facilitating the operation of the market system* by:

- providing the legal foundation and social environment conducive to the effective operation of the market system;
- maintaining competition as the basic regulatory mechanism in a capitalistic economy.

► *supplementing and modifying the operation of the market system* by:

- redistributing income and wealth in order to ameliorate inequality in the society;
- adjusting the allocation of resources so as to alter the composition of the national product;
- stabilizing the economy, that is, controlling unemployment and inflation caused by business fluctuations, and promoting economic growth.

To sum up, the *characteristics of all modern economies* are:

(1) the private property;
(2) the freedom of entreprise and choice;
(3) the self-interest as a motivating force;
(4) the competition;
(5) the reliance on a market system;
(6) the use of advanced technologies and large amounts of capital goods;
(7) the specialization;
(8) the use of money.

There are strong interrelationships between economic goals of the government. They can be:

► *complementary* as, for instance, economic growth policy, and the policy of decreasing unemployment; in these situations, economic policy-making is relatively easy.

► *conflicting* as, for instance, reducing unemployment policy and reducing inflation policy; when the unemployment problem is reduced, by some reasons, the inflation problem tends to get worse.

Conflicts like this among goals test the science and the art of policymakers.

THE CIRCULAR FLOW MODEL OF THE ECONOMY

Firms are major actors of any economy. A ***firm*** is *a business organization that produces goods and/or services*. A ***plant*** is an establisment at a single location used in the production of a good or service (for exemple, a factory, mine, farm, or store). The dimension of a firm often depends on the number of plants it has.

An ***industry*** refers to all the producers of a good or service. For exemple, we are in the construction industry. From a strictly economic point of view, we speak about the construction business.

An overview of the operation of the market system can be obtained through the ***circular flow model***. This *simplified model locates the product and resources markets* and presents the major income - expenditure flows and resources - output flows which constitute the lifeblood of the market economy.

In a monetary economy, households, as resource owners, sell their resources to business and, as consumers, spend the money income received therefrom in buying goods and services. Businesses must buy resources in order to produce goods and services; their finished products are then sold to households in exchange for consumption expenditures or, as businesses view it, revenues.

The net result is a counterclockwise *real flow* of economic resources and finished goods and services, and a clockwise *monetary flow* of income and consumption expenditures. These flows are simultaneous and repetitive.

Government expenditures, taxes, and transfer payments affect the distribution of income, the allocation of resources, and the level of economic activity. The circular flow model is a useful means for envisioning how government performs its redistributional, allocative, and stabilizing functions.

MONEY

Money, one of the most crucial elements of economic science, are essential in every economies with specialization of production, where exchange is necessary. The monetary system is the life blood of the circular flows of income and expenditure which typify all economics.

There are three *functions of money:* medium of exchange, measure of value, and store of value.

(1) ***Medium of exchange*** means *anything that is widely accepted in payment for goods and services and in settlement of debt*. As a convenient social invention, money is the most common medium of exchange and it allows society to avoid the main complication of barter: the required coincidence of wants.

(2) ***Measure of value.*** Business actors need *measurements for the value of things offered at the market*. These allows us:

- to *state the price* of each product in terms of the monetary unit (unit of account);
- to really *compare* the relative worth of various commodities and resources in order to facilitate rational decision making;
- to *measure* transactions involving future payments (debt obligations of all kind).

(3) ***Store of value.*** Money is a very convenient *form in which savings are accumulated*. Comparing with other methods of storing wealth (real estate property, stocks, bonds, a.s.o.), money offers the advantage of being immediately usable by a firm or a household in meeting any and all financial obligations.

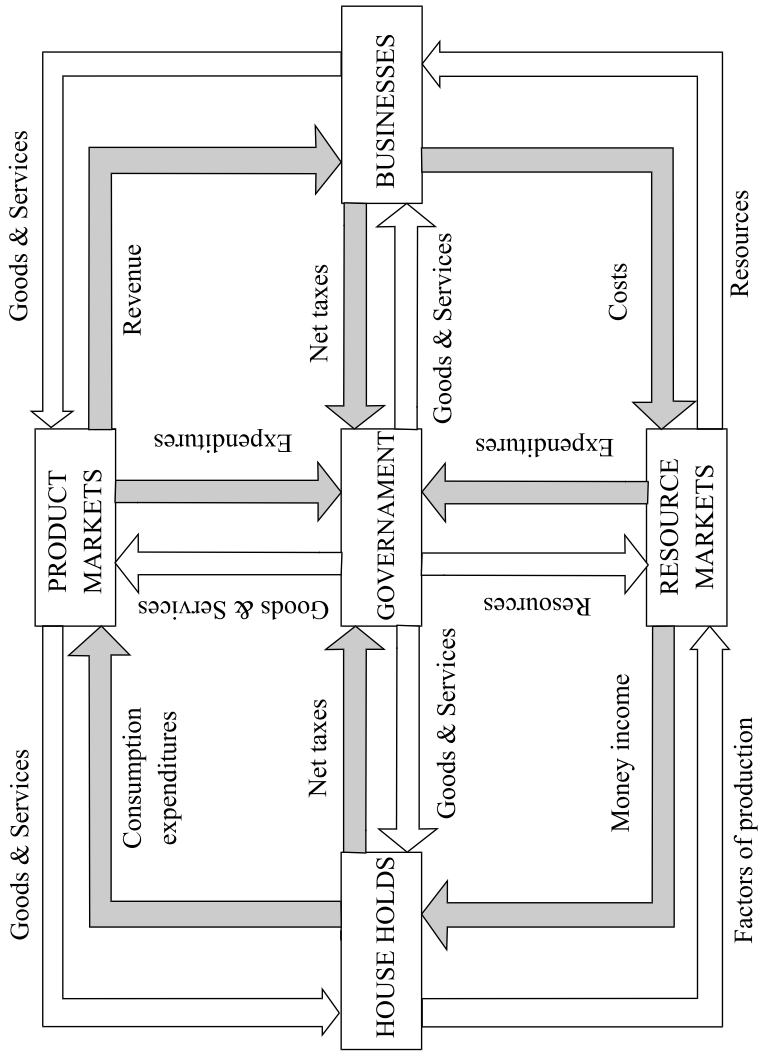

Fig.1.2. The Circular Flow Model

Money can perform the mentioned functions only in following *conditions*:

- ► it must be *acceptable* as purchasing power in the whole market;
- ► it must be easily *recognizable* so that will know what it is and what its value is;
- ► it must be *homogeneous,* that means any two similar units have equal value;
- ► it must be *divizible,* this way the value of goods that are fractions of the unit of account can be calculated, expressed and handeled easily;
- ► it must be *portable* so that to facilitate carrying it;
- ► it must be *durable,* that means to last for a quite long period or, if it is strictly necessary, to be replaceable at a low cost;
- ► it must have a high degree of *stability of value* so that to inspire trust.

Money, which is essentially the debts of government and depositary institutions (commercial banks and thrift institutions), has value because of the goods and services which it will command in the market. Maintenance of the purchasing power of money depends to a considerable degree upon the effectiveness with which government manages the money supply.

Money are usually related to *prices*. Economists make a clear distinction between nominal price and real price.

The ***nominal price*** of a good is simply *the number of monetary units that must be given up to acquire it*. But, when we offer to exchange some amount of money for some amount of good, we are really offering to give up our capacity to acquire other goods in exchange for this good.

The ***real price*** of a good is *the amount of other goods that could be purchased instead*. This is an important economic measure because the purchasing power of money erodes over time through inflation, thus the nominal price may not be a very good way of expressing how many of some other good we must sacrifice for this one.

Using a broad index of prices, the ***Consumer Price Index*** is a standard against which to compare individual prices. It responds to the question how to adjust for inflation by dividing the current nominal price of a good by some measure of how nominal price of all goods have changed over time.

THE MARKET MECHANISM

There are thousands of markets around us and millions of interconnections among the markets. As we already saw, there are two main mechanisms by which can be answered to the questions of what, how, and for whom to produce in one economy: the market and the intervention of the government.

Phisical proximity is not required to make a market. For exemple, stock market transactions are made between buyers and sellers ussuallt separated by huge distances.

A market could be a very *simple* or a very *complex* one. In a complex economy, in any market, the price provides the focus for interactions between buyers and sellers. In this respect, prices performe two important and interrelated *functions*:

► they provide *information*, summarizing all aspects of the market;

► they provide *incentives* for those involved in the market relationships.

The way in which the price is determined is done by the number of participants in that market. Some markets are dominated by a few large companies, and others have tousands of sellers. A ***monopoly*** exists when *in the market operates only one major seller*. Conversely, an ***oligopoly*** exists when *in the market operate a few sellers.*

Depending the way in which the price is determined by the number of participants in the market, there are two types of competition in that market:

► ***the perfect competition***, when there are so many buyers and sellers that no single buyer or seller has any influence over the price;

► ***the imperfect competition***, when any buyer or any seller is able to influence the price.

Changes in market conditions are reflected in changes in prices. Prices provide information to market participants, they provide them with incentives to respond to changing conditions, and they bring order out of a potentially chaotic situation.

Market mechanism has impressive strenghts, but also drawbacks.

►The ***advantages*** of the market mechanism are:

- it pushes producers to offer the goods and services that consumers want by the incentives it gives;
- it also pushes producers to acquire usefull knowledge and skills;
- it encourages producers to conserve scarce resources;
- it encourages customers to use scarce goods carefully;
- it involves a high degree of economic freedom, every actor of the economic scene being unrestricted to choose depending on their owen needs, desires, tastes and preferences;
- it provides every moment information regarding local

conditions for transactions.

►The ***weacknesses*** of the market mechanism are:

- it may give the weak and the helpless little more than the freedom to starve;
- an unregulated system of private company may be quite instable, with periods of inflationary boom giving way to sharp recessions.
- prices are not always the result of impersonal market forces: the monopoly or oligopolist may restrict production in order to keep the price high;

Although the market is a vital mechanism, it has sufficient drawbacks to provide the government with a major role.

KEY CONCEPTS

Pure (laissez faire) capitalism
Command economy
Private sector
Public sector
Economic role of the government
Circular flow model
Real flow
Monetary flow
Money
Medium of exchange
Measure of value
Store of value

METHODOLOGICAL ISSUES IN ECONOMICS

ECONOMIC THEORIES AND MODELS

Economic analysis is a marginal one. Marginality is extremely important to the understanding of the economic theory and models, especially in microeconomics.

"Marginal" is the term commonly used by economists to mean "additional". In ***marginal analysis,*** economists *examine the consequences of the dynamics: small changes by adding or substracting from the current state of affaires*. Consequently, many economic key concepts are approached by their marginalist perspective: marginal cost, marginal benefit, marginal product, marginal productivity, marginal revenue, marginal utility, a.s.o.

Much of economics is theory and models. One important aim of the economic science is to develop its tools - theories and models -, and then to test them against facts. Economists borrow ways of investigation from different fields of the science, adjusting each to fit the particular problems posed by economic facts. Thus, mathematical reasoning, historical study, statistical inferences, etc. are extensively used in economics.

To understand the functioning of anything as complex as the economy, ***abstraction*** from unimportant details is necessary. Abstraction means *ignoring many details in order to focus on the most important factors in a problem*. But there is no such thing as one specific degree of abstraction for all analytic purposes. The optimal degree of abstraction

depends on the objectives of the analysis. A model that is a gross oversimplification for one purpose could be needlessly complicated for another.

Theories exist in all scientific and investigative disciplines, as an attempt to explain on paper how real-world phenomena are related. A world in which there are billions of consumers and millions of firms, making trillions of transactions each year, is too complex to be understood in details. Thus, economists attempt to simplify it by using theories that make simplifying assumptions.

*A **theory*** is a *deliberate simplification (abstraction) of factual relationships that attempts to explain how those relationships work*. In other words, it is an *explanation* of the mechanism behind observed phenomena. The task of economic theory or analysis is to systematically arrange, interpret, and generalize upon facts. Its aim is to be supportive in understanding and predicting the economic real world behavior.

There are always other theories that may potentially be even better at explaining the world. This is the explanation that economists continue collect data, in order to build better models and evaluate them.

Inside an economic phenomena can be found many economic aspects, elements or variables, related each other. Two variables are said to be in ***correlation*** if they tend to go up or down together. Just looking at the degree of correlation between the behavior of two sets of statistics may not tell us much about cause and effect.

An ***economic model*** is a *representation, a formal illustration of a theory, or a part of a theory, for the purpose of illuminating cause-and-effect relationships*. It is a simplified framework for organizing the way we think about the problem, because it abstracts from the myriad unimportant details and presents the essence of how the real economic world works. Often it is mathematical, but it doesn't have to be.

For instance, if we constructed a mathematical system to represent an individual consumer's decision about buying a building apartment, we would say that we have built a model of an real estate purchase decision. It will be useful in helping us to understand how the real estate market works and to predict what would happen if we tray to implement a particular real estate policy.

The most fundamental positive analytical model that economists use is perhaps *the market model*, which illustrates the interaction between demand and supply, ultimately determining the level of price and the resources allocation.

Neither theories nor models don't provide a complete picture of everything in the real world, but it's very important to make as *accurate* as possible *predictions* about it.

First of all, theory must be *testable* to determine if it relied upon as an explanation of real-world events. Tests of theory must be *replicable,* in other words, to lead to the same results when repeated by others.

Because Economics deals with human behavior, which is hard to predict, economists have to rely upon *observation* of the real world to get the information they need for testing their theories. In this process, they gather empirical information.

On the other hand, Economics deals with a very complicated world. Consequently, most scientific theories and models examine only a small part of the real world. Economists use ***simplifying assumptions*** to remove away much details that are not directly related to the phenomena being studied.

There are several commonly used *assumptions* in economic theory:

► "***all else (other things) beign equal" (ceteris paribus) assumption*** states all other exogenous variables, except those under immediate consideration (endogenous), are held constant;

► ***the economic man assumption*** states that everyone in the market act rationally, with the goal of maximizing their own profits or utility;

► ***the efficient markets assumption*** states that economic markets operate according to the laws of economics, with perfect information, no elements within the market make abvious errors, and that any changes in market conditions are instantly communicated to all economic actors, who then can react to them very quickly;

► ***the instantaneous activity assumption*** states that all sort of resources can be shifted from one use to another at once, with no time spending;

► ***the costless assumption*** states that are no costs of transportation, obtaining knowledge and skills, shifting resources to different uses, moving/changing the skills of labor, a.s.o.;

► ***the perfect information assumption*** states that economic actors have immediate and total access to all necessary data they need.

USING GRAPHS IN ECONOMIC ANALYSIS

There is a continuing interplay between models and facts in the study of economic relationships and problems. Data (facts) are essential for two *reasons*:

► they *suggest* relationships which we should aim to explain;

► having formulated our theories, they can also be used to *test* our hypotheses and to quatify the effects they imply.

Economists communicate ideas (facts) by three main tools: tables, graphs, and equations. Frequently they are used together and are accompanied by world descriptions.

Data can be presented by schedules (tables), times series data, and cross section data.

(1) ***Schedules (tables)*** are an easily to understand form, which concentrate in columns and rows different related information (Tab.3.1).

Temperature	Soft beverages sold (mil. monetary unit)
under - 10	5
- 10 - 0	6
0 - 10	7
10 - 20	9
20 - 30	30
above 30	65

(2) **Time series data** are values of a given variable at a different points in time (ex.: the price evolutions of the cement in 2000) (Tab.3.2)

Month	Price (1.000 monetary unit/tone)
January	325
April	350
July	400
October	350

(3) ***Cross section data*** *refer to the same point in time, but to different people* (ex.: unemployment by age groups in September 2000) (Tab.3.3)

Age group	Number of unemployed persons
18 - 25	127.535
25 - 45	277.301
45 - 65	89.553

Tables and graphs show relationships between variables. There are two *types* of variables:

► ***independent variable***, which may change freely and *"causes" the change in the dependent variable*;

► ***dependent variable***, which is the "effect" or outcome, and *changes with changes in the independent variable*.

Usually, we put the independent variable (cause) on the horizontal axis and the dependent variable (effect) on the vertical axis.

To see and understand, economists need simplier means by which to express many kinds of data and information, especially that which appears in tables. ***Graphs*** are tools by which economists convert their theories and models, or the numbers in tables, into pictures showing *a visual representation of the relationship between two variables*. Graphs are invaluable tools in economic analysis because they permit clear expression and handling of sometimes very complex relationships.

In a graph, a relationship between two variables can be (Fig.3.1. and Fig.3.2):

► ***a positive one (direct related)***, when the two variables change in the same direction (upsloping line);

► ***a negative one (inversely related)***, when the two variables change in opposite directions (downsloping line).

Both types of graphs could express two types of *relationship*:

► a ***linear*** one (straight line graph);

► a ***non-linear*** one (curved graph).

The ***slope of a straight line*** is *the ratio of the vertical change to the corresponding horizontal change in moving between any two points* (Fig.3.3). It indicates how much the graph rises per unit when we move from left to right. The slope of an upsloping line is positive, while that of a downsloping line is negative.

The vertical (or horizontal) intercept and the slope of a line establish its location and are used in expressing the relationship between two variables as an ***equation***:

$$X = a + by$$

Curved lines also have slopes, but the numerical value of the slope is different at every point. ***Slope of a curve*** at any point is determined by *calculating the slope of a straight line drawn tangent to that point* (Fig.3.4).

To understand how the economy works we need both theory and facts. We need theory to know what facts to look for: there are too many facts for the facts alone to tell us the correct answer. Facts without theory are useless, but, on the other hand, theory without facts remains an unsupported assertion. Consequently, we need both.

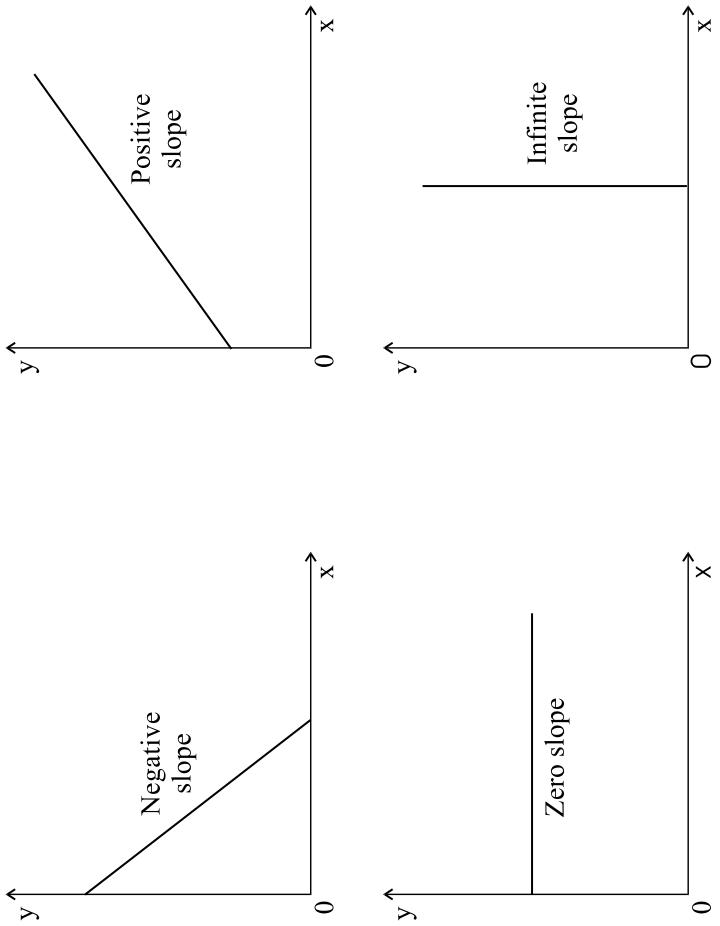

Fig.3.1. Different Types of Slope of a Straight-line Graph

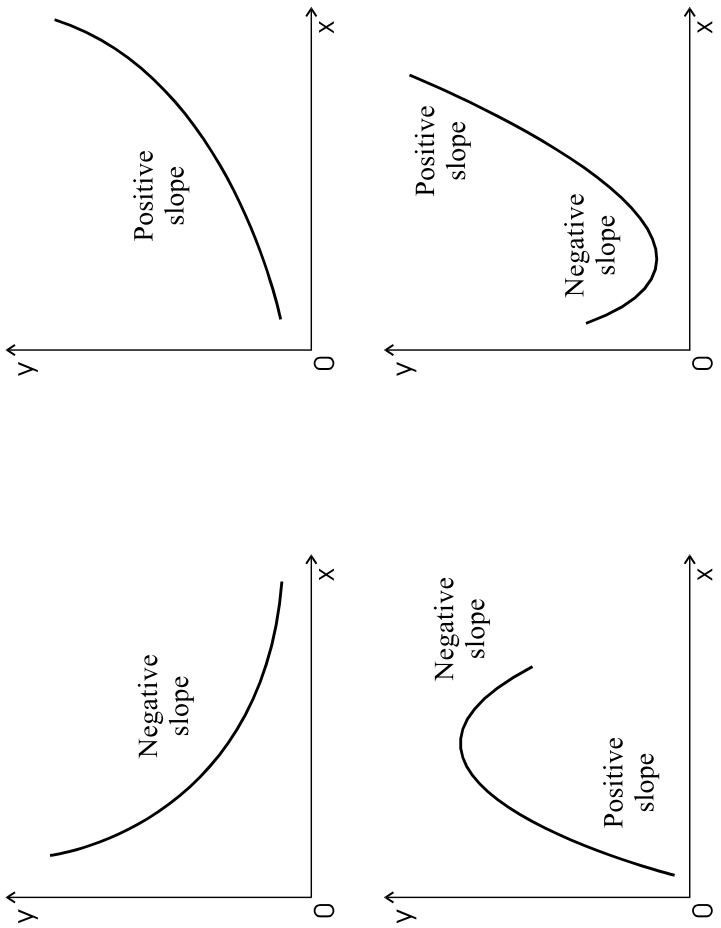

Fig.3.2. Different Types of Slope of a Curved Graph

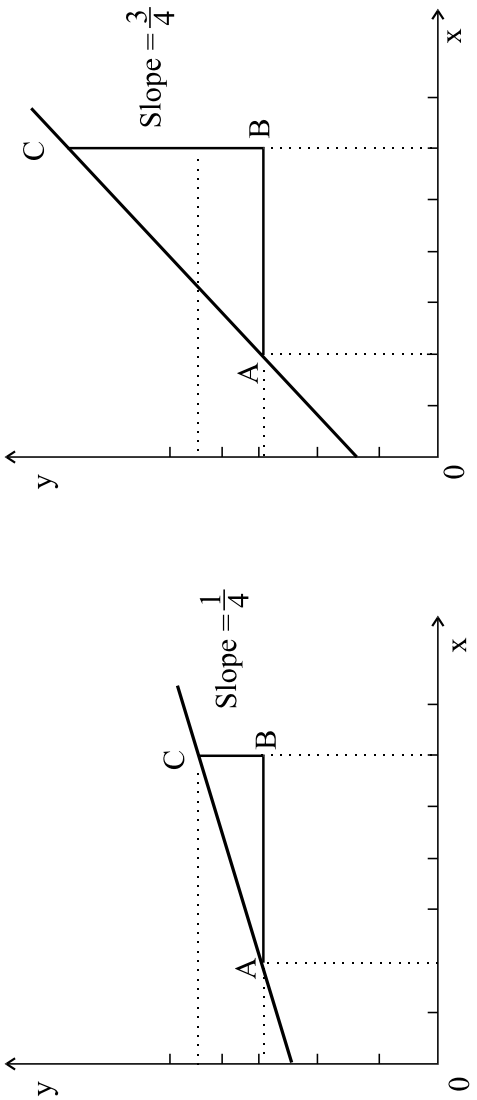

Fig.3.3. Slope of a Straight-line

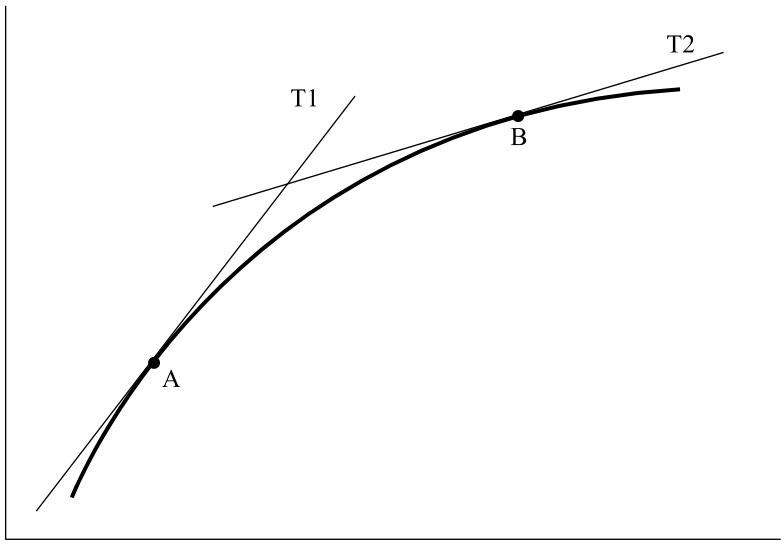

Fig.3.4. Slope of a Curved Line

KEY CONCEPTS

Marginal analysis
Abstraction
Correlated variables
Economic model
Simplifying assumptions
"Other things being equal" (ceteris paribus) assumption
Economic data
Schedules (tables)
Graph
Independent variable
Dependent variable
Slope of a straight line
Slope of a curved line
Equation
Direct related variables

PRODUCTION POSSIBILITIES FRONTIER

Because resources are scarce, a full-employment, full-production economy cannot have an unlimited output of goods and services. Consequently, ***choices (trade-offs)*** must be made on which goods and services to produce and which to forgo.

In order to understand how society make choices we *assume*:

- ► the economy is operating at full-employment and achieving full-production; that means it works *efficiently*;
- ► we are looking the economy at some specific point in time, or over a very short period of time, for which *resources and technology are both fixed*; no impact from these inputs is expected;
- ► the economy is *producing just two products*, say "X" - a consumer good, and "Y" - a capital good.

Limited resources means a limited output and, as a consequence, society has to decide how much from each good to produce. For an exemple, the alternative possibilities are shown in the ***production possibilities table*** (Tab.4.1) and the production possibilities frontier (Fig.4.1).

Tab.4.1. Production Possibilities Table

Possibilities	Good "X" (consumer good)	Good "Y" (capital good)	Sacrifice of capital goods	Gain of consumer goods
A	0	10	-	-
B	2	9	1	2
C	4	7	3	4
D	6	4	6	6
E	8	0	10	8

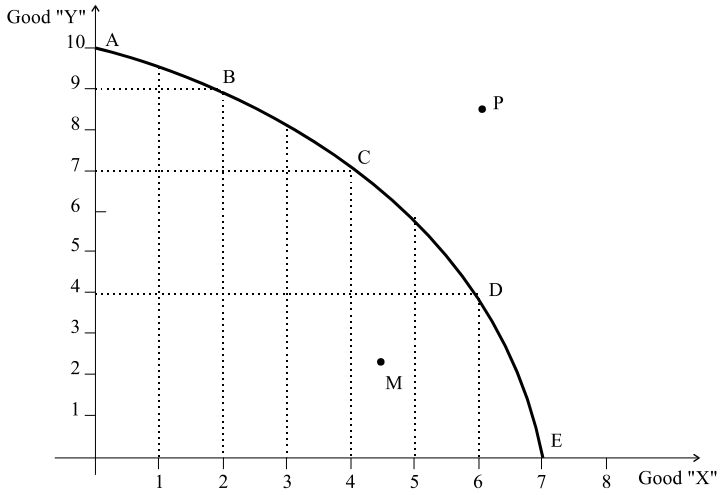

Fig.4.1. Production Possibilities Frontier

The ***production possibilities frontier*** is a graphical tool used for economic analysis of production decisions. It measures *the quantity of two goods that an economy is capable of producing with its currently available resources and technology*. An economy producing along its production possibilities curve is achieving at highest efficiency.

The production possibilities frontier is the curved line drawn through points A, B, C, D, and E and represents the maximum possible quatities of goods X and Y that the economy is able to produce and therefore symbolizes the efficient production assumption. The quantity of good X produced is measured on the horizontal axis, while the quantity of good Y produced is measured on the vertical axis.

On the production possibilities frontier:

► at the *point A*, the economy is using all of its resources to produce 10 units of good Y and 0 units of good X;

► moving down along the curve *to the right* of point A, fewer units of Y are produced, and more and more units of X are produced;

► at the *point B*, the economy is producing 9 units of Y and 2 units of X;

►at the *point C*, the economy is producing 7 units of Y and 4 units of X, and so on.

► at the *point E*, the economy is putting all its resources into production of good X - 7 units and 0 units of good Y.

At any point in time, a full-employment, full-production economy must sacrifice some of product X to obtain more of product Y.

Both points A and E are clearly *unrealistic extremes*. Points that lie in the interior of the curved production possibilities frontier, such as point M, represent *quantities of good X and Y that are less than the maximum quantities the economy is capable to produce* and are therefore considered ***inefficient production points*** (*underutilized resources*). Under the efficient production assumption, production quantities, such as point M, can be excluded from any economic analysis.

Points that lie beyond the production possibilities frontier, such as point P, represent, because this curve shows the maximum possible quantities of good X and Y that the economy is capable of producing, ***unattainable production points*** (greater input of resources), and can also be ruled out. Thus, the curve is, in effect, a really frontier.

Two important *notices* are to be made regarding the production possibilities frontier.

► The bowed-out, *concave shape* of the production possibilities frontier is due to the presumption that the economy's resources are not equally well suited to the production of both goods X and Y. For exemple, for construction purposes, the land from plane is different from the land from mountains.

A special case arises when the resources used to produce good Y are *equally well suited* for the production of good X. In this case, the production possibilities frontier would not be curved outward. Instead, it will simply be a straight line, connecting the points where the economy is using all of its resources to produce good X (point E) and where is using all of its resources to produce good Y (point A).

► We assumed the use of *fixed resources and technology*. If the amount of resources available to produce goods X and Y were to increase as a result of economic growth, then the production possibilities curve would shift outward, to the right, implying that the economy could produce greater quantities of both X and Y. The same holds true when improvements in technology allow for more efficient use of available resources. In situations like this, production points such as point P may then become attainable.

THE OPPORTUNITY COST

The ***opportunity cost*** of a decision or choice that one makes is *the value of the highest valued alternative that could have been chosen but was instead forgone (sacrificed).*

Economic resources are not completely adaptable to alternative uses. This *lack of perfect flexibility, or interchangeability, on the part of resources and the resulting increase in the sacrifice of one good that must be made in the acquisition of more and more units of another good* is the rationale for the ***law of increasing opportunity cost***. It is reflected in the shape of the production possibilities curve. When rational choices are made, opportunity cost always is less than the value of what is chosen.

In the figure 4.1, suppose that the economy is initially at point B, producing 2 units of good X and 9 units of good Y. Consider what happens when the economy desires another unit of good X and so *changes its production* from point B on the production possibilities frontier to point C.

The opportunity cost of the additional unit of good X is the 2 units of good Y (9 units of Y - 7 units of Y) that are forgone in moving from point B to point C. In the case of the production possibilities frontier, where there are only two goods, the highest valued alternative to good X is good Y and vice versa.

Further, suppose that the economy desires yet another unit of good X and so *changes its production* from point C on the production possibilities curve to point D. The

opportunity cost of this additional unit of good X is now 3 units (7 units of Y – 4 units of Y). In this exemple, the opportunity cost of producing one more unit of good X increases as more of good X is produced. The explanation is that some of the resources used to produce good Y are not as well suited to produce good X.

Consequently, as more and more of the economy's resources are devoted to producing good X, the opportunity cost of good X, as measured in units of good Y forgone, will be increasing.

In summary, the production possibilities frontier illustrates four basic economic concepts:

- ► the *scarcity of resources* is implicit in that all combinations of output lying outside the production possibilities curve are unobtainable;
- ► *choice* is reflected in the need of a society to select among the various attainable combinations of goods lying on the curve;
- ► the downward slope of the curve implies the notion of *opportunity cost*;
- ► the concavity of the curve reveals *increasing opportunity costs*.

KEY CONCEPTS

Choices (trade-offs)
Production possibilities table
Production possibilities curve (frontier)
Inefficient production points
Unattainable production points
Opportunity cost
Law of increasing opportunity costs

CHAPTER 5

DEMAND

5.1. DEMAND AND THE LAW OF DEMAND

Demand is a schedule which summarizes *the willingness of buyers to purchase a given product during a specific time period at each of the various prices at which it might be sold*. Demand does not reflect what buyers want or need, but only what they are *willing and able to pay for.*

5.1.1. ***Expressing Demand***

Information concerning the demand can be expressed in three different, but dependent, ways: demand tables (schedules), demand curves, and/or demand functions.

(1) ***Demand schedule***, suppose *data are shown in tables* (Tab.5.1). As a tabular statement of a buyer's plans or intentions,

with respect to the purchase of a product demand for construction surface, for instance, is represented in table 5.1. It is very important to observe, the quantity demanded at each price level must relate to some specific time period (an hour, a day, a week, a month, a year, etc.).

Tab.5.1. An Individual Buyer's Demand for Construction Surface (hypothetical data)

Price of the construction surface (monetary unit/square metre)	Quantity demanded (square metre/year)
2	100
4	90
6	80
8	70
10	60

(2) ***Demand curve*** is the *line showing the relationship between price per unit and the maximum quantity buyers would be willing to buy*. In economics texts, demand curve could be usually a straight line which is assumed to have a *negative slo*pe (Fig.5.1).

Other things being equal, *as price falls, the corresponding quantity demanded rises and, conversely, as price increases, the corresponding quantity demanded falls*. Generally, if the price of a good rises, then other goods might look a little more attractive, and buyers would demand less of this good. But that assume that consumers'incomes, tastes etc. stay constant. If they change, then we would have an entirely new demand curve. This is the ***law of demand***.

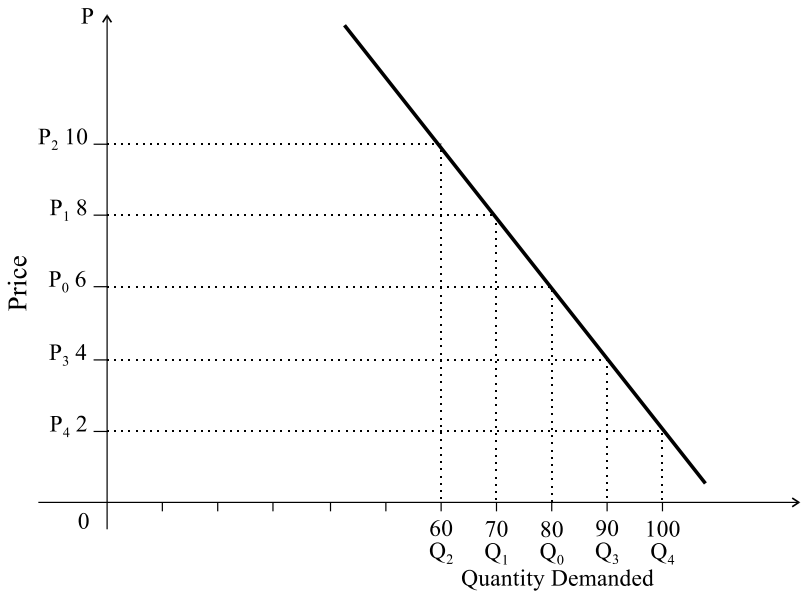

Fig.5.1. An Individual Buyer's Demand Curve

(3) ***Demand function*** is a *mathematical relationship between price and quantity demanded*. In the graph (Fig.5.1) we observe that as price increases by 2 monetary units, quantity demanded falls by 10 units (square metres in our case). This suggest a demand function.

5.1.2. ***The Quantity Demanded***

The ***quantity demanded*** is *the amount of a good that will be purchased in the market at a given price*. The graph from figure 5.1 shows different price and quantity demanded combinations:

- ► at market price P_0 (6m.u.), quantity demanded is Q_1 (80 square metres);
- ► at market price P_2 (10 m.u.), quantity demanded is Q_2 (60 s.m.);
- ► at market price P_4 (2 m.u.), quantity demanded is Q_4 (100 s.m.).

The *effects of changes in price* of the quantities demanded are different. Suppose that price starts out at P_0, with associated quantity demanded of Q_0 (Fig.5.1):

- ► if price *rises* from P_0 to P_2, quantity demanded will *fall* from Q_0 to Q_2; at higher prices, a lower quantity will be demanded;
- ► if price *falls* from P_0 to P_4, quantity demanded will *rise* from Q_0 to Q_4; at lower prices, quantity demanded will be higher.

5.1.3. ***Market Demand Curve***

Because consumers are willing to buy different amounts at different prices, ***market demand curve*** is found by taking the *horizontal summation of all the individual demand curves for a good*. This way, the demand curve D shows how much of the good Q buyers will purchase in the market at each possible price P (Fig.5.2).

Exemple

Suppose that there were just two consumers in the market for the good G: consumer A and consumer B. Their individual

demand curves will be different, according to their different preferences for the good G. Figure 5.3 represents the two individual demand curves along with the market demand curve for good G, obtained by a horizontal summation of the two individual curves.

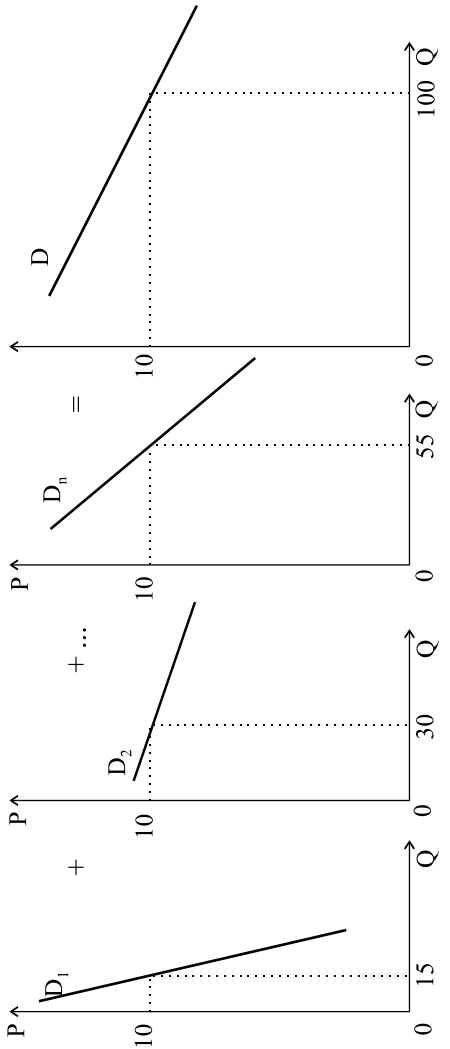

Fig.5.2. Market Demand Curve (D) as the Sum of the Individual Demand Curves (D_1+D_2+...+D_n)

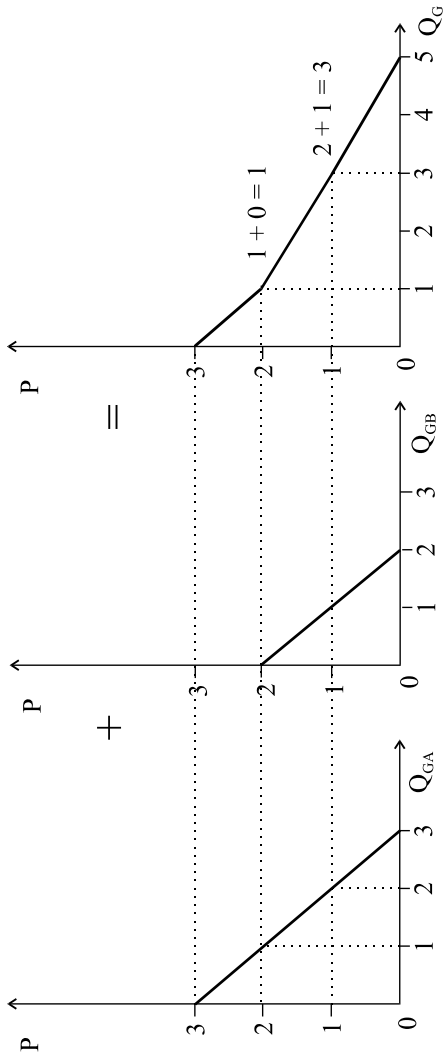

Fig.5.3. Market Demand Curve (An Exemple)

The market demand curve for good G is found by *summing together the quantities that both consumers demand at each price*. For exemple, at a price of one monetary unit, consumer A demands two units, while consumer B demands just one unit, and the market demand will be:

2 units + 1 unit = 3 units of good G.

5.2. CHANGES IN DEMAND

5.2.1. Shifts in Demand

Demand on the market does not alway stay the same. Prices change and, consequently, quantities demanded change.

A ***change in demand*** refers *to a shift in the entire demand curve* either (Fig.5.4).:

- ► outward, to the right (an *increase in demand*), or
- ► inward, to the left (a *decrease in demand*).

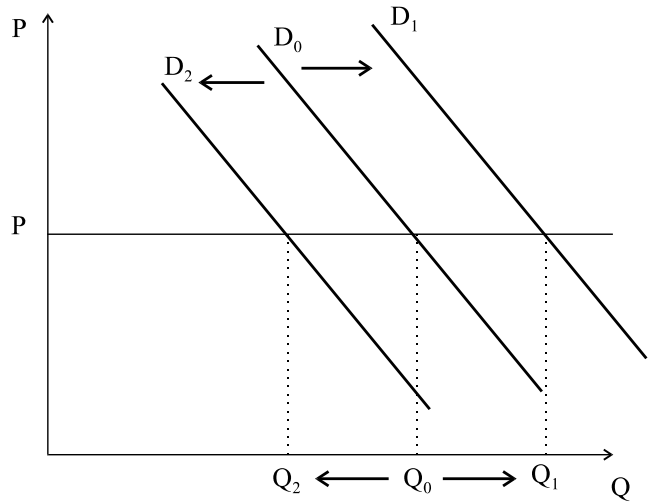

Fig.5.4. A Change in One or More of the Determinants of Demand

The demand curve will shift:

► *outward*, if the market demand increases from, say, the original curve D_0 to curve D_1, so that quantity demanded at the price level P will be greater (Q_2);

► *inward*, if market demand decreases from, say, the original curve D_0 to curve D_1, so that the quantity demanded at the price level P is now less (Q_2).

5.2.2. Demand Shifters

In the simple demand model we are discused up to now, "other things being equal" (or ceteris paribus) assumption ignores exogenous variables (things that happen outside the model). But

there are some common exemples of exogenous, real-world causes of shifts in demand.

An increase or decrease in the demand for a specific product can be caused by some nonprice determinants ***(demand shifters)***: changes in consumer tastes, number of buyers, changes in money income, price of related goods, and consumer expectations.

(1) A change in the *number of buyers* in a market, in terms of the increasing or decreasing of consumers will constitute an increase or decrease of their demand.

(2) *A change in consumer tastes*, prompted by advertising, fashion or technological changes can increase or decrease the demand for this product.

(3) *Consumer expectations* about different aspects of the future, such as changes in the product level, can determine a shift in demand in terms of its increase or decrease.

(4) *The change in income* has an impact more complex upon the demand. It depends on the type of the specific product: *normal, inferior* or *luxury goods*.

- ***Normal goods*** are *those for which demand varies directly with the money income*: a rise in income cause an increase in demand and, alternatively, a fall in income cause an decline in demand. Most products are commodities, normal goods and their demand curves slope downward from left to right (negatively).
- ***Inferior goods*** are *those for which demand varies inversely with a change in money income*: a rise in income cause a decline in demand and a fall in income cause an increase in demand.

- ***Luxury goods*** do not obey the law of demand. Their demand curves go an un-typical way: *quantity demanded is higher at high prices than at low prices*. Famous brands of some product (fashion brands, for instance) are desirable especially because they are expensive; their main destination is to express the owner's weath, but they aren't much use for anything else. If they were cheap, they wouldn't serve this purpose, and the quantity demanded of them would be less.

(5) *The price of related goods* has, once again, a complex impact on the demand for a specific product depending on the type of relationship. We distinguish here three types of relationship between two different goods: *substitute goods*, *complementary (associated) goods* and *independent goods*.

- ***Substitutes*** are two or more products for which the price of one good and the demand for the other are *directly* related.
- ***Complements (associated)*** are two or more products for which the price of one good and the demand for the other are *inversely* related.
- ***Independents*** are two or more products for which a change in the price of one would have *little or no impact* upon the demand of the other.

5.3. DEMAND ELASTICITY

5.3.1. Elasticity of Demand

The most basic thing about *elasticities* is that they are measures of how sensitive, how responsive, one variable is to change in

another variable. The specific measure of sensitivity we choose is the ratio of percentage change, for exemple, the percentage change in the dependent variable per unit percentage change in the independent variable.

For any relationship between a dependent variable and one or more independent variables, an elasticity can be calculated between the dependent variable and each of the independent variable.

Generally, ***elasticity*** is *a measure of the percentage change in one variable (say, X) compared to the percentage change in another (say, Y):*

$$E_{xy} = \frac{\%\Delta X}{\%\Delta Y}$$

According to the laws of algebra, elasticity is:

► *positive* if the slope of the function it describes is a positive one;

► *negative* if the slope of the function it describes is a negative one.

In our case, a demand curve, for which quantity demanded changes in the *opposite* direction from a change in price (as price rises, quantity demanded falls and vice versa), except luxury goods, has a *negative elasticity*. Although elasticity usually is mathematically negative, economists generally show it as positive.

As we already saw, demand changes over time as response to changes in prices and income. The point is *how much could be these changes?*

There are two main factors which determine changes in demand: *the level of price in the market* and *consumers'income*.

► ***Price elasticity of demand*** describes *the relationship between changes in price (P) and changes in quantity demanded* (Q_D), whether quantity demanded changes more or less rapidly than does price. Price elasticity of demand shows:

- *how quantity demanded reacts to changes in price*;
- what happens to ***total revenue***, the total sum of money spent in the market on the good in question, when price changes and the demand curve does not shift.

► ***Income elasticity of demand*** *measures the response of the quantity demanded of a good when consumers'income change*.

5.3.2. **Measuring Price Elasticity of Demand**

Price elasticity of demand is measured as the percentage change in quantity demanded divided by the percentage change in price:

$$E_D = \frac{\text{percentage change in quantity demanded}}{\text{percentage change in price}}, \textit{ or}$$

$$E_D = \frac{\text{change in quantity demanded}}{\text{original quantity demanded}} : \frac{\text{change in price}}{\text{original price}}$$

The quantity demanded leads us to a specific level of the ***total revenue (spending),*** *the total sum spent on the good in the market for a specific price*.

Total revenue = Price × Quantity demanded

On the market, can be identified three generic situations (Fig.5.3): *elastic demand*, *inelastic demand*, and *unit elastic demand*.

(1) ***Demand is elastic*** if a given percentage change in price is accompanied by a relatively *larger* percentage change in the quantity demanded.

Price and total revenue change in *opposite* direction:

- when price rises, total revenue falls;
- when price falls, total revenue rises.

$$\% \Delta Q_D > \% \Delta P, \quad so \; Ep > 1,$$

where:

$\% \Delta Q_D$ is the percentage change in the quantity demanded;

$\% \Delta P$ is the percentage change in the level of price;

Ep is the price elasticity of demand.

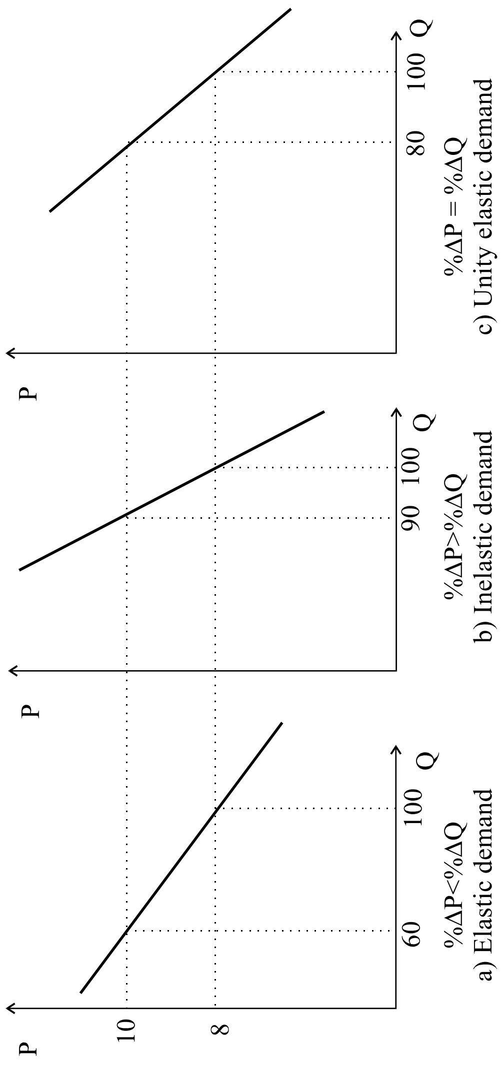

Fig.5.5. Price Elasticity of Demand

Exemple

% ΔP = (10 - 8) / 8 = 25%
% ΔQ_D = (100 - 60) / 60 = 67%
Ep = % ΔQ_D / % ΔP = 67% / 25% = **2,68**

(2) ***Demand is inelastic*** if a given percentage change in price is accompanied by a relatively *smaller* percentage change in the quantity demanded.

Price and total revenue change in the *same* direction. When:

- price rises, total revenue rises;
- price falls, total revenue falls, too.

$$\% \Delta Q_D < \% \Delta P, \quad so \; Ep < 1,$$

where:

% ΔQ_D is the percentage change in the quantity demanded;

% ΔP is the percentage change in the level of price;

Ep is the price elasticity of demand.

Exemple

% ΔP = (10 - 8) / 8 = 25%
% ΔQ_D = (100 - 90) / 90 = 11%
Ep = % ΔQ_D / % ΔP = 11% / 25% = **0,44**

(3) ***Demand has a unit elasticity*** if a given percentage change in price is accompanied by a equally percentage change in the quantity demanded.

$$\% \Delta Q_D = \% \Delta P, \quad so \; Ep = 1,$$

where:

$\% \Delta Q_D$ is the percentage change in the quantity demanded;

$\% \Delta P$ is the percentage change in the level of price;

Ep is the price elasticity of demand.

Exemple

% ΔP = (10 - 8) / 8 = 25%
% ΔQ_D = (100 - 80) / 80 = 25%
Ep = % ΔQ_D / % ΔP = 25% / 25% = **1,00**

These different cases of the price elasticity of demand array between two extreme situations (Fig.5.6): *perfectly elastic demand* and *perfectly inelastic demand*.

(1) Demand is **perfectly elastic** when *there is a small price reduction which would cause buyers to increase their purchases from zero to all they could obtain*; a perfectly elastic demand curve is a line *parallel to the horizontal axis*.

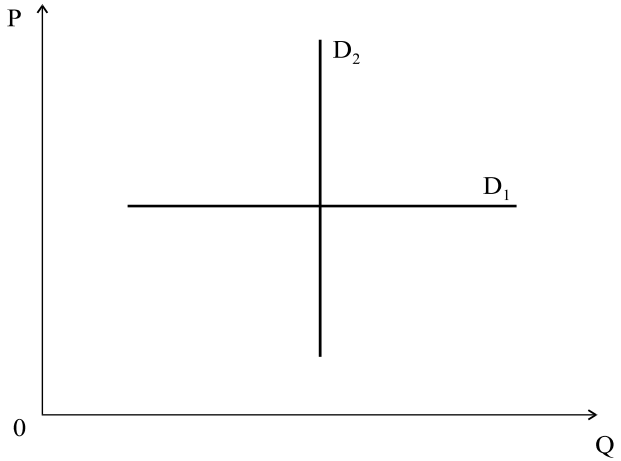

Fig.5.6. Perfectly Elastic (D_1) and Inelastic (D_2) Demand

(2) Demand is ***perfectly inelastic*** *when a change in price results in no change whatever in the quantity demanded*; a perfectly inelastic demand curve is a line parallel to the vertical axis (D_2).

A particular case of the demand elasticity concerne the relationship between the product demand and resource demand.

Generally, the elasticity of demand for any resource will depend upon the elasticity of demand for the product which it helps produce. *The greater the elasticity of product demand, the greater the elasticity of resources demand.*

The explanation consists in the derived nature of resources demand. A small rise in the price of a product with great elasticity of demand will give rise to a sharp drop in output and, therefore, a relatively large decline in the amounts of the various resources demanded. This correctly implies that the demand for the resource is elastic.

5.3.3. **Determinants of Price Elasticity of Demand**

There are several factors which can affect the direction and the magnitude of consumers'adjustments to price changes, depending on their sensibility. The main of these factors are: importance of the good in the consumer's budget, substituibility of the product, type of goods, and the adjustment time available.

(1) ***Importance of the good in the consumer's budget***. Other things being equal, *the larger a good portion in one's budget, the greater tend to be the elasticity of demand for this product*.

Consumers are not very concerned about prices of goods upon which they spend a small percent of their income. Their demand for them tends to be inelastic. But price changes of goods that they spend a large percent of their budget on have much more significant impacts; demand for such goods tends to be *more elastic*.

(2) ***Substituibility of the product*** means the *degree to which a good could be replaced in consumption by another good*. The larger the number of substitute products available, the greater the elasticity of demand.

(3) ***Type of goods: necessities or luxuries***. The demand for goods that consumers consider to be necessities is likely to be more inelastic versus the demand for luxuries and frills, which tends to be elastic.

(4) ***Adjustment time***. Demand changes pertain to a time frame, therefore, for most goods it is important to distinguish between *short-run* and *long-run elasticities*.

Demand tends to be more elastic the longer the time available to adjust to changes in the price level. The explanation of this phenomenon consist in the fact that many consumers, even organizations, are creatures of habits. When the price of a product rises, it is necessary a specific time period to seek out and experiment with other products to verify if they are acceptable.

5.3.4. Cross Elasticity of Demand

If price elasticity of demand expresses the effect of a change in a product's price upon the quantity of *that product*, another virtual influence have to be measured: the price of a *different product.*

Cross elasticity of demand shows *how sensitive consumer purchases of one product (*say *M) are to change in the price of some other product (*say *N).* The formula for the coefficient of cross elasticity of demand is similar to simple price elasticity ,except that we are relating the percentage change in the consumption of X to a percentage change in the price of Y:

$$E_{MN} = \frac{\text{percentage change in quantity demanded of M}}{\text{percentage change in price of N}}$$

Cross elasticity concept allow us to more deeply understand substitute and complementary goods. If cross elasticity of demand is:

► *positive,* quantity demanded of good M varies directly with a change in the price of good N, then M and N are *substitute* goods (for instance: coffee and tea);

► *negative,* quantity demanded of good M varies indirectly with a change in the price of good N, then M and N are *complementary goods*, that means they "go together" in consumption (for exemple: gaz and cars).

5.3.5. Income Elasticity of Demand

Price is not the only factor which influences the quantity demanded. There are many other economic influence and a very important one is consumers'income. The core logic of elasticity also apply in this particular case.

Income elasticity of demand *measures the sensibility of quantity demanded of a good in response to changes in the incomes of consumers who buy it*.

$$E_I = \frac{\%\Delta Q_D}{\%\Delta I}$$

For normal goods, income elasticity of demand is *positive*: quantity demanded rises or falls as income does.

There are two generic situation: income elasticity *above* 1, and income elasticity *below* 1.

(1) ***Positive income elasticity.*** Income elasticity is *above* 1 when *the percentage change in quantity demanded exceeds the percentage change in income*. That means quantity demanded rises or falls faster than income does.

$$\% \Delta Q_D > \% \Delta I,$$

where:

$\% \Delta Q_D$ is the percentage change in quantity demanded.

$\% \Delta I$ is the percentage change in income.

Consumers will spend a larger fraction of their incomes on the good as their incomes rise, and a smaller fraction of their incomes on it when their incomes fall. For most goods the income elasticity coefficient will be positive, but it still varies greatly among products.

(2) ***Negative income elasticity.*** Income elasticity of demand is below 1 when *the percentage change in quantity demanded is less than it is for income*.

$$\% \Delta Q_D < \% \Delta I,$$

where:

$\% \Delta Q_D$ is the percentage change in quantity demanded.

$\% \Delta I$ is the percentage change in income.

That means consumers will spend a smaller fraction of their incomes on the good as their incomes rise, and a larger fraction of their incomes on it when their incomes fall.

5.4. NECESSITIES AND LUXURIES; NORMAL AND INFERIOR GOODS

Depending on their income elasticity of demand, goods are classified in *luxuries* and *necessities*.

► ***Luxuries*** are *those goods with income elasticity of demand above 1*.

► ***Necessities*** are and *those with income elasticity of demand below 1*.

When income falls, consumers cut back more on goods they can do without. Conversely, when income rises, they feel they can better afford these luxuries, for which income elasticity of demand, then, exceeds 1.

Another classification of goods regards their income elasticity of demand. They are *normal (superior),* and *inferior goods*.

► ***Normal (superior) goods*** are those for which the income elasticity of demand is *positive*.That is, as consumer income increases or falls, the quantity demanded of normal goods rises and falls with income. Most goods are normal goods.

All inferior goods are necessities, but normal good are necessities only if they are not luxuries (Fig.5.7).

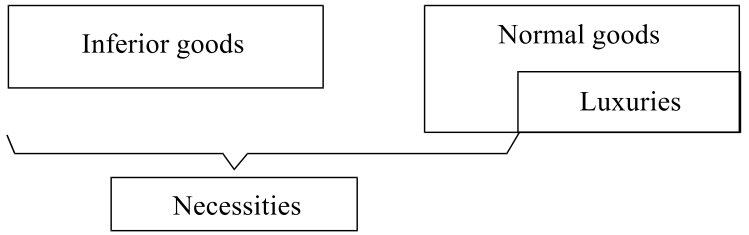

Fig.5.7. Relationships between Normal, Inferior Goods, Necessities and Luxuries

► ***Inferior goods,*** are those for which the income elasticity of demand is *negative*. For inferior goods, quantity demanded of them:

► decreases as income rises;
► increases as income falls.

This negative income elasticity of demand for inferior goods usually occurs because there are more desirable, but also *more expensive*, close substitutes for them.

Consumers' behavior is different depending to changes in their incomes:

► when their incomes *fall*, consumers can adjust by substituting the other way; they buy *more* of the inferior good, substituting it for the more expensive normal good;

► when their incomes *increase*, consumers are more easily able to buy the preffered, but more expensive substitute, close substitutes for them.

The practical significance of income elasticity coefficients is that they help us *predict* which industries are likely to expand in the future and which to decline. Other things being equal:

► a *high positive income elasticity* implies that industry will share more than proportionately in the overall income growth of the economy;

► a *small positive* or, worse yet, a negative coefficient implies a declining industry.

KEY CONCEPTS

Demand
Demand schedule (table)
Demand curve
Demand function (equation)
Quantity demanded
Market demand curve
Law of demand
Elasticity
Elasticity of demand
Price elasticity of demand
Total revenue (spending)
Inelastic demand
Elastic demand
Unit elastic demand
Elasticity of product demand
Elasticity of resource demand
Determinants of demand
Change in demand
Shift in demand
Demand shifters
Cross elasticity of demand
Substitute goods
Complementary goods
Income elasticity of demand
Positive income elasticity
Negative income elasticity
Necessities
Luxuriy goods

Perfectly elastic demand
Perfectly inelastic demand
Normal (superior) goods
Inferior goods

CHAPTER 6

SUPPLY

6.1. SUPPLY AND LAW OF SUPPLY

Supply is *a schedule which summarizes the willingness of firm, as sellers, to produce a given product during a specific time period at each of the various price at which it might be sold*.

6.1.1. **Expressing Supply**

Just as with demand, the information concerning supply can be expressed in three different, but related ways: supply schedules (tables), supply curves, and/or supply functions.

(1) A ***supply schedules*** suppose data are shown in *tables*.

As a tabular statement of a producer's plans or intentions with respect to the production of a specific good, supply for construction

surface, for instance, is represented in table 6.1. It is very important to observe, the quantity supplied at each price level must relate to some specific time period (an hour, a day, a week, a month, a year etc.).

Tab.6.1. An Individual Producer's Offer for Construction Surface (hypothetical data)

Price of the construction surface (monetary unit/square metre)	Quantity supplied (square metre/year)
2	600
4	700
6	800
8	900
10	1.000

(2) A ***supply curve*** shows *the maximum quantity sellers would be willing to offer at each possible price and at any given level of other variables that might affect supply*. In economics texts supply curve usually could be a straight line which is assumed to be positively sloped (Fig.6.1).

Other things being equal:

► as price increases, the corresponding quantity supplied rises;

► as price falls, the corresponding quantity supplied falls.

It is the ***law of supply***. It states the producers are stimulated or dissapointed according to the movement of price: an increase or a decrease.

► A *higher price* would encourage sellers to offer more, partly because it would help cover the costs of expansion. If any of the variables that affect production costs change, then the whole supply curve would shift.

► A *lower price* would discourage sellers to continue offering on the market and, consequently, it is most likely, they will restrain their production capacities.

The supply curve in a graph usually *slopes upward from left to right (positively)*, reflecting the law of supply.

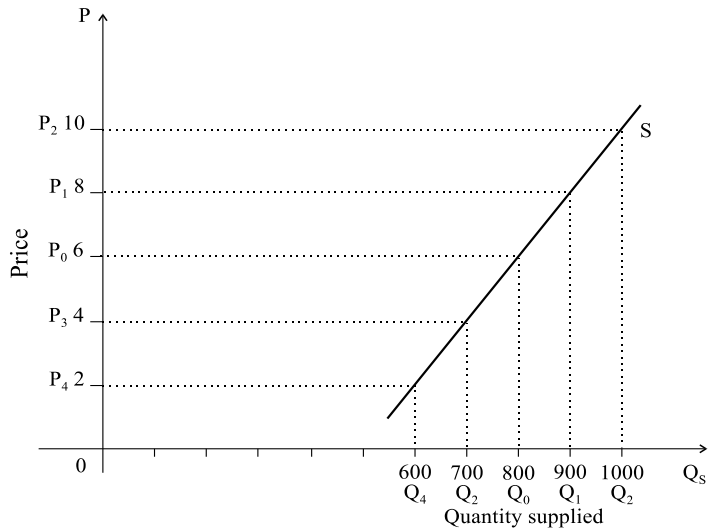

Fig.6.1. An Individual Producer's Supply Curve

(3) A ***supply function*** is *a mathematical relationship between price and quantity supplied*. In the graph (Fig.6.1) we observe as

price increases by 2 monetary units, quantity supplied rises by 100 units (quadrat metres in our case). This suggest a supply function.

6.1.2. **The Quantity Supplied**

Quantity supplied is *the amount of a good that will be produced for the market at a given price*. The graph from figure 6.1. shows different price and quantity supplied combinations:

- ► at market price P_0 (6 m.u.), quantity supplied will be Q_0 (800 square metres);
- ► at market price P_2 (10 m.u.), quantity supplied will be Q_2 (1.000 s.m.);
- ► at market price P_4 (2m.u.), quantity supplied will be Q_4 (600 s.m.).

The effects of changes in price on the quantity supplied are different. Suppose that price starts out at P_0, with associated quantity demanded of Q_0 (Fig.6.1):

► if price *rises* from P_0 to P_2, quantity supplied will *rise* from Q_0 to Q_2; at higher prices, quantity supplied will be higher;

► if prices *falls* from P_0 to P_4, quantity supplied will *fall* from Q_1 to Q_2; at lower prices, a lower quantity will be supplied.

6.1.3. **Market Supply Curve**

Because producers are willing and able to offer different amounts at different price levels for a specific good, ***market supply***

curve is the cumulative individual supplies for that good. It is found by taking the *horizontal summation of all the individual supply curves for a good*. This way, the supply curve S shows how much of the good Q producers will offer in the market at each possible price P (Fig.6.2).

Exemple

Suppose that there were just two suppliers in the market for the good G: supplier A and supplier B. Their individual supply curves will be different, according to their different productions for the good G. Figure 6.2 represents the two individual supply curves along with the market supply curve for good G, obtained by a horizontal summation of the two individual curves.

The market supply curve for good G is found by *summing together the quantities that both producers offer at each price*. For exemple, at a price of one monetary unit, supplier A offers two units, while supplier B offers just one unit, and the market supply will be 2+1=3 units of good G.

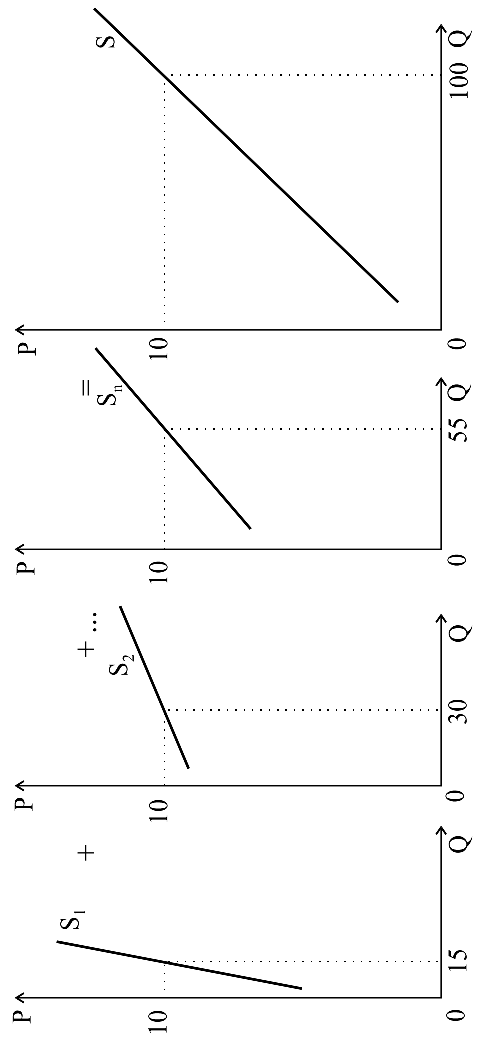
P
10
0
15
Q
S_1
+
P
10
0
30
Q
S_2
+ ...
P
10
0
55
Q
S_n
=
P
10
0
100
Q
S

Fig.6.2. Market Supply Curve (S) as a Sum of Individual Supply Curves (S1 + S2 +.....+Sn)

6.2. CHANGES IN SUPPLY

6.2.1. Shifts in Supply

Supply on the market does not always stay the same. Prices change and, consequently, quantities supplied change.

A ***change in supply*** refers to a shift in the entire supply curve that moves either (Fig.6.3):

► outward, to the right (an *increase in supply*);
► inward, to the left (a *decrease in supply*).

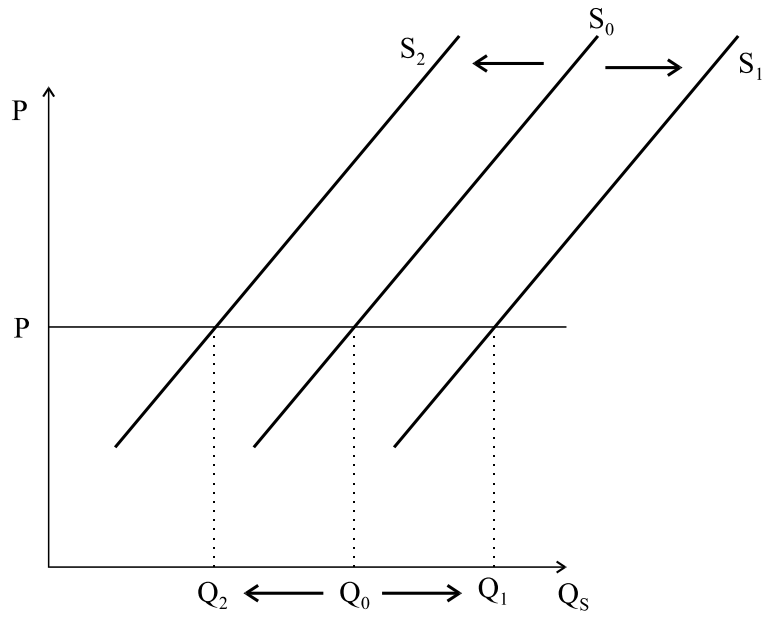

Fig.6.3. A Change in One or More of the Determinants of Supply

The supply curve will shift:

► *outward* if market supply increases from, say, the original position S_0 to curve S_1, so that quantity supplied at the price level P will be greater (Q_1);

► *inward* if market supply decreses from the original position S_0 to curve S_2, so that quantity supplied at the price level P will be now less (Q_2).

6.2.2. Supply Shifters

An increase or decrease in the supply for a specific product can be caused by some ***non-price determinants (supply shifters)***: price of production factors, expectations about future level of product price, price of related goods, level of taxes and subsidies, technological changes, and the characteristics of the industry.

(1) ***A decrease in the resource price*** will lower production costs and, consequently, shifts the supply curve to the right. Conversely, an increase in input prices will raise production costs and reduce supply, shifting the supply curve to the left.

(2) **Expectations concerning the future price of a product** can affect a producer's current willigness to supply that product. He will be stimulated to increase its own supply if he anticipate a future rise of the price or to decrease its own supply if he anticipate a future fall down of the price.

(3) ***A change in the price of other goods*** can also shift supply curve for a product, especially if this will be further manufacturated (exemple: the supply for iron minerals will depend on the demand and price of steel in the market).

(4) ***Increasing taxes*** usually reduces supply, because businesses treat most of them as costs. Conversely, ***subsidies*** stimulate producers to increase their supply in such area.

(5) ***Technological changes*** and the perspective of producing at lower costs will stimulate producers to increase their supply.

(6) Industries that have in their structure lots of small firms differ from those with few firm in the way supply is determined. Given the ***scale of operations*** of each firm, the larger the number of suppliers, the greater will be market supply and the supply curve will shift to the right. Conversely, the smaller the number of firms in an industry, the less the market supply will be, firms leave that industry and supply curve will shift to the left.

6.3. SUPPLY ELASTICITY

6.3.1. Price Elasticity of Supply

As we already saw, supply changes over times as response (reaction) to changes in price. The point is *how much could be these changes?*

Price elasticity of supply *describes the relationship between changes in price (P) and changes in quantity supplied (Q_s):* whether quantity supplied changes more or less rapidly than does price.

Price elasticity of supply is measured as the percentage change in quantity supplied divided by the percentage change in price. When calculated, price elasticity of supply should be positive. Therefore, when market price changes, total revenue will change in the same direction as price:

- ►increases in price lead to increases in total revenue;
- ►decreases in price lead to decreses in total revenue.

$$E_S = \frac{\%\Delta Q_S}{\%\Delta P}$$

Supply elasticity is calculated in the same fashion as demand elasticity. In the market, can be identified three generic situations (Fig.6.4): elastic supply, inelastic supply, and unit elastic supply.

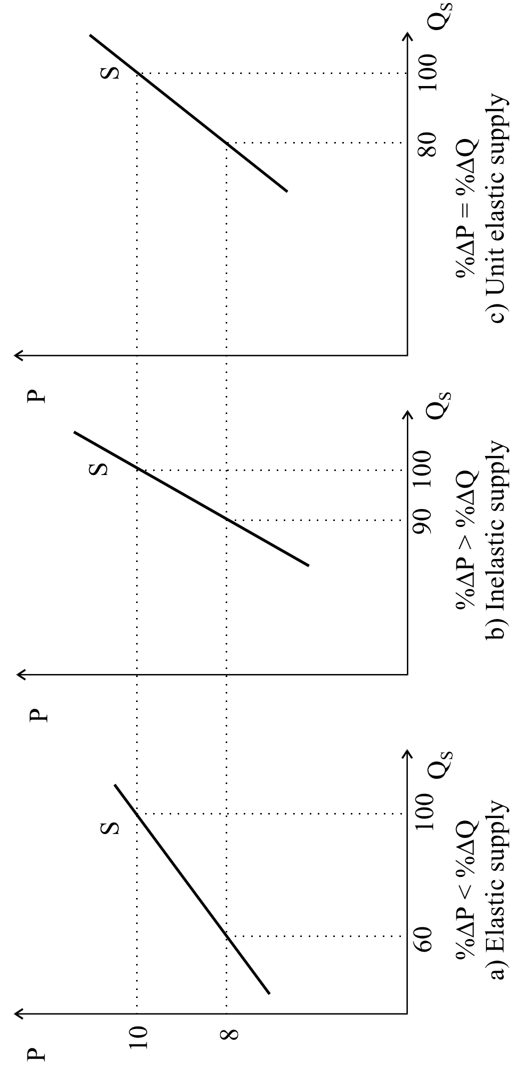

Fig.6.4. Price Elasticity of Supply

(1) ***Supply is elastic*** if a given percentage change in price is accompanied by a relatively *larger* percentage change in the quantity supplied. Price and supply change in the *same* direction:

- ► when price rises, supply rises;
- ► when price falls, supply falls, too.

$$\% \Delta Q_s > \% \Delta P, \qquad \text{so } E_s > 1,$$

where:

$\% \Delta Q_s$ is the percentage change in the quantity supplied;

$\% \Delta P$ is the percentage change in the level of price.

E_s is the price elasticity of supply.

Exemple:

$\% \Delta P = (10 - 8) / 8 = 25\%$
$\% \Delta Q_s = (100 - 60) / 60 = 67\%$
$E_p = \% \Delta Q_s / \% \Delta P = 67\% / 25\% =$ **2,68**

(2) ***Supply is inelastic*** if a given percentage change in price is accompanied by a relatively *smaller* percentage change in the quantity supplied.

$$\% \Delta Q_s < \% \Delta P, \qquad \text{so } E_p < 1,$$

where:

$\% \Delta Q_s$ is the percentage change in the quantity supplied;

$\% \Delta P$ is the percentage change in the level of price.

E_s is the price elasticity of supply.

Exemple:

$\% \Delta P = (10 - 8) / 8 = 25\%$
$\% \Delta Q_s = (100 - 90) / 90 = 11\%$
$E_p = \% \Delta Q_s / \% \Delta P = 11\% / 25\% =$ **0,44**

(3) ***Supply has a unit elasticity*** if a given percentage change in price is accompanied by a *equally* percentage change in the quantity supplied.

$$\% \Delta Q_s = \% \Delta P, \qquad \text{so } E_p = 1,$$

where:

% ΔQ$_s$ is the percentage change in the quantity supplied;

% ΔP is the percentage change in the level of price.

E_s is the price elasticity of supply.

Exemple:

% ΔP = (10 - 8) / 8 = 25%
% ΔQ_s = (100 - 80) / 80 = 25%
E_p = % ΔQ_s / % ΔP = 25% / 25% = **1,00**

6.3.2. Impact of Time

Elasticity of supply depends partly on the time available for firms to adjust to market price changes. The amount of time which a producer has to respond to a given change in product price is the main determinant of the elasticity of supply.

Generally speaking, a greater output response is expected the longer the amount of time a producer has to adjust to a given price change. This is because a producer's response to an increase in the price of product X depends upon its ability to shift resources (factor

of production) from the production of other goods to the production of X. This resources shifting takes time.

We distinguishes between immediate market period, short-run, and long- run (Fig.6.5).

(1) In the ***immediate market period***, there is insufficient time to change output, so supply will be perfectly inelastic.

(2) In the ***short-run,*** firms are restricted by plant capacity, factory, supplies etc., but output can be altered by changing the intensity of its use, so supply will be more elastic.

(3) In ***the long-run,*** all necessary adjustments, including changes in plant capacity, can be made and supply become still more elastic.

6.3.3. Perfectly Inelastic Supply

Perfectly inelastic supply occur when supply curve is graphed as a *vertical line.* In this situation, supply cannot change *at all*, no matter how high or low prices go.

When supply is perfectly inelastic, shifts in demand change only price and total revenue, since quantity supplied cannot change.

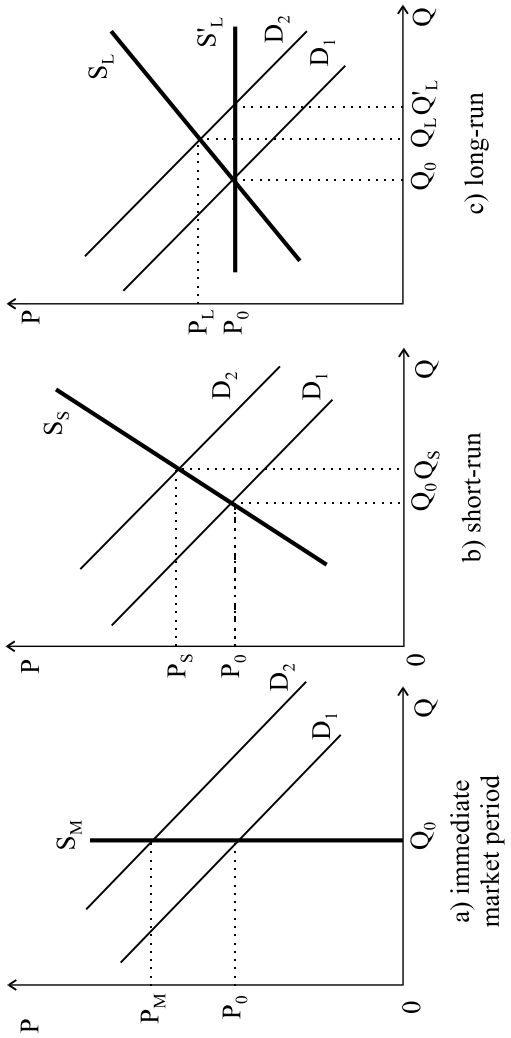

Fig.6.5. Time and Elasticity of Supply

As we already saw, the immediate run is a time period so short that firms cannot make any adjustments at all; during this time, supply must remain perfectly inelastic.

For some *goods that are very expensive* and take a long time to produce (buildings, factories etc.), the immediate run can be quite a while. Until new ones can be planned, designed, built and brought on line, the fixed, perfectly inelastic supply of existing ones will be all there is.

Some other goods have, by their nature, a *permanently limited supply available*, and their supplied quantity can never be augmented. Land and certain rarities (faimous paintings, stamps, coins etc.) are exemples. For each there is a fixed amount in existence, and no more can be made.

KEY CONCEPTS

Supply
Supply schedule (table)
Supply curve
Supply function (equation)
Law of supply
Quantity supplied
Market supply curve
Determinants of supply (supply shifters)
Change in supply
Shift in supply
Price elasticity of supply
Elastic supply
Inelastic supply
Unit elastic supply
Time and elaticity of supply
Immediate market period
Short-run
Long-run
Perfectly inelastic supply

CHAPTER 7

THEORY OF CONSUMER BEHAVIOR

Economic theory of consumer behavior explaines how consumers allocate their incomes and how this determines the demands for various goods and services. This, in turn, can help economists to understand how changes in income and prices affect demand and why the demand for some products are more sensitive than others to changes in price and income.

There are three main aspects here:

► *consumer preferences* – how people might prefer one good to another;

► *budget constrains* – the limited incomes which have to be allocated among consumption items;

► *consumer choices* – which means putting together consumer preferences and budget constrains.

7.1. CONSUMER CHOICE

The theory of ***consumer behavior*** describes how individual consumers make ***economic choices***, given their ***preferences***, their incomes and the price of good that they desire to purchase. The key concept is here *marginal utility*. The model of consumer choice allows us to predict how consumers will respond to changes in market conditions.

The theory of consumer choice is built on the assumption that people behave rationally in attempting to maximize the satisfaction they can obtain by purchasing a specific combination of goods and services.

A typical consumer can be described like this:

► he is a fairly rational person who attempts to dispose of his income in such a way as to derive the greatest amount of satisfaction (utility) of it (a *rational behavior*);

► he has rather clear-cut *preferences* for various goods and services available in the market;

► he has a ***limited money income (budget)*** because he supplies limited amounts of human and property resources to businesses;

► because the products he wants have *price* tags on them, he will be able to purchase only a limited amount of goods.

The consumer must make compromises. That means ***choices (trade-offs)*** must be made among alternative goods to obtain with limited money resources the most satisfying mix of goods and services. Consequently, consumer choice can be viewed in two related parts:

► the study of *consumer preferences*;
► the analysis of the *budget line*, which constrains the *choice*s a person can make.

7.2. LAW OF DIMINISHING MARGINAL UTILITY

Consumers allocate their limited resources in order to buy goods and services that yield them the most satisfaction (utility). ***Utility*** is *the satisfaction obtained from the consumption of goods and services*.

Utility is a *subjective* measure of satisfaction that varies from a people to another, according to each individual's *preferences.* It is not possible to measure different utilities, nor is it possible to claim that one individual's utility is higher than another's. Utility is just a unitless measure that economists use in their explanation of consumer behavior.

Utility has two specific characteristics:

► it is *different* from "usefulness";
► it is a *subjective concept*, because it will vary widely from person to person for the same product.

There are four aspects of the economic utility: cardinal utility, ordinal utility, marginal utility, and total utility.

(1) ***Cardinal utility*** refers to putting an *absolute* measure of utility upon goods and services that form in their different combinations various market baskets. In this case, the value judgement is: "I like this product twice as much I like that product".

It is an interpersonal utility comparison. Cardinal utility cannot be measured.

(2) ***Ordinal utility*** expresses the utility only by *ranking* the consumer's preferences among goods and *market baskets*. This time, ordinal utility can be measured. The value judgement is: "I like this product the most, this one next, this one third - best, a.s.o.".

By asking costumers if they like product M more, less or the same as B, responses make possible rank-ordering goods and services in order of *preferences.*

(3) ***Marginal utility*** of a good or service is the *additional* utility a consumer receives from the consumption of *one more unit* of it, while holding consumption of everything else constant.

(4) ***Total utility*** is the utility that an individual receives from consuming a certain amount of a particular good or service.

Law of diminishing marginal utility states that *the marginal utility that ones recives from consuming succesive units of the same good or service will decrease as the number of units consumed increases*. This law is a key element in the theory of consumer behavior.

Exemple

Consider the thirst specific to a hot sommer day and many glasses of mineral water. We assume all the units of mineral water glasses are considered here to be *identical*.

The utilities that one obtains from drinking succesive glasses of mineral water are *different*. The first glass just begins to quench its thirst; the utility received is quite high and it is very satisfying because the consumer is very thirsty. If the consumer drinks a second one, the utility received from it is *less* than the utility received from the first one. The marginal utility of the second glass is lower because the consumer already has had one and he is no

more thirsty as before. A third glass of water might also provide some utility, but not as much as the second glass. A fourth glass cannot be finished.

To sum up, *for each additional unit consumed , the marginal utility of normal good is declining, while the total utility is increasing, but by less*.

7.3. CONSUMER EQUILIBRIUM

Consumers have limited incomes with which to buy goods and services, so they can't consume all of everything that they may want. Consequently, their objective will be to *allocate* their incomes so as to buy the one combination of goods and services that allows to maximize utility by getting the most utility possible from spending their incomes. This is the *principle of utility maximization*.

In ***maximizing total utility***, the consumer faces a number of *constraints:*

► *the consumer's income;*
► the *price of the good and services* that the consumer wishes to consume etc.

The consumer's effort to maximize total utility is refered to as the *consumer's problem.* In this respect, the *consumer equilibrium* is referred to as solution to the consumer's problem. This entails decisions about how much the consumer will consume of a number of goods and services.

7.3.1. Determining the Consumer Equilibrium

Consumers maximize utility by allocating their incomes so that the ***marginal utility per monetary unit spent*** to be the same for all goods and services consumed. The marginal utility of the last unit of good 1 consumed (MU_1) divided by the price of good 1 (P_1) must equal the result of the same calculation for good 2, good 3, etc.

$$\boldsymbol{MU_1/P_1 = MU_2/P_2 = ... = MU_n/P_n}$$

Exemple

To illustrate how the consumer equilibrium condition determines the quantity of goods that the consumer demands, consider the simplier case of a consumer who is choosing among only two goods: good A and good B.

This consumer knows the prices of good A and good B and has a fixed income (budget) that can be used to purchase quantities of goods A and B. It is expected the consumer will buy quantities of good A and B so as to completely exhaust the budget for such purchases.

The actual quantities purchased of each good are determined by the condition for consumer equilibrium:

$$\boldsymbol{MU_A/P_A = MU_B/P_B}$$

This condition states that the marginal utility per monetary unit spent on good A must equal the marginal utility per monetary unit spent on good B.

If, for exemple: the marginal utility per monetary unit spent on good A were *higher* than the marginal utility per monetary unit spent on good B, then it would make sense for the consumer to purchase more of good A rather than purchasing any more of good B.

After purchasing more and more of good A, the marginal utility of good A will eventualy *fall* due to the law of diminishing marginal utility, so that the marginal utility per monetary unit spent on good A will eventually *equalize* that of good B. Of course, the amount purchased of good A and B cannot be unlimited and will depend not only on the marginal utilities per monetary unit spent, but also on the consumer's budget.

The condition for consumer equilibrium can be further extended to the more realistic case where the consumer must choose how much to consume of *many different goods*. The consumer equilibrium condition for this general situation is to equalize all of the marginal utilities per monetary unit spent, subject to the constraint that the consumer's purchases do not exceed his budget.

7.3.2. An Exemple

Suppose:

- ► the price of good A is 2 monetary unit per unit;
- ► the price of good B is 1 monetary unit per unit.
- ► the consumer has a budget limited to 5 monetary unit.

The marginal utility (MU) that the consumer receives from consuming 1 to 4 units of good A and B is represented in table 7.1. Marginal utility is here measured in fictional units called "*utils*", which serve to quantify the consumer's additional utility (satisfaction) received from the consumption of different quantities of goods A and B. The rule is: *the larger the number of utils, the greater is the consumer's marginal utility from consuming that unit of the good*.

Table 7.1 also contains the ratio of the consumer's marginal utility to the price of each good, obtained by dividing the marginal

utility corresponding to different units of the good to the price of that good.

Tab.7.1. Consumer Equilibrium for Two Goods

Good A:				Good B:			
Units (Q)	Price (P)	Marginal utility (MU)	MU/P	Units (Q)	Price (P)	Marginal utility (MU)	MU/P
1	2	24	12	1	1	9	9
2	2	18	9	2	1	8	8
3	2	12	6	3	1	5	5
4	2	6	3	4	1	1	1

In order to find the consumer equilibrium, we compare the marginal utility per monetary unit spent (the ratio of the marginal utility to the price of a good) for goods A and B, subject to the constraint that the consumer does not exceed her budget limited to 5 monetary units.

The marginal utility per monetary unit spent on the first unit of good A is greater than the marginal utility per monetary unit spent on the first unit of good B (12utils>9utils). The consumer can afford to purchase this firs unit of good B, because its price is 2 monetary unit per unit. After this, he has 5-2=3 monetary units remaining in his budget.

In the next stage, the consumer will compare the marginal utility per monetary unit spent on the second unit of good A with marginal utility per monetary unit spent on the first unit of good B.

These rations are both equal to 9 utils and, consequently, consumer is *indifferent* between purchasing the second unit of good A and first unit of good B. So he purchases both. He can afford this because the second unit of good A costs 2 monetary units per unit and the first unit of good B cost 1 monetary unit per unit, that is a total of 3 monetary units.

At this moment, the consumer has exhausted his budget of 5 monetary units and has reached the consumer equilibrium, where the marginal utilities per monetary unit spent are equal. The resolution about the consumer's equilibrium choice will be to purchase 2 units of good A and 1 unit of good B. *The total utility was maximized and there will be no point to any further switching*.

7.3.3. The Marginal Rate of Substitution

Along with the price ratio between goods, the marginal rate of substitution can be used to determine utility maximization.

The ***marginal rate of substitution (MRS)*** is *the ratio at which consumers are willing to trade between pairs of goods and services at the margin*.

For instance, for two products, A and B, the marginal rate of substitution will be:

$$MRS_{A/B} = MU_A/MU_B$$

It describes how consumer are willing to trade A for B, and conversely.

Exemple:

If $MRS_{AB} = 5$, this means that one unit of good A is five times as valuable (has five times the utility) for the consumer as one unit of good B. The consumer, then, is willing to trade 5 units of B for 1 unit of A.

The marginal rate of substitution (MRS_{AB}) depends upon how much of A and B the consumer is consuming. It will be different for the various cmbinations of the two goods.

Now we turn to the condition of the utility maximization:

$$\boldsymbol{MU_1/P_1 = MU_2/P_2 = ...= MU_n/P_n}$$

By algebric manipulation, the expression above can be rewritten as follows:

$$\boldsymbol{MU_1/MU_2 = P_1/P_2 = ...MU_A/MU_B = P_A/P_B =....}$$

But $MU_A/MUB = MRS_{A/B}$. Thus, another statement of the condition for utility maximization is:

$$\boldsymbol{MRS_{AB} = P_A/P_B}$$

Exemple:

If the price of a unit of X is five times the price of a unit of B, the price ratio (P_A/P_B) will be 5. To maximize utility, MRS_{AB} also must be 5, which means that MU_A is five times MU_B.

7.4. IMPACT OF PRICE CHANGE UPON CONSUMER EQUILIBRIUM

The consumer's choice of how much to consume of various goods depends on the price of those goods. A change in price level of products determines the consumer's equilibrium choice consumption patterns to change.

For considering an exemple, we turn to table 7.1 where the consumer must decide how much to consume of goods A and B.

Suppose the price of good A increases from 2 to 3 monetary units per unit, while the price of good B remains unchanged and everything else remains constant. The ratio of the marginal utility of good A to the price of good A is now changed and this new situation is described in table 7.2.

Tab. 7.2. Impact of Price Change upon Consumer Equilibrium

Good A:				Good B:			
Units	Price (P_A)	Marginal utility (MU)	MU/P_A	Units	Price (P_B)	Marginal utility (P_B)	MU/P_B
1	3	24	8	1	2	9	9
2	3	18	6	2	2	8	8
3	3	12	4	3	2	5	5
4	3	6	2	4	2	1	1

The increase in the price level of good A to 3 monetary units lowers the marginal utility per monetary unit spent on good A relative to the previous case, where the price of good A was 2 monetary units. As before, the new consumer equilibrium is found by comparing the marginal utility per monetary unit spent on good A with the marginal utility per monetary unit spent on good B. The new equilibrium choice made by the consumer will be 1 unit of good A and 2 units of good B.

The reason consists in the similarity of the marginal utilities per monetary unit spent of these two quantities, for which the purchase completely exhausts the consumer's budget of 5 monetary units.

The effect of a price change on the consumption patterns (consumer's equilibrium choice) is often divided into two effects: substitution effect and income effect of a price change.

7.4.1. Substitution Effect of a Price Change

A change in the price of good A affects the total quantity of goods and services that an individual or a household can consume.

The substitution effect *measures the change in consumption brought on by the change in price of a related good.* Relative price changes cause consumers to switch from one good to another. The change in its price makes it more or less attractive relative to other goods.

Exemple

In the exemple considered above, as the price of good A rises from 2 monetary units to 3 monetary units, good A becomes more expensive relative to good B, thus less attractive for the consumer,

while good B becomes less expensive relative to good A, thus more attractive.

It is consequently expected that the consumer to respond to this price increase by substituting her consumption away from good A and toward good B. He is going to change his consumption choice from 2 units of good A and 1 unit of good B to a new pattern: 1 unit of good A and 2 units of good B.

7.4.2. Income Effect of a Price Change

A change in the price of a good also affects the total quantity of goods and services that a consumer or a household can consume.

The income effect *measures the change in consumption brought on by the change in a consumer's effective income due to a change in price of a good*.

As a result of a change in price of a good, the ***real purchasing power* (*real income*)** of the consumer will change.

► If the price of good A *rises*, the consumer's purchase power *decreases*. The consumer can no longer afford to buy everything he used to and his total consumption will have to be cut back. The same income buys less total utility than before; effective income has fallen.

► If price of good A *decreases*, the consumer's purchase power *increases*. The consumer can afford to buy more, consequently its consumption will increase. The same income buys more total utility than before; effective income has rised.

Exemple

In the exemple above, the increase in the price of good A from 2 monetary units to 3 monetary units reduces the consumer's real

purchasing power. Prior to the price change, the consumer was able to purchase 2 units of good A and 1 unit of good B using his budget of 5 monetary units. After the price of good A rises to 3 monetary units, the consumer is no longer able to purchase the same bundle of goods because it would cost 7 monetary units and his budget is limited at only 5 monetary units. That's because he must reduce his spending.

The income effect is here the portion of the consumer's change in the consumption of good A as consequences of the change in his real purchasing power (real income).

7.4.3. Consumer's Perception of Supply

We explained that the consumer maximizes utility when the marginal utility per monetary unit spent on each good consumed is the same. If he consumes any more of a good, its marginal utility will fall because of the law of diminishing marginal utility.

If the consumer is to continue maximizing utility, then, in order for the equality $MU_A/P_A = MU_B/P_B$ =....to hold, P_n, the price of good *n*, also must fall. Therefore, the utility-maximizing consumer will buy more of a good only if its price falls and the consumer's demand curve for the good is sloping *downwards*.

Usually, the consumers are thought of by economists as ***price-takers***. This means that, since each consumer is only one of a great many, *none of them has enough power in the market to influence the market price level by his action alone*.

The consumers expect the market price for each good or service to stay unchanged no matter how much/little the individual consumer chooses to buy. Therefore, to the consumer, market supply is perceived as *perfect elastic.*

7.4.4. Consumer Behavior toward Complementary and Substitute Goods

Complementary goods are those that consumers usually consume *together* in his consumption patterns. Their complementary use leads the consumer to consider the complementary combination of goods, to some extend, to be a *single* good. For exemple: computers and diskettes, VCRs and videotapes, automobiles, gas and tires etc.

The consumer behavior toward complementary goods is: *if the price of a complementary good rises, then, the consumption of that good and its complement will fall, and vice versa*.

Substitute goods are those that the consumer can exchange for one another in his consumption patterns. For exemple, tea and coffee, liquid and solid soap, etc. Because the consumer is not able to distinguish between perfect substitutes at all, he will consume only the cheapest, and none of the others.

The consumer can tell the difference between *close substitutes* and may consume some of each, but he is still very sensitive to their substitutability. A change in price of one will determine changes in the consumption of all of them.

The consumer behavior toward substitute goods is: *if the price of one close substitute rise, the consumer will buy less of it and more of the other, and vice versa*.

7.5. CONSUMER SURPLUS

Consider the consumer's demand curve (D) for a good and the consumer's perfect elastic perception of the market supply at price level P_S (Fig.7.1).

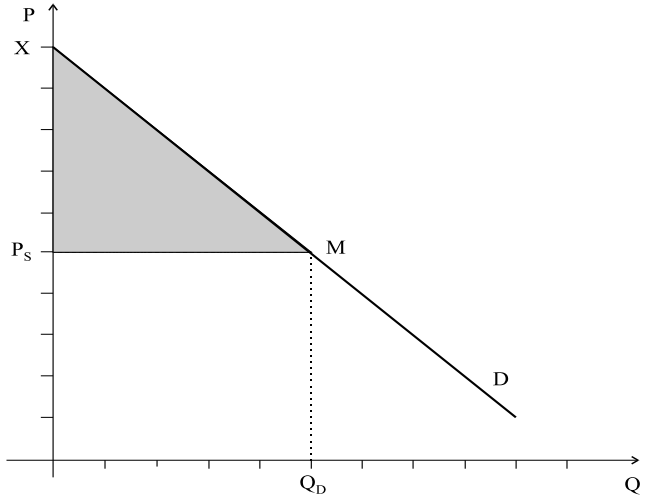

Fig.7.1. Consumer Surplus is the Shaded Area X, P_S, M.

The consumer tray to maximize his utility. The P_S is a monetary measure of what the last unit consumed of the good (the marginal unit) is valuable to the consumer.

Due to the law of diminishing marginal utility, marginal utility (MU) of the other units consumed will exced the marginal utility (MU) of the marginal unit. While demand curve (D) shows that the consumer would have been willing to pay *more* than P_M for each of those units because of their higher marginal utility, they still cost

only P_M per unit. Consequently, for this other units, the consumer receives more marginal utility per monetary unit spent than for the marginal unit.

The *extra total utility, determined as difference between the maximum price that consumers are willing to pay for a good and the market price that they actually pay for a good* is called ***consumer surplus***. In the graph from fig.7.1, it is represented as the shadel area X, P_S, M.

Exemple

We assume the market price of 5 monetary unit and the equilibrium quantity demanded of 5 units of a specific good (Fig.7.2).

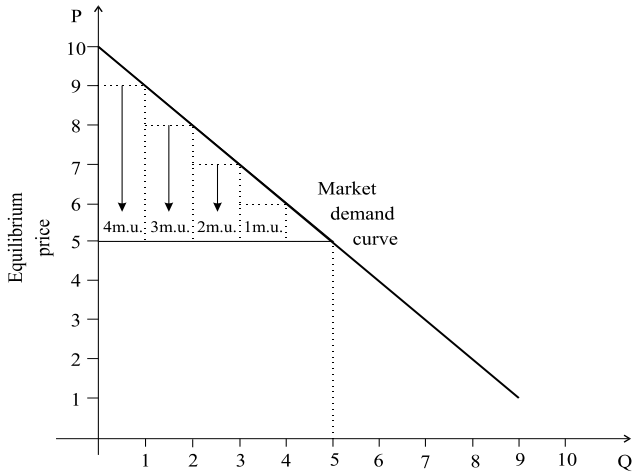

Fig.7.2. Calculation of Consumer Surplus for a Specific gGod

The market demand curve shows that consumers are willing to pay:

- ► at least 9 monetary units for the first unit of the good;
- ► 8 monetary units for the second unit;
- ► 7 monetary units for the third;
- ► 6 monetary units for the fourth unit.

Because they can purchase 5 units of the good for just 5 monetary units, their surplus from the first unit purchased will be:

9 m.u. - 5 m.u. = ***4 monetary units***.

Their surpluses from the next units purchased (the second, the third and the fourth) will be, similarly, 3 m.u., 2 m.u., and 1 m.u., respectively.

The *consumer surplus* will be the total sum of the surpluses calculated above:

4 m.u. + 3 m.u. + 2 m.u. + 1 m.u. = ***10 monetary units***

However, this is only an approximation of the real consumer surplus. To calculate the *true* consumer surplus, we must consider *the whole area of the triangle born below the market demand curve and above the market price*. This triangle having the base of lenght 5 and height of length 5, applying the rule of triangle area (one half the base multiplied by height), the true value of the consumer surplus in this exemple become ***12,5 monetary units***.

7.6. INDIFERENCE CURVE

Consumer behavior can be understood through a more sofisticated explanation based upon budget line and indifference curve.

7.6.1. The Budget Line

The ***budget line (constraint)*** *shows all the various combinations of any two goods which can be purchased, given their prices and the consumer's income* (Tab.7.3) (Fig.7.3).

Because the consumer prefers more to less, he will always select a point on the budget line. The consumer has then a problem of choice (trade-off). Along the budget line, more of the good can be obtained only by sacrificing some of the other good.

Tab.7.3. Combinations of Two Obtainable Goods A and B with an Income of 15 monetary units

Good A:			Good B:			Total
Price	Units	Expenditure	Price	Units	Expenditure	Expenditures
1,5	10	15	3,0	0	0	15
1,5	8	12	3,0	1	3	15
1,5	6	9	3,0	2	6	15
1,5	4	6	3,0	3	9	15
1,5	2	3	3,0	4	12	15
1,5	0	0	3,0	5	15	15

The location of the budget line (constraint) depends upon the prices of the two goods:

► if *no A* is bought, the consumer can buy the maximum affordable quantity Q_B (5 units);

► if *no B* is bought, the consumer can by the maximum affordable quantity Q_A (10 units);

► other *intermediate points* on the budget line are the other affordable combinations between A and B; for instance, the disposable budget of 15 monetary units can be used to buy 6 units of good A and 2 units of good B.

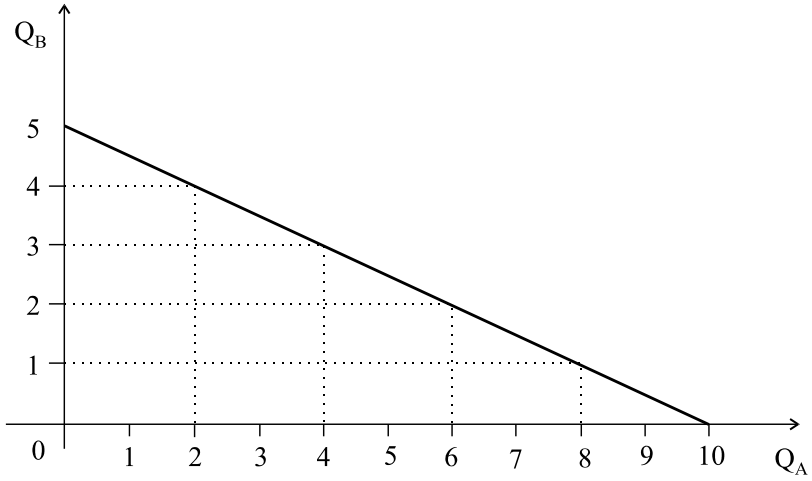

Fig.7.3. Consumer's Budget Line for Two Goods

The location of the budget line varies with changes in both money income of the consumer and prices of the goods in the market.

(1) Changes in *money income of the consumer* will determine a shift of the budget line as follows:

- ► an *increase* in money income will shift the budget line to the *right*;
- ► a *decrease* in money income will move the budget line to the *left*;

(2) *Changes in the price of the goods* in the market will determine a shift of the budget line as follows:

- ► a *decline* in the prices of *both* products (equivalent of a real income increase), will determine the budget line to move to the *right*;
- ► an *increase* in the prices of *both* goods will shift the budget line to the *left*.

7.6.2. The Indifference Curves

An ***indifference curve*** *shows all combinations of two products which will bring to the consumer the same level of satisfaction (utility).* Since all the combinations on one line are of equal utility to the consumer, he is *indifferent* to which is actually consumed. That is why they are called indifference curves.

Exemple

Suppose a two-goods model (Tab. 7.4) and (Fig. 7.4).

Tab.7.4. An Indifference Table (hypothetical case)

Combination	Good A (units)	Good B (units)
l	1	8
m	2	5
n	4	3
p	7	2
q	12	1

The indifference curves cannot intersect and they have several particular *characteristics*: they are downsloping; they are convex; they are many in an indifference map.

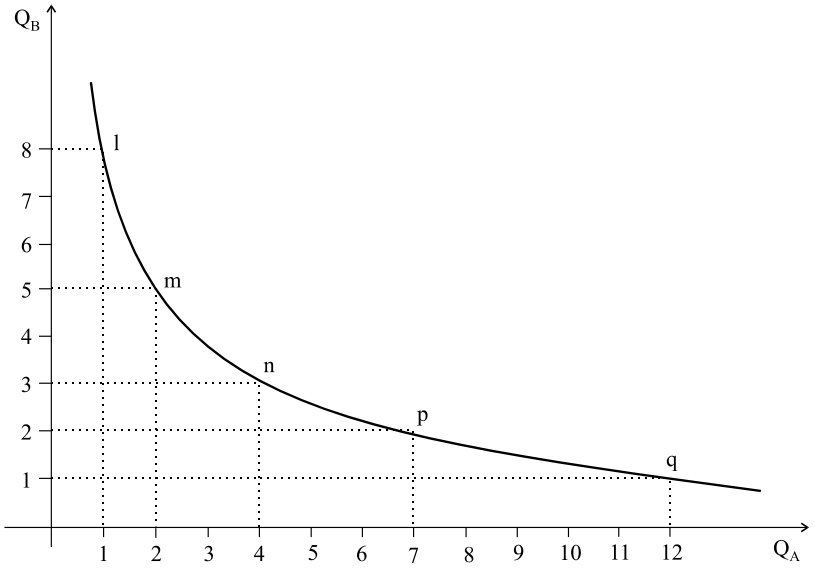

Fig.7.4. A Consumer's Indifference Curve

(1) Indifference curves are *downsloping* because both products yield utility to the consumer.

(2) Indifference curves are *convex* as viewed from the origine because the slope diminishes as we down along the curve.

The slope of the indifference curve measures the *marginal rate of substitution* (MRS) because it shows the rate, at the margin, at which the consumer is prepared to substitute one good for another so as to remain totally satisfied. In other words, the diminishing slope of the indifference curve means the willingness to substitute A for B diminishes as we more down along the curve.

(3) Indifference curves are *many* in a whole set which describes an ***indifference map*** (Fig.7.5); each curve reflects a different level

of total utility for the consumer, the level being higher as we more out from origin to the right.

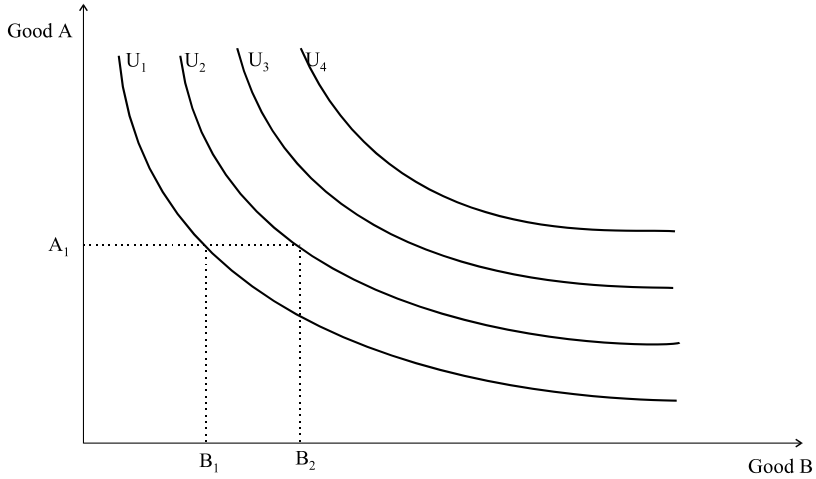

Fig.7.5. Indifference Map

Exemple

One combination on curve U_1 is quantity A_1 of good A and B_1 of good B. Moving to curve U_2, the consumer can consume the same amount of A while increasing consumption of B to B_2. It is a demonstration of the fact that indifference curve U_2 represents a greater total utility, since it can allow consumption of more of B without requiring any A to be given up.

7.6.3. Utility Maximization

We now combine the last two concepts studied, the budget line and the indifference map, in order to explain the ***consumer's utility maximization*** (Fig.7.6).

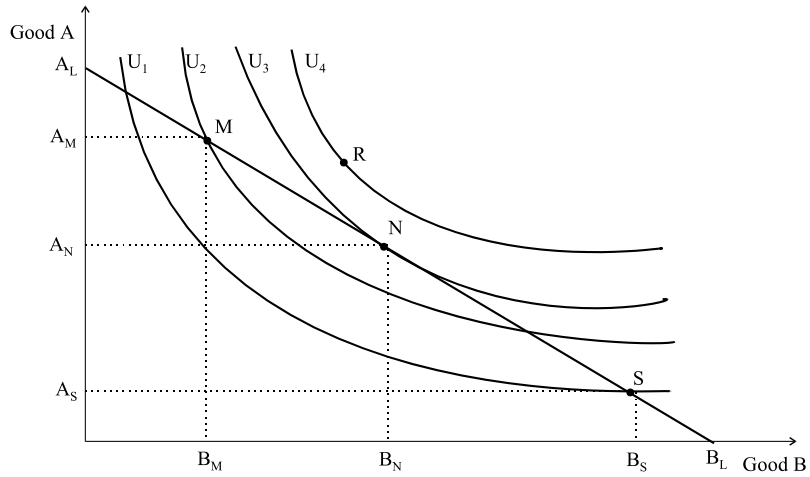

Fig.7.6. The Consumer's Equilibrium Position (Utility Maximization)

The consumer reaches the equilibrium position, where his utility is maximized, at point N, where the budget line is *tangent* to the *highest* indifference curve. This specific point indicates the one combination of goods and the corresponding quantities of each good.

In our graph, this combination will be quantity A_N for good A and quantity B_N for good B, which provides the most total utility obtainable with the consumer's limited income.

Any other affordable combination (say, M or S), also represents attainable combination of A and B, but yield *less* total utility as is evidenced by the fact they are on lower indifference curve. On the

other hand, point R entails more utility than N, but it is outside the budget line and therefore unattainable.

7.7. OTHER APPLICATIONS

7.7.1. Representing the Income/Substitution Effects

We can now review the income and substitution effects studied before using the indifference map (Fig.7.7).

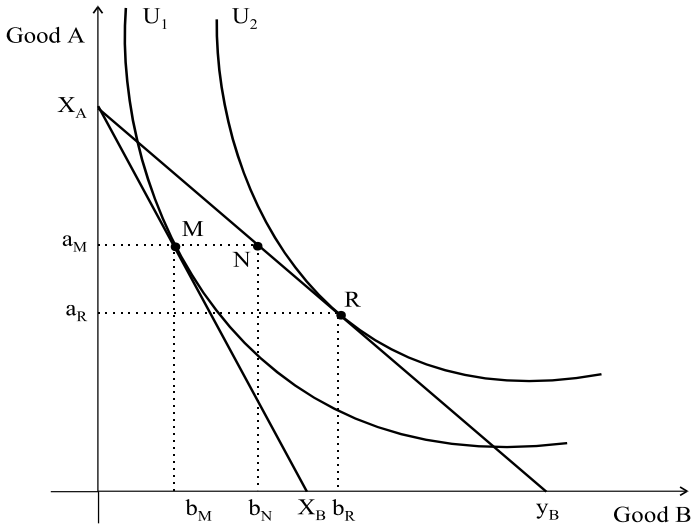

Fig.7.7. Income/Substitution Effects Represented by Indifference Map

Suppose the consumer starts out with budget line X_AX_B. He choose the combination M of the goods A and B, in order to

maximize his utility. The consumer is on the highest indifference curve attainable - U_1. The choosen quantity of B will be b_M.

Then, the price of B falls, and the budget line moves to X_AX_B because for each possible quantity of A purchased, the money left over to buy B will buy more B at the lower price.

On the new budget line, at combination N, the consumer increases purchases of B from b_M to b_N without changing the consumption of A. This additional consumtion of B (the quantity b_Mb_N) results from the *income effect* of the fall in price of B. The drop in price of B leaves the consumer with income left over when the original combination M is bought; the consumer's *effective* income has increased.

Although combination N represents more total utility than combination M, the consumer still has not maximized his utility from the descrease in price of the good B. The budget line reaches the highest indifference curve possible (U_2) at combination of the point R. Combination N is bellow U_2, so the consumer can increase total utility even more, by changing consumption to combination R.

To move from the point N to the point R, the consumer buys an additional quantity b_Nb_R of B, reducing the consumption of A from a_M to a_R. This is the *substitution effect.* This means the additional quantity b_Nb_R of B was *substituted* in place of the quantity a_Ma_R of A which is given up. This way, utility is now maximized.

7.7.2. Representing the Downward-Sloping Demand

A previously discussed concept, the downward-sloping demand, can also be explained using the indifference map (the top graph in the figure 7.8) correlated with the consumer's demand curve (the lower graph in the figure 7.8).

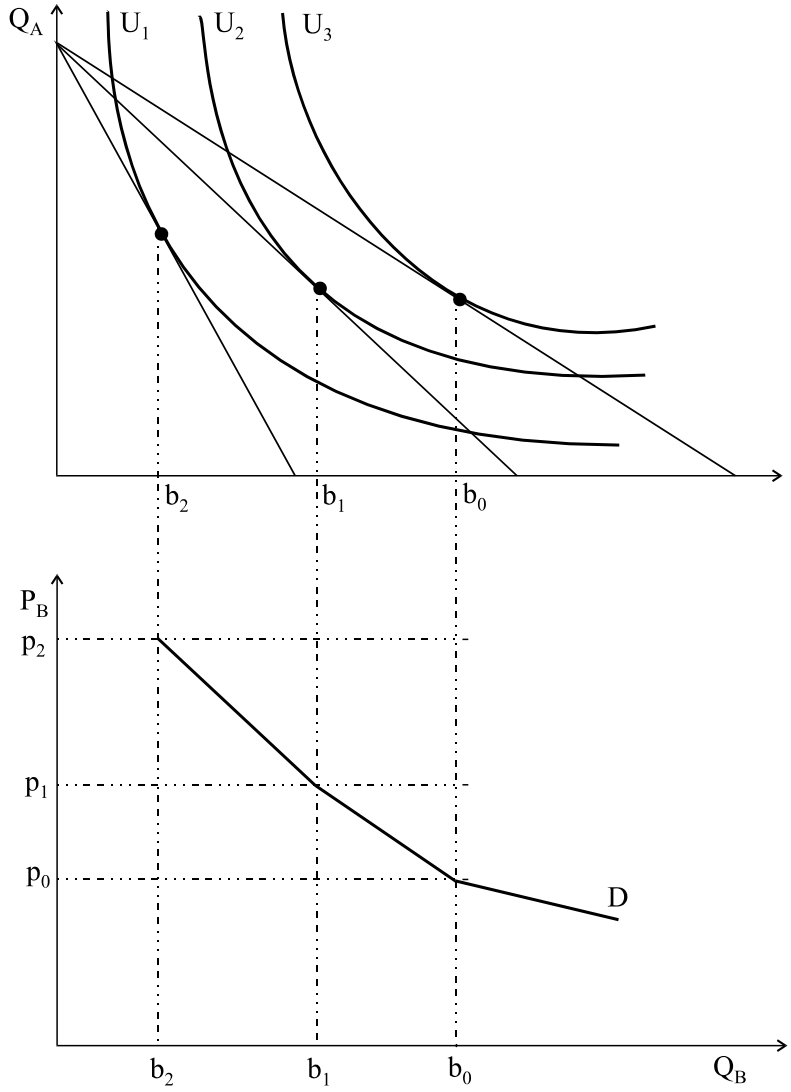

Fig.7.8. Downward-Sloping Demand Represented by Indifference Map

The indifference map shows different quantities of A and B consumed at three different price levels for B: p_0, p_1, and p_2.

If we suppose the price of A does not change, then we can depict three separate budget lines, reflecting the different prices of B. The consumer will buy quantity b_0 of B at the price level p_0, quantity b_1 of B at the price level p_1, and quantity b_2 of B at the price level p_2.

Consumer's demand curve (D) for B is represented in the lower graph. The horizontal axes on both graphes in the figure are the same: the quantity demande of B. The resulting demand curve D slopes downward, meaning that larger quantities of B will be consumed as price of the product B falls (the law of demand).

KEY CONCEPTS

Consumer behavior
Consumer choice (trade-off)
Consumer preferences
Limited income (budget)
Cardinal utility
Ordinal utility
Marginal utility
Total utility
Law of diminishing marginal utility
Maximizing total utility (consumer equilibrium)
Marginal utility per monetary unit spent
Marginal rate of substitution
Substitution effect of a price change
Income effect of a price change
Real purchasing power
Consumer surplus
Budget line (constraint)
Indifference curve
Indifference map

Utility maximization

CHAPTER 8

MARKET EQUILIBRIUM

A ***market*** is *a mechanism which brings together buyers and sellers of particular goods and services, and operates in order to allocate resources.*

Markets exists in a wide and complex variety of forms:
resources market; labor market; capital market; monetary market.
Each of them has its own subdivisions.

Regardless the specific type, any market has three crucial *elements*:

► ***buyers*** – those who are seeking to acquire the good or service, forming the *demand*;

► ***sellers*** – those who are offering the good or service, forming the *supply*;

► ***prices*** – established so that to satisfy both groups simultaneously.

Economic activities that determine society's allocation of its resources depend upon supply and demand. These are the forces that drive markets and are the fundamental aspects of microeconomics. In this context, the firms decide what to produce, how to produce it, and how much to consume.

8.1. DEFINING MARKET EQUILIBRIUM

The previous two chapters have examined the demand decisions of buyers and the supply decisions of sellers, *separately*. However, in the market for a particular good X, the decisions of buyers *interact simultaneously* with the decisions of sellers.

The market mechanism is the *tendency* for supply and demand to equilibrate, so that there is neither excess demand nor excess supply. When the demand for good X equals the supply of good X, the market for good X is said to be in ***equilibrium (market clearing)***.

Supply-demand analysis is one of the basic tools of microeconomics. In competitive markets, supply and demand curves tell us how much will be produced by firms and how much will be demanded by consumers as a function of price.

If we could estimate, at least approximatively, the supply and demand curves for a particular market, we could calculate the market-clearing price by equating supply and demand. Also, if we know how supply and demand depend on other economic variable, such as income or the prices of other goods, we could calculate how the market-clearing price and quantity will change as these other variables change. This is a means of explaining or predicting market behavior.

The intersection of demand curve (D) and the supply curve (S), point E on the graph (Fig.8.1), expresses *equilibrium* between market supply and market demand.

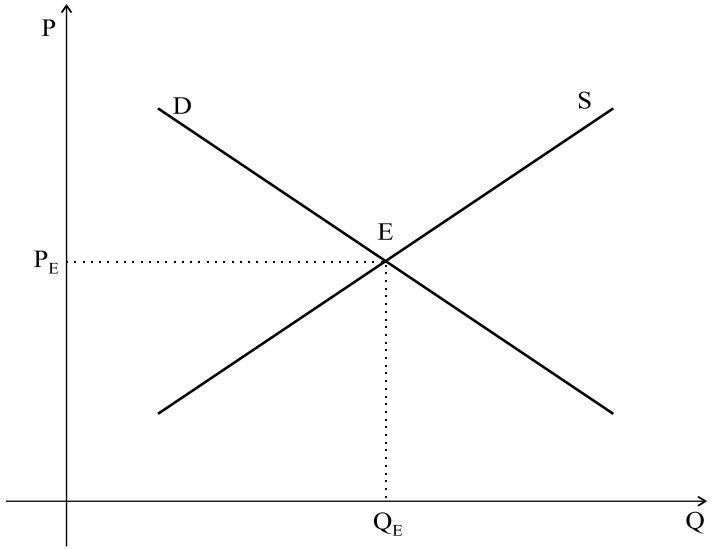

Fig.8.1. Market Equilibrium

In the graph from figure 8.1, the intersection of demand (D) and supply (S) is the only point where quantity demanded and quantity supplied are equal *at the same price.* This condition defines market equilibrium. *So long as demand (D) and supply (S) do not change, the market will remain in this equilibrium and will be stable*.

Associated with any market equilibrium will be an equilibrium quantity and an equilibrium price.

► The ***equilibrium quantity*** *of good X is that quantity for which the quantity demanded of good X exactly equals the quantity supplied of good X*.

► The ***equilibrium price*** *for good X is that price per unit of good X for which the quantity demanded of good X exactly equals*

the quantity supplied for good X. It is the single price at which both sellers and buyers are satisfied. The equilibrium price will tend to change if either the supply or the demand curve shifts.

A crucial assumption of the market model is that price will adjust until the quantity being demanded and the quantity being supplied are the same. At any other price, there would either be:

(1) ***excess demand*** (a "shortage"), when demand exceeds supply;
(2) ***excess supply*** (a "surplus"), when supply exceeds demand.

In either case, we assume that price will adjust upward or downward until there is equilibrium, or market clearing.

The determination of equilibrium quantity and equilibrium price, known as ***equilibrium analysis,*** can be achieved in two different ways: algebraic approach and graphical approach.

(1) The *algebraic approach* to equilibrium analysis is to solve, simultaneously, the algebraic equations for demand and supply. In the exemple given above, the demand equation for good X was

$$P = 10 - 2Q,$$

and the supply equation for good X was

$$P = 1/2\ Q.$$

Consequently, by solving the algebraic system we find:

P = 2 monetary units;
Q = 4 units of good X.

(2) The *graphical approach* to equilibrium analysis is illustrated in figure 8.2 which combines the demand and supply curves into a single graph. The equilibrium price and quantity are determined by the intersection of the two curves.

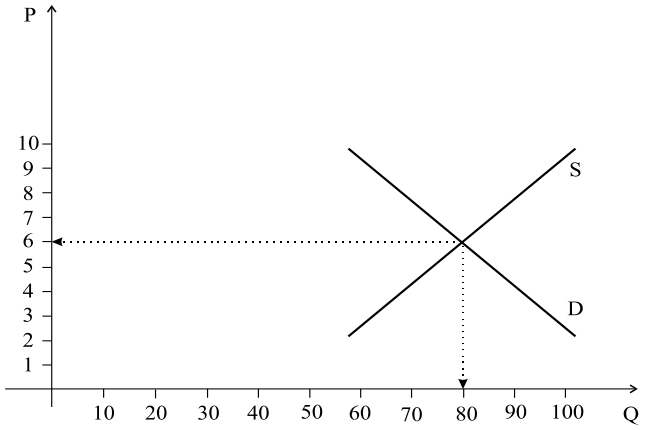

Fig.8.2. Market Equilibrium for Good X

The equilibrium quantity is 80 units for good X, and the equilibrium price is 6 monetary units per unit of good X.

8.2. MARKET DISEQUILIBRIUM AND RESTORING MARKET EQUILIBRIUM

Market disequilibrium (departure from equilibrium) *occurs when the price prevailing in the market is in another point as* P_E. That means, quantity demanded and quantity supplied are not the same either.

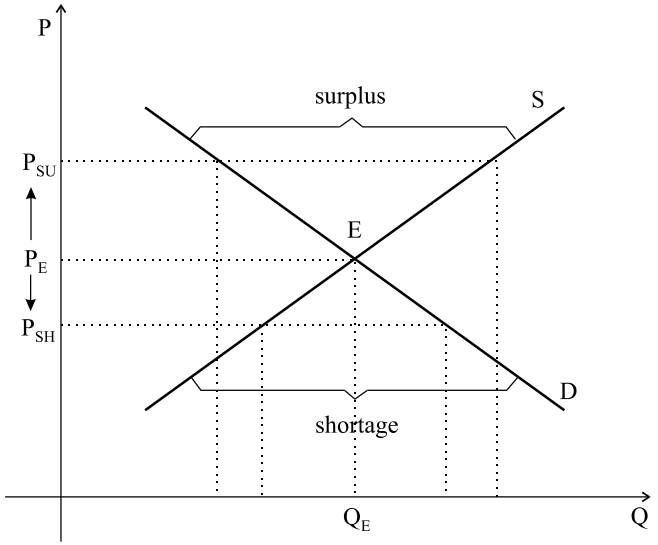

Fig.8.3. Market Disequilibriums

There are two main situations : *surplus (excess supply)* and *shortage (excess demand).*

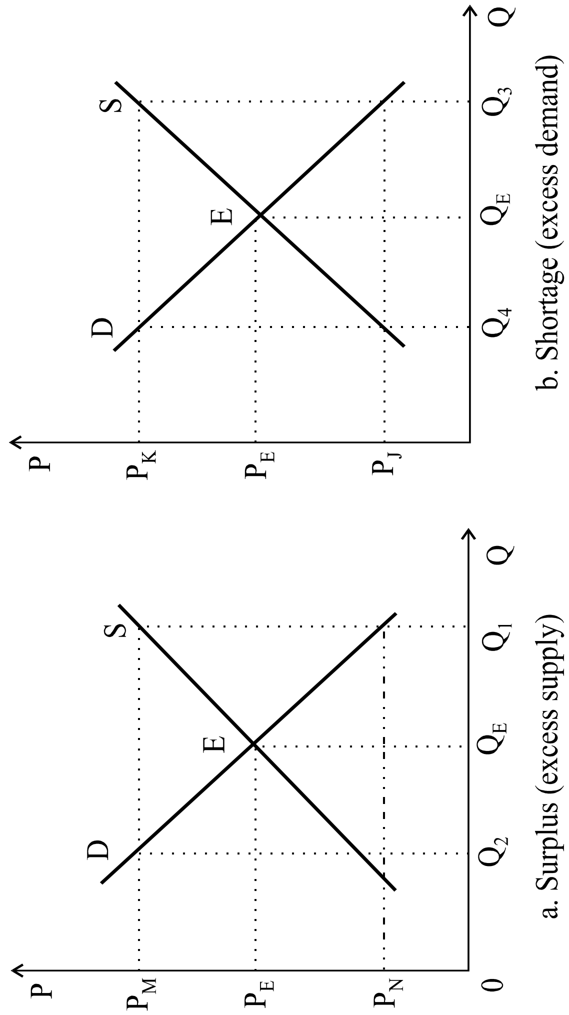

Fig.8.4. Market Disequilibriums

(1) ***Surplus (excess supply or shortfall in demand)*** which would exists at above-equilibrium prices, *push price down* and thereby increases the quantity demanded and reduces the quantity supplied until equilibrium is achieved. This happens because the surplus of good X would prompt competing sellers to bid down the price to incourage buyers to take this surplus off their hands.

In figure 8.4a, at price level $P_{M,}$ quantity demanded is only Q_2, much less than Q_1. As a result, firms will have to cut back their production and reduce price to sell the surplus.

By the law of demand, the quantity demanded (Q_D), will rise as price falls. By the law of supply, the quantity supplied (Q_S) will fall as price falls. This will continue until quantity supplied (Q_S) and quantity demand (Q_D) both are equal (at quantity Q_E). This will be at the equilibrium point E, where price is P_E.

(2) ***Shortage (excess demand or shortfall in supply)***,which would exists at below-equilibrium prices, *drives price up*, and in doing so, increases the quantity supplied and reduces the quantity demanded until equilibrium is achieved. This happens because 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.

In figure 8.4b, at price level P_J, quantity demanded is Q_3, which is much more than Q_4. This situation will encourage firms to increase price and increase production.

By the law of demand, the quantity demanded (Q_D) will fall as price rises. By the law of supply, the quantity supplied (Q_S) will rise as price rises. This will continue until quantity supplied (Q_S) and quantity demanded (Q_D) both are equal (at quantity Q_E). This will be at the equilibrium point E, where price is P_E.

8.3. SHIFTS IN DEMAND AND SUPPLY

8.3.1. Shifts in Demand

A ***shift in demand*** usually leads to a *change in the quantity demanded*. It designates the movement from one point to another point (from one price-quantity combination to another) on a fixed demand curve.

The only time it won't is if the supply curve happens to shift at the same time so that, by coincidence, the same price or the same quantity demanded/supplied exists at the new equilibrium. If only the supply curve shifts, then a change in equilibrium quantity demanded also will occur, but on the same demand curve as before.

We have to avoid the virtual confusion of a "shift in demand" with a "change in the quantity demanded":

► a *shift in demand* means that the market demand curve actually has moved to a new position;

► a *change in the quantity demanded* means that there is a new equilibrium, but not necessarily a new demand curve. A change in quantity demanded can occur on the same demand curve when only the supply curve shifts.

8.3.2. Shifts in Supply

A ***shift in supply*** usually leads to a change in equilibrium price, and equilibrium quantity supplied.

The only time it won't is if the demand curve happens to shift at the same time in such a way that, by coincidence, the same price or the same quantity demanded/supplied exists at the new equilibrium.

If only the demand curve shifts, then a change in quantity supplied will occur, but on the same supply curve as before.

We have to avoid the virtual confusion of a "shift in supply" with a "change in quantity supplied":

► a *shift in supply* means that the market supply curve has actually moved to a new position:

► a *change in quantity supplied* means that there is a new equilibrium but not necessarily a new supply curve. A change in quantity supplied can occur on the same supply curve by moving from one point to another if it is the demand curve that shifts.

8.3.3. Demand Shifts/Quantity Supplied

Shifts in demand along the same supply curve lead to new equilibrium positions, with both price and quantity demanded and supplied different from the original equilibrium E, where price is P_0 and quantity demanded/supplied is Q_0 (Fig.8.5a).

There are two possible *moves* for the demand curve: outward shift and inward shift.

(1) ***Outward shift in demand*** (from D_0 to D_1 in the graph). In this situation, equilibrium moves along the supply curve (S) from E to M. Price will be higher (P_1) and quantity demanded/supplied will be higher (Q_1).

(2) ***Inward shift in demand*** (from D_0 to D_2 in the graph). In this situation, equilibrium moves along the supply curve (S) from E to N. Price will be lower (P_2), and quatity demanded/supplied will be lower (Q_2).

In brief, we found a *direct relationship* between a change in demand and the resulting changes in both equilibrium price and quantity.

It is important to understand that, in both cases, since the supply curve remains the same, market supply has not changed. Only the quantity supplied changes. Market equilibrium has changed, but along the *same* supply curve.

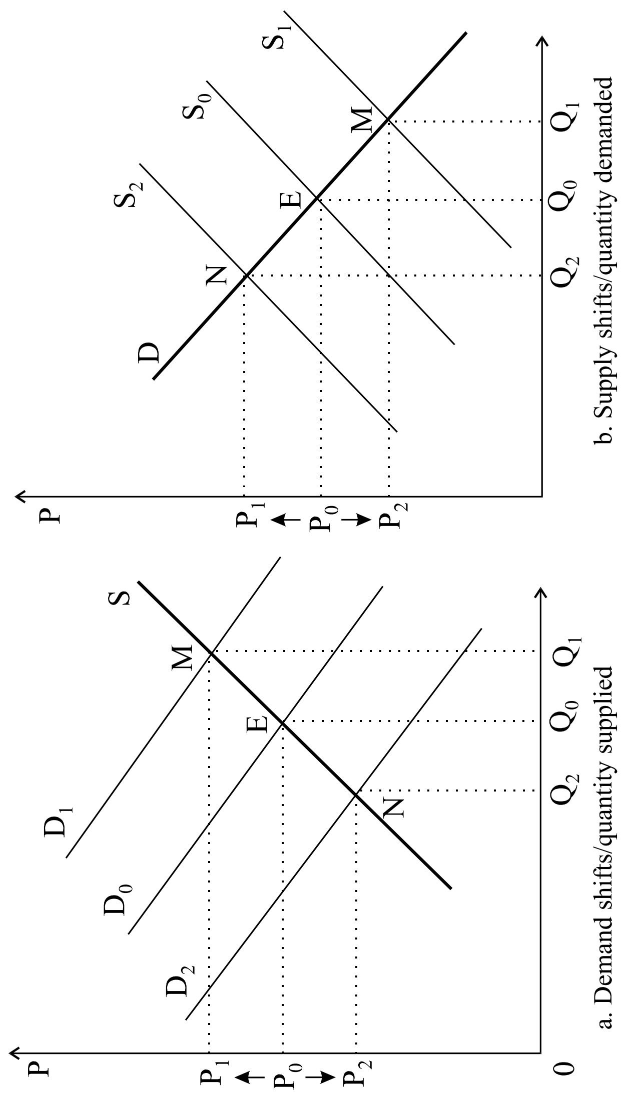

Fig.8.5. Shifts in demand and supply

8.3.4. Supply Shifts/Quantity Demanded

Shifts in supply along the same supply curve lead to new equilibrium positions, with both price and quantity demanded and supplied different from the original equilibrium E, where price is P_0 and quantity demanded/ supplied is Q_0 (Fig.8.5b).

There are two possible *moves* for the supply curve: outward shift and inward shift.

(1) ***Outward shift in supply*** (from S_0 to S_1 in the graph). In this situation, equilibrium moves along the demand curve (D) from E to M. Price will be lower (P_1), and quantity demanded/supplied will be higher (Q_1).

(2) ***Inward shift in supply*** (from S_0 to S_2 in the graph). In this situation, equilibrium moves along the demand curve (D) from E to N. Price will be higher (P_2), and quantity demanded/supplied will be lower (Q_2).

It is important to understand that, in both cases, since the demand curve remains the same, market demand has no changed. Only the quatity demanded changes. Market equilibrium has changed, but along the *same* demand curve.

In brief:

► an increase in supply has a *price-decreasing* and a *quantity-increasing effect;*

► a decrease in supply has a *price-increasing* and a *quantity-decreasing effect.*

There is an *inverse relationship* between a change in supply and the resulting change in equilibrium price, but the relationship between a change in supply and the resulting change in equilibrium quantity is *direct*.

8.4. COMPLEX CASES IN CHANGING DEMAND AND SUPPLY

More complex cases arise if in the market moves involve changes in both supply and demand. There are two possible cases: supply and demand change in opposite directions; supply and demand change in the same direction.

(1) ***Supply and demand change in opposite direction***. Further, we can find here other two situations: when supply increases and demand decreases; when supply decreases and demand increases.

a. *Supply increases, demand decreases situation* can conduct to following consequences:

- because there are coupled two decreasing effects, the net results will be *a fall in the equilibrium price* greater than that which would result from either change taken in isolation;
- because the effects of the changes in supply and demand are opposed (the increase in supply tends to increase equilibrium quantity, while the decrease in demand tends to reduce the equilibrium quantity), the direction of the change in equilibrium quantity depends upon the *relative sizes of the changes in supply and demand*.

b. *Supply decreases, demand increases situation* involves two price-increasing effects. Consequently:

- an increase in *equilibrium price* greather than that caused by either change taken separately;
- the effect upon *equilibrium quantity* is indeterminate, depending upon the relative size of the changes in supply and demand: if the decrease in supply is relatively larger than the increase in demand, the equilibrium quantity will be less than it is initially; if the decrease in supply is relatively smaller than the increase in demand, the equilibrium quantity will increase as a result.

(2) ***Supply and demand change in the same direction***. Further, we can find here other two situations: when supply and demand both increase; when supply and demand both decreas.

a. *Both supply and demand increasing situation* can conduct to following consequences:

- if the increase in supply is of greater magnitude than the increase in demand, the net result will be for *equilibrium price* to decrease; if the opposite is true, equilibrium price will increase;
- the effect upon *equilibrium quantity* is certain: this will increase by an amount greater than that which either change would have entailed in insolation due to the quantity-increasing effects of both increases in supply and demand.

b. *Both supply and demand decreasing situation* can conduct to following consequences:

- if the decrease in supply is greater than the decrease in demand, *equilibrium price* will rise; if the reverse is true, equilibrium price will fall;
- *equilibrium quantity* will be less than that which prevailed initially because decreases in supply and demand both have quantity-decreasing effects.

Special cases arise where a decrease in demand and a decrease in supply, on the one hand, and an increase in demand and an increase in supply, on the other hand, *exactly cancel out*. In both cases, the net effect upon equilibrium price will be *zero* and, consequently, *price will not change*.

Another special case in the analysis of demand and supply model concerns the ***government price controls*** for any given goods or services. Markets are rarely free of government intervention. Besides imposing taxes and granting subsidies, governments often

regulate markets in a variety of ways. This is available even for competitive markets.

The ***price ceiling*** means *the government mandate that the price can be no higher than a maximum allowable level*. The quantitative impact of effective price ceilings is an *excess demand* caused by an increase in the quantity demanded (consumers will demand more at this low price) and a decrease in the quantity supplied (producers, particularly those with higher costs, will produce less). In this situation, the economic analisys has to estimate *how large* that excess demand might have been.

KEY CONCEPTS

Market
Market equilibrium
Equilibrium analysis
Equilibrium price
Equilibrium quantity
Market disequilibrium
Surplus (excess supply)
Shortage (excess demand)
Shift in demand
Shift in supply
Government price control
Price ceiling

CHAPTER 9

PRODUCTION COSTS

If the demand side of the market is done by the behavior of consumers, in turn, the supply side of the market is done by the behavior of producers. It is very important for any firm to know how to organize its production efficiently and how their costs of productio change as input prices, on one hand, and the level of output, on the other hand, change, too. Therefore, the theory of production and cost is central for the company's management.

9.1. FIRM'S THEORY

One crucial decision of the firm concerns *how much to produce and offer for sale in the market*, in other words, what level of output to be done. But, further, firm has to decide how much effort is necessary in doing this and what amount of effects is expected to be. Thus, it has to know how much it will cost to produce this output and how much revenue will be earned by selling it.

For each level of output, production costs depend on the specific *technology* used. In turn, technology further determines:

► *what kind of and how many inputs* (factors of production) are necessary to produce it;

► the specific *input prices* that determine what the firm will have to pay for them.

The revenue obtained from selling output depends on the *demand curve* faced by the firm. It will determines the price for which any given quantity of output can be sold and hence the revenue the firm will earn. Consequently, it is the interaction of production costs and virtual revenues that determines how much output firm wish to supply on the market (Fig.9.1).

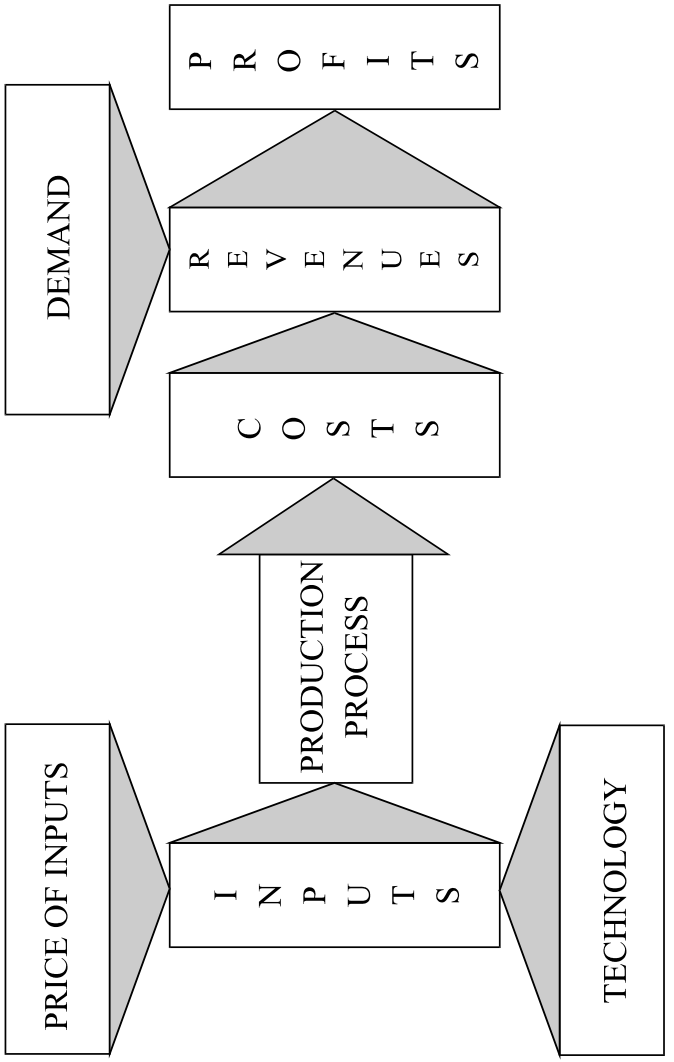

Fig.9.1. Relationships between Firm's Production Costs, Revenues, and Profits

Profits = Revenues - Costs

The firm's ***income (revenue)*** is *the amount it earns by selling its goods or services in a given time period*. The firm's ***costs*** are *the expenses implied in producing goods or services in a given time period*.

All firms have the same main goal - to gain as much profit as possible. ***Profits*** are *the difference between revenues and costs*. In order to select the output level which maximizez its profits, the firm examines how revenues and costs change with the level of output produced and sold. That's why the *output level is one of the most important decision for any firm.*

Individuals, households or organizations do not always pay their bills immediately. From an economic viewpoint, the correct understanding of revenues and costs relates to the activities carried out during the year whether or not payments have yet been made. This distinction between economic revenues and costs, on one side, and actual receipts and payments, on the other side, conduces us to the important concept of cash flow. The firm's ***cash flow*** is *the net amount of money actually received during the period*. Increasing the cash flow it earns is also an important goal of any firm.

The firm's profits will have three *destinations*:

► a part will be claimed by, and therefore flow to, government as ***company income tax;***

► a part of remaining corporate profits will be paid out to their stakeholders (shareholders) as ***dividends***;

► the last part of remaining corporate profits will be invested currently or in the future in new plants, equipments a.s.o., as ***retained (undistributed) profits***.

Retained earnings are the part of after-tax profits that is turned back into the business, rather than paid out to shareholders as dividends.

9.2. THE BALANCE SHEET

All the aspects defined above will be summarized in the ***income statement (profit-and-loss account)***, that tell us about *the firm's flow of money during a given year*. It results from the firm's balance sheet. The ***balance sheet*** *lists the assets the firm owns and the liabilities for which it is responsible*.

Assets are *what the firm owns (cash in the bank accounts, accounts receivable from its customers, inventories in warehouses, buildings, equipments, etc.)*; they are shown on the left side of the balance sheet;

Liabilities are *what the firm owes (unpaid bills and salaries, long- and/or short-term mortgages for bank loans, etc.)*; they are shown on the right side of the balance sheet.

The *difference between what a firm owns and what it ows* is its ***net worth***, on which always depends its reputation, customer loyalty and a bundle of intangibles which economists call *goodwill*.

Tab.9.1. Corporate " X " Balance Sheet at 31 December 2000 (in monetary units)

ASSETS	***LIABILITIES***
Factorybuilding	Accountspayable

500.000 Other equipment 250.000 Inventories 75.000 Accountsreceivable 50.000 Cash 125.000	100.000 Salaries 75.000 Bankloanmortgages 75.000 Insurancemortgages 25.000 Net worth 1.000.000
1.000.000	***1.000.000***

Exemple

An hypothetical balance sheet is represented in the table 8.1. Retained (undistributed) profits affect the balance sheet:

► if retained profits are kept as cash or used to purchase new equipments, they will *increase* the assets side of the balance sheet;

► if retained profits are used to *reduce* the firm's liabilities, they will reduce the right side of the balance sheet.

Either way, the firm's net worth will increase.

9.3. PRODUCTION COSTS AND FIRM'S PROFITS

We can now review, from another perspective, the concept early discussed of *opportunity cost*. The firm finds a useful guide to what has to be done in the two pieces presented above: the income

statement and the balance sheet, both processed in the accounting department of the firm.

Economists and accountants do not always have the same perception of costs and profits. *Accountants* are mainly interested in recording the *actual* receipts and payments of the company. Concerned with the firm's financial statement, accountants tend to take a retrospective look at a firm's finance, because they have to keep track of assets and liabilities and evaluate past performance.

Economists, on the other hand, take a forwardlooking view of the firm. Concerned with what costs are expected to be in the *future*, and with how the firm might be able to lower its costs and improve its profitability, economists and managers are especially interested in the role of costs and profits as determinants of the firm's output (production, supply) decision and in finding the best combination of inputs (allocation of resources) to particular activities.

A necessary distinction has to be made between explicit and implicit costs. A firm's ***explicit costs*** comprise *all explicit payments to the factors of production the firm uses*. Wages paid to workers, payments to suppliers of raw materials, and fees paid to bankers and lawyers are all included among the firm's explicit costs.

A firm's ***implicit costs***, on the other hand, consist of *the opportunity costs of using the firm's own resources without receiving any explicit compensation for those resources*. For exemple, the owner of a firm, who works along with his employees but does not draw a salary, forgoes the opportunity to earn a wage working for someone else. Or, another exemple, a firm that uses its own building for production purposes forgoes the income that it might receive from renting the building out. All these implicit costs are not regarded as costs in an accounting sense, but they are a part of the firm's costs of doing business, nonetheless. When economists discuss costs, they have in mind *both* implicit and explicit costs.

The difference between explicit and implicit costs is crucial to understanding the difference between accounting profits and economic profits. ***Accounting profits*** are *the firm's total revenues from sales of its output, minus the firm's explicit costs*.

Accounting profits = Total revenues - Explicit costs

Economic profits are *total revenues minus explicit and implicit costs*.

Economic profits = Total revenues - (Explicit costs + Implicit Costs)

Alternatively stated, economic profits are accounting profits minus implicit costs.

Economic profits = Accounting profits - Implicit costs

Thus, the difference between economic profits and accounting profits is that economic profits include the firm's implicit costs, while accounting profits do not. Ignoring the opportunity costs and economic profits, and relying only on accounting costs and accounting profits, this way can be seriously misleading. *It is the core phylosophy of the business*.

A firm is said to make ***normal profits*** *when its economic profits are zero*. This fact implies that the firm's reserves are enough to cover the firm's explicit costs and all of its implicit costs. These implicit costs add up to the profits the firm would normally receive if it were properly compensated for the use of its own resources - hence the name, normal profits.

9.4. TYPES OF COSTS

Economists distinguishe between two types of costs, depending on their relationship with output change: fixed costs and variable costs.

9.4.1. Fixed, Variable and Total Costs

The ***fixed costs*** are *those not affected by the firm's level of production*. They exist and do not change no matter how much or how little the firm produces. Being *independent* of the level of production, the fixed costs include only those expenses that do not change as production change:

- rent payments for facilities, equipments;
- debt payments on loans, mortgages;
- salaries of permanent personnel who remain employed regardless of production level (managers, accountants, etc.);
- insurance premiums, licence fees;
- different taxes (property taxes, privilege taxes, a.s.o.).

The ***company's fixed costs (FC)*** are *the sum of all of the firm's different fixed costs incurred*. It can be represented graphically as a horizontal line since, at all levels of production (Q), fixed costs

remain *relatively* constant (Fig.9.2). The only way the firm can avoid paying fixed costs is to go out of business altogether.

The ***variable costs*** are *those affected by the firm's level of production*. They exist and change depending on how much or how little the firm produces. For instance, as production increases, more labor must be hired to make it, and more raw materials must be purchased to make it with. Being *dependent* of the level of production, the variable costs include those expenses that change as production change:

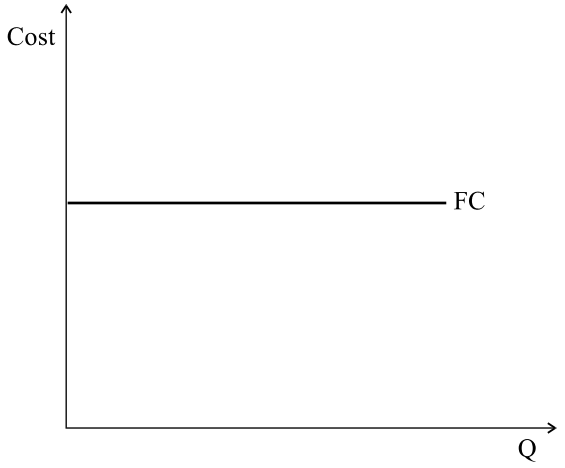

Fig.9.2. Fixed Costs

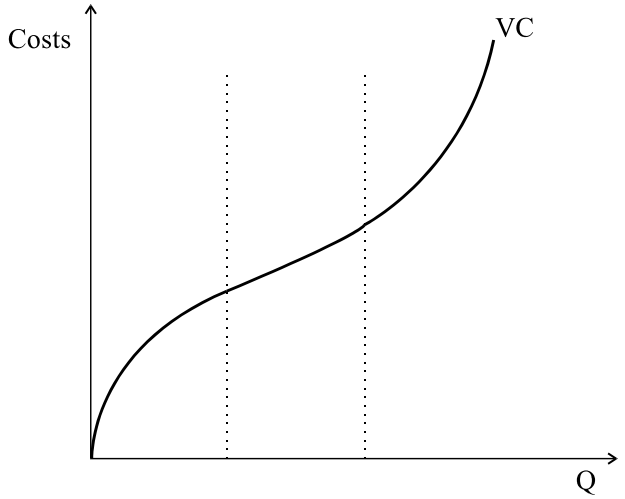

Fig. 9.3. Variable Cost

- payments for labor (salaries for employees direct implied in the production process);
- raw materials;
- utilities (energy, fuel, technological water);
- advertising expenses;
- waste disposal;
- taxes which vary with production level (income taxes, sales taxes, excise taxes, a.s.o.).

The ***company's variable cost (VC)*** is *the sum of all the firm's different variable costs incurred* (Fig.9.3). The variable cost has a more complicated behavior: they increases as output increases, but at different rates.

► At first, variable cost *rises rapidly*, because many resources are not being fully used (buildings and equipments are to be bought or rented, people hired, etc.). The production level is not great enough to employ them in the most efficient combinations.

► In the second stage, most resources are used efficiently, variable costs rise *more slowly* and its level off.

► In the third stage, finally, when production is high, diminishing returns cause variable costs to accelerate and they *increase rapidly* again.

The ***company's total costs (TC)*** is *the sum of fixed cost and variable cost* (Fig.9.4).

$$TC = FC + VC$$

In the graph showing the costs vertically and the output horizontally, the total cost is represented as a sum of:

► *fixed cost*, a straight line, because it never change, regardless the amount of output;
► *variable cost*, which increases as output increases.

The shape of the total cost curve is *similar* to the shape of the variable cost curve, but it is *above* the fixed cost:

► when output is *zero*, then total cost is done by the fixed cost;
► as output *grows*, total cost increases rapidly at first, then more slowly, because of the diminishing returns;
► when output become *very large*, total cost starts to increase rapidly again.

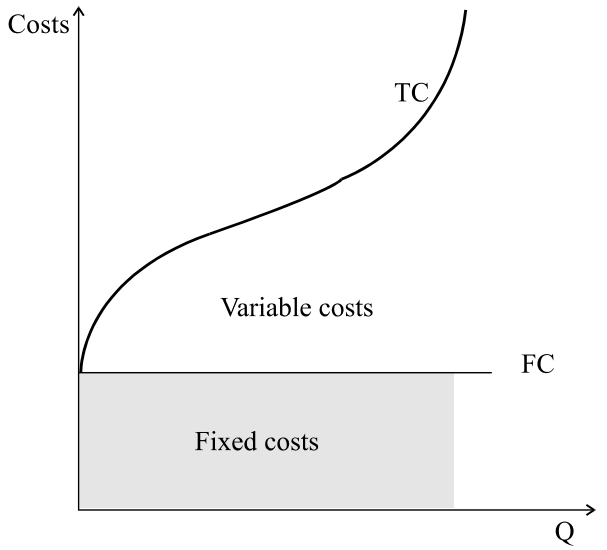

Fig.9.4. Total Cost

9.4.2. Diminishing Returns

It is expected for any economy to put its resources into use, the most productive being used with priority. The ***marginal product of inputs*** is *the additional output obtained from using one additional unit of a variable input.* As production increases, the marginal product of inputs decreases.

At the company's level, *if the use of a variable input (resource) increases, while the other inputs being used remain fixed, at some point, the productivity of the variable input will begin to decline*. Economists call this the ***law of diminishing returns***.

When labor is used as an input to production (with capital fixed), small increments in labor input add substantially to output as

workers are allowed to develop specialized tasks. However, the law of diminishing returns applies in this case: when there are too many workers, some jobs become redundants, and the marginal product of labor falls.

Further, we consider variable costs as costs of variable inputs and fixed costs as costs of fixed inputs. When we take variable and fixed inputs together, the law of diminishing returns is expected to affect the variable inputs.

Fixed inputs (plant, equipments, etc.) don't change, while variable inputs (labor, materials,etc.) can be increased and decreased. Output will change when variable inputs are changed within a given base of fixed outputs.

When output reaches a high enough level, *inefficiency* will become a problem and diminishing returns will set in. This can happen for many *reasons*:

► *production lines* (a fixed input) could become crowded and, therefore, overused by the variable inputs;

► *bottlenecks* can develop and they will work less efficiently a.s.o.

Since variable inputs become less efficient when diminishing returns sets in, the amount of variable inputs needed to add a given amount to output will increase. This means that the cost of the variable costs also will increase (Fig.9.3).

The law of diminishing returns is relevant in the *short-run* when at least one input is unchanged. The law describes a declining marginal product but not necessarly a negative one.

The law of diminishing returns applies to *a given production technology*. Over time, however, inventions and other improvements

in technology may allow the entire output curve to shift upward, so that more output can be achieved with the same inputs.

9.4.3. Short-run and Long-run

The costs which a firm needs in producing any given output depend upon the type of *adjustments* it is able to make in the amounts of the various inputs it employs. Some of them (labor, raw materials, fuel, power) generally can be varied easily and quickly. Some of others (plant capacity of manufacturing, for instance) require more time for adjustments. Talking about production and cost, the economists then distinguishe between short-run and long-run, depending upon the time involved.

(1) The ***short-run*** refers to *a period of time too brief to allow a firm to change (adapt) all its resources*, in which one or more factors of production cannot be changed. In the short-run, some costs are fixed. Factors that cannot be varied over this period are called *fixed inputs*.

Existing plant capacity, for instance, can be used more or less intensively in the short-run. A firm's capital usually requires time to change – a new factory must be planned and built, and machinery or other equipment must be ordered and delivered. It takes at least one year.

(2) The ***long-run***, in turn, refers to *a period of time extensive enough to permit a firm to alter the quantity of all resources employed*. In the long-run, *all costs are variable* because this time existing firms can even dissolve and leave the industry or new firms can be created and enter the industry.

There are strong relationships between firm's short- and long-run decisions:

► if in the short-run firms vary the intensity with which they utilize a given plant, machinery or other equipment, in the long-run, in turn, firms vary the size of the plant (capacity of production);

► in the short-run, all fixed inputs represents the outcomes of previous long-run decisions, based on the firm's estimates of what they could profitable produce and sell;

► firms continually make production decisions in the short-run, while simultaneously planning how to alter their inputs in the long-run.

The analisys of the firm in microeconomics tends to consider the short-run, but the long-run will be further also described.

9.4.4. Average Fixed, Variable and Total Costs

Suppliers are particularly interested in their average (per unit) costs. This information is more usable for making comparisons with product price, which always is expressed on a per unit basis. There are three types of *average costs:* average fixed cost, average variable cost, and average total cost. Graphically, each of them provides a U-shaped curve (Fig.9.5).

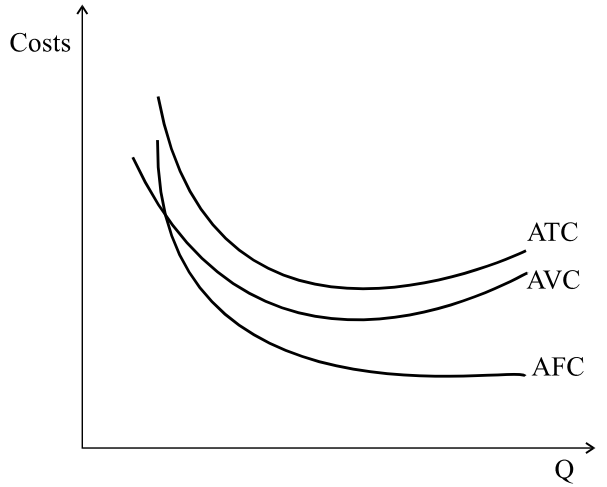

Fig.9.5. Average Fixed, Variable, and Total Costs

(1) ***Average fixed cost (AFC)*** is *calculated by dividing total fixed cost (TFC) by the corresponding output (Q):*

$$AFC = TFC/Q$$

As specific behavior, average fixed cost *declines so long as output decreases.*

(2) ***Average variable cost (AVC)*** is *calculated by dividing total variable cost (TVC) by the corresponding output (Q):*

$$AVC = TVC/Q$$

As specific behavior, *average variable cost initially declines, reaches a minimum, and then increases again.*

(3) ***Average total cost (ATC)*** *is calculated by dividing total cost (TC) by corresponding output (Q):*

$$ATC = TC/Q = AFC + AVC$$

Average total cost is found by adding vertically the average fixed cost and average variable cost curves. Thus, the verticale distance between the average total cost and the average variable cost curves reflects average fixed cost at any level of output.

9.4.5. The Marginal Cost

The last type of cost concept discussed here, but the most important, is the marginal cost.

Marginal cost (MC) is *the additional cost of producing one more unit of output*. In fact, the marginal cost of producing any unit of output is only the additional variable cost that will be incurred for the production of that one unit.

$$MC = \frac{\Delta TC}{\Delta Q},$$

were:

Q means "change in Q" always by one unit, so that marginal cost will be the increase in total cost incurred to produce *one more unit of output.*

As specific behavior:

► at very low levels of production, the marginal cost *declines sharply*, then, depending upon the behavior of the firm's variable

cost, it *decreases more slowly*, reaches a minimum, and finally *rises* again, rather sharply;

► as output continues to increase, diminishing returns set in. Variable cost begins to rise more rapidly. Therefore, marinal cost begins to *rise* and continue to do so as output increases further (Fig.9.6).

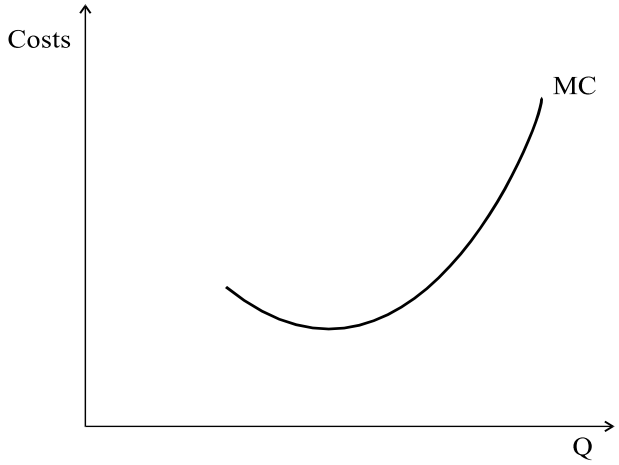

Fig.9.6. Marginal Cost

There is a special relationship between marginal product, as change in total output associated with each additional input, and marginal cost. 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, alternatively, diminishing returns (that is, a falling marginal product) will be reflected in a rising marginal cost.

9.4.6. Relationship between Marginal Cost, Average Total Cost, and Average Variable Cost

Figure 9.7 shows:

► so long as marginal cost remains *below* average variable cost, average variable cost will *decline* as output increases; the cost of each succesive unit, which is the marginal cost, is less than average variable cost to that point and therefore reduces the average when it is added into the calculation.

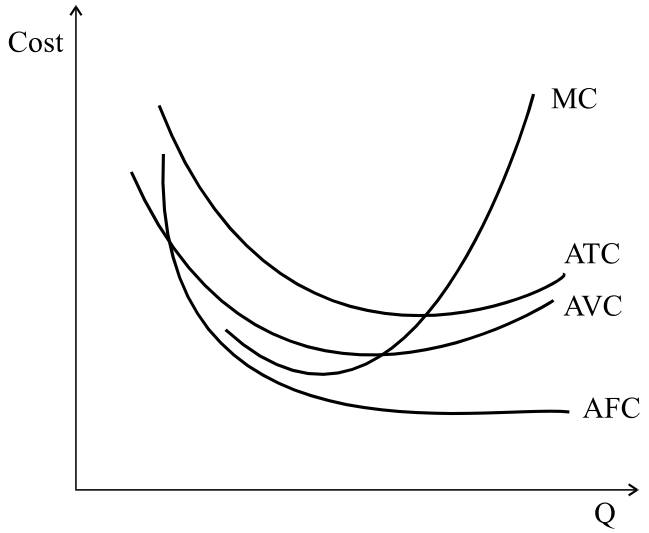

Fig.9.7. Relationship between Marginal Cost, Average Fixed Cost, Average Variable Cost, and Average Total Cost

► once marginal cost begin to *increase*, it will reach the point at which marginal cost *equalize* the average variable cost:

MC = AVC

► *beyond* this point, marginal cost is greater than average variable cost (***MC>AVC***) and, therefore, average variable cost will begin to increase as output increases.

The same explanation also shows that:

► as long as marginal cost is *below* the average cost, the average cost will fall;

► beyond the point where marginal cost equalize the average total cost, average cost will begin to *rise*.

Consequently, we can understand why *the rising marginal cost curve always intersects the average variable cost curve* ***at its lowest (minimum) point***.

The same logic leads us to the conclusion that the rising marginal cost curve also intersects the average total cost curve at the *lowest (minimum)* point on the average total cost curve. This is because whenever the extra or marginal amount added to total cost (or variable cost) is less than the average of that cost, the average will necessarly *fall*.

Conversely, whenever the marginal amount added to total (or variable) cost, the average unit must *rise*.

Table 9.2 summarize this important relationship.

Tab.9.2. Relationship between Marginal Cost and Average Cost

When:	MC<AC	MC=AC	MC>AC
AC is	***falling***	***at its minimum***	***rising***

This relationship between marginal cost, average variable cost, and average total cost is essential to determine the ***firm's equilibrium*** - *how much it will produce and what price it will get for its products in the market.*

9.5. ECONOMIES AND DISECONOMIES

9.5.1. The Long-run Average Cost

As we already saw, in the long run all desired resource adjustments can be done by an industry and the individual firms which it comprises. The analisys is conducted in terms of average total cost, making no distinction between fixed and variable costs, because all resources, and therefore all costs, are variable in the long run, this being a matter of as much as decades in some industries.

Suppose a firm starts out on a small scale and then, step-by-step, expends to successively larger plant size. As this growth occurs, its average total cost has following behavior:

- for a first stage, *successively larger plants will bring lower average total costs, which conduce to* ***economies of scale***;
- for a second stage, *successively larger plants will bring higher average total costs, which conduce to* ***diseconomies of scale*** (Fig.9.8).

The ***long-run average total cost curve (LATC)*** is made up of *segments of the short-run cost curve (SATC1, SATC2, a.s.o.) of the various-sized plants from which the firm might choose*. Each short-run average cost curve (SATC) in the graph is a short-run average

total cost (ATC) curve with the firm using the optimum amount of plant equipment for that level of output. The long-run average cost curve (LATC) "envelopes" the short-run cost curves (SATC) that the firm experiences at various levels of output.

The long-run average total cost curve shows the *least per unit cost at which any output can be produced after the firm has had time to make all appropriate adjustments in its plant size* (capacity of production).

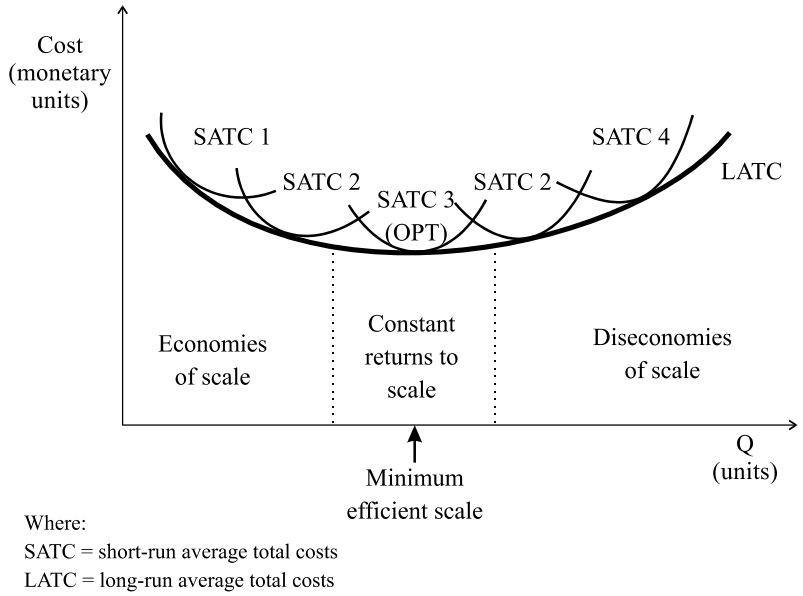

Fig.9.8. The Long-run Average Total Cost Curve

9.5.2. Economies and Diseconomies of Scale

The U-shaped long-run average cost curve is explained in terms of economies and diseconomies of scale:

► the long-run average cost curve (LATC) usually *falls* over a considerable first portion of its length due to economies of scale;

► at higher levels of output, the long-run average cost remains *constant*, and the firm is said to experience *constant returns to scale*;

► at very high output levels, the long-run average cost curve may *rise* due to diseconomies of scale.

Economies of scale (economies of mass production) are caused by many factors, such as:

- increased specialization in the use of labor;
- better utilization of, and greater specialization in, management;
- affordability and efficiently operating of the best available equipment;
- effective utilization of by-products.

All these considerations will contribute to lower unit costs for the producer who is able to expand its scale of operations.

Economies of scale behave differently in different industries. For instance, some heavy industries (autos, steel, etc.) show economies of scale up to very great size because they use large plants and heavy investments in fixed equipment. They also benefit from use of specialized inputs.

In some industries there may not be enough demand to warrant large plant or firm sizes. In other, such as those where personal service to customers is significant, large size may not increase efficiency.

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 become a large-scale producer (bureaucracy, difficulties in circulating the information etc.). Geographical problems may also explain dieconomies of scale. We say, the firm is too big.

The firm's ***optimum plant size*** *(minimum efficient scale),* operates at *the optimum rate of the output*. It occurs at the lowest point on the long-run average total cost (LATC) curve. This is the *level of output at which economies of scale end and constant returns to scale begin* (Fig.9.8).

The lowest point on the long-run average total cost is *the single one* where LATC curve is tangent to the lowest point on a short-run average total cost (SATC) curve (the one marked with OPT.). At all other points on LATC, the tangency with SATC curves occurs *somewhere other* than the lowest points on these other SATC curves.

The *shape* of the long-run average cost curve depends on two things:

► how long the economies of scale persist;
► how quickly the diseconomies of scaleoccur as output is increased.

The balance of these two forces is an empirical question of fact which will vary from industry to industry and from firm to firm.

9.5.3. **Economies and Diseconomies of Scope**

Very often, firms produce more than one product. These two or more products can be closely related, slightly related, or totally unrelated. Regardless the degree of connection between its products, a firm is likely to enjoy production or cost advantages when it produces two or more products rather than producing only one. The explanation could consists in:

► the joint use of inputs or production facilities;
► the utilization of by-products from one output as input for another;
► the joint implementation of marketing programs;
► cost savings of having a common management.

Exemple

A construction firm could produce, for exemple, two types of products:
► construction of buildings;
► interior decorations.
Both products use capital (buildings, machinery and equipments) and labor as inputs. Both products rely on similar machinery, use similarly skilled workers, and share the firm's management resources. Organization's management must choose *how much of each product to produce*.

The ***product transformation curve*** describes the *various combinations of two outputs that could be produced with a fixed amount of production inputs*. Figure 9.9 represents the two product transformation curve, *C1* and *C2*. Each curve shows the different combinations of buildings and interior decorations that can be produced with a given input of capital and labor.

Fig.9.9. *Product Transformation Curves*

In our exemple:

► curve *C1* describes all combinations of buildings and interior decorations that can be produced with a relatively *low level of inputs*;

► curve *C2* describes all combinations of buildings and interior decorations that can be produced with *twice the level of inputs*.

Product transformation curves described in figure 9.9 do have following characteristics:

► their *slope is a negative* one because, to get more of one output, the firm must give up some of the other output;

► they are *a concave* ones (bowed outward) because joint production usually has advandages that enable a single organization to produce more buildings and interior decorations with the same resources than would two organizations producing each product separately.

Organization's production process involves:

► ***economies of scope***, if its joint output is *greater* than the output that could be achieved by two different separate firms, each producing a single product, with equivalent production inputs allocated between them;

► ***diseconomies of scope***, if its joint output is *less* than the output that could be achieved by two different separate firms.

It is important to mention that there is *no direct relationship* between increasing return to scale and economies of scope:

► a two-output company can obtain economies of scope *even* if its production process involves decreasing returns to scale;

► a joint-product firm can have increasing returns to scale for each individual product, *yet not* obtains economies of scope.

In the company's practice, it is important to know the extent to which there are economies of scope. There is the *degree of economies of scope* that meeasures the percentage of the cost of production which is saved when two or more products are produced jointly rather than separately.

9.7. THE LEARNING CURVE

Over time, a firm "learns" as cumulative output increases and managers use this experience process in planning and forecasting future costs.

Long-run average costs may *decline* over time in some companies due to the absorbtion of new technological information and the gaining of more job experience for its employes. As the economic practice demonstrates, the assertion that firms enjoying lower average costs over time are growing companies with

increasing returns to scale is not always true. Increasing returns to scale is not the only reason for a large company to have lower long-run average costs than a smaller company. There are other explanations, too.

Over time, gaining experience for its workers and managers, the company will experience falling marginal and average cost of producing a given level of output because of fourth *reasons*:

► as *managers* gain more experience in scheduling the processes, planning and forecasting will become more and more effective;
► as *engineers* gain more experience in designing and manufacturing products, the costs and defects will lower;
► as *workers* gain more experience in the accomplishment of a specific task, the time necessary to do this will be more and more shorter and labor productivity increases;
► as *suppliers* themselves gain more experience in effectively processing the materials offered, then these advantages will be transferred, at least a part of them, in lower costs of materials for the company.

A ***learning curve*** *shows the relationship between a company's cumulative output and the amount of inputs necessary to produce a unit of output.* For an exemple, figure 9.10 represents a learning curve for the production of bungalows by a construction company. The two axis measure:

► the *cumulative* number of bungalow units produced by the construction company, on the horizontal axis;
► the number of hours of labor necessary to produce the corresponding number of bungalows.

Fig. 9.10. *The Learning Curve*

The learning curve describes the extent to which the hours of labor needed per unit of output (a bungalow) falls as the cumulative output (number of bungalows) produced increases. As we can see, the fewer the hours of labor necessary, the lower the marginal and average cost of production. Consequently, *labor input per unit of output directly affects the company's cost of production*.

To represent the learning curve, we use the relationship:

$$L = A + BN^{\beta} \ ,$$

where:

L is the labor input per units of output;
N is the cumulative units of output produced;
A, B, and β are constants, with *A* and *B* positive, and β between 0 and 1. *The larger is β, the more important is the learning effect*.

The learning curve effects can be important for a company decision regarding the penetration of a particular industry and/or launching a new product.

The per-unit labor requirement falls with increased production due to the learning curve. Consequently, the total labor requirement for producing more and more output increases in smaller and smaller increments. That's why, looking at the higher

initial labor requirement, a company could have a pessimistic perception over its business. Over time, in turn, once the learning effects has taken place, production costs will be lower, and the company could enjoy increasing profits.

KEY CONCEPTS

Income (revenue)
Cost
Profit
Cash flow
Firm's income tax
Stockholder
Shareholder
Dividend
Retained (undistributed) profit
Income statement
Balance sheet
Assets
Liabilities
Net worth
Explicit cost
Implicit cost
Accounting profit
Economic profit
Normal profit
Fixed costs
Variable costs
Total cost
Marginal product of inputs
Law of diminishing returns
Short-run
Long-run
Average cost
Marginal cost
Economies of scale
Diseconomies of scale
Lung-run average total cost
Optimum plant scale
Production transformation curve
Economies of scope
Diseconomies of scope
Learning curve

CHAPTER10

SELECTING THE PRODUCTION TECHNIQUE

10.1. THE EFFICIENCY

Efficiency is the goal of getting the most out of the firm's productive efforts. Conversely, inefficiency occurs when there is wastw.

Economists recognize several *types* of efficiency of production: economic efficiency; technical efficiency; allocative efficiency.

(1) ***Economic efficiency*** *exists when the firm, at a given level of output, is using the one technically efficient combination of resources that results in the lowest cost to the firm of producing that amount of output*.

(2) ***Technical efficiency*** *exists within the firm whenever using a lower quantity of any input will require using more of at least one other input in order to maintain the same level of output*. Technical efficiency refers to the different ways in which a firm can combine inputs in order to produce a certain quantity of output.

(3) ***Allocative efficiency*** *refers to the one level of output at which the firm's average cost (ATC) is lowest*. The firm is able to be economically efficient at many levels of output; however, the average total cost (ATC) will vary among them. The allocatively efficient one is the one at which the average total cost is lowest. The result is that if the firm's production is allocativelly efficient it is producing output at the lowest possible cost.

All of these depend upon many *factors:*

- ► input prices;
- ► market price of output;
- ► the production function.

If any of these change, then the points at which any of these kinds of efficiency occurs may change as well.

10.2. EFFICIENCY OF A PRODUCTION TECHNIQUE

One of the most important questions rised by the economic life of the firm concerns the optimum production technique recomended to be adopted by this company. In order to answer, the firm has to analyse the relationship between the choice of production technique - say, the use of robots - and its own costs of production. This problem leads us to the concept of " function of production ".

10.2.1. **Production Functions**

Firms turn *inputs*, also called *factors of production*, into *outputs*, also called *production*. Inputs can be further divided into the

broad categories of labor, materials, and capital, each of them including more narrow subdivisions. For instance:

► *labor inputs* include skilled and unskilled workers, as well as the entrepreneurial efforts of the firm's managers;

► *materials* include steel, plastics, electricity, water, and any other goods that the firm buys and transforms into a final product;

► *capital* includes buildings, equipments, and inventories.

The firm uses these inputs to produce output. This rises many engineering and management problems that have to be solved.The ***production function*** specifies *the maximum output level that can be produced from any given amount of inputs.*

Production function usually are shown as mathematical expressions relating combinations of variable inputs and the maximum output they can produce:

$$Q = f(a,b,c,...),$$

where *a,b,c* etc. are inputs.

For instance, if there are two inputs, labor L and capital C, the implied function of production will

$$Q = F(K,L)$$

This equation states that the quantity of output depends on the quantities of the two inputs, capital and labor. It is a formal way of saying that if the amounts of variable inputs used in a production

process are changed, the quantity of output will change in a certain way.

Production function can be very complex or very simple. The simplest shows the changes in Q due to varying the amount of the single variable input.

Exemple

Table 10.1. summarizes the technically efficient production technique listed by the corresponding production function.

Tab.10.1. The production function

OUTPUT LEVEL (units/year)	CAPITAL INPUT (number of machines)	LABOR INPUT (number of workers)
80	4	4
80	2	6
85	2	7
150	4	12

The table could be enlarged to include other combinations of labor and capital that are also technically efficient.

The question is: *how does the firm find its as complete as possible list of technically efficient production technique?* In part, it will use the expertise of its engineers, designers or time-and-motion experts. These ones analyse industrial or work procedures to determine the most efficient methods of production. In part, the firm may experiment different techniques and observe the results.

10.2.2. **Measuring the Production Function**

A firm can obtain the necessary information regarding its production functions either from: engineering approaches and statistical approaches.

(1) ***Engineering approaches***, *ask experts to describe a particular production capabilities of the firm*. The engineering approach is most useful when a firm whishes to examine its own production relationship.

Applyed to a particular firm, data are well understood, however, they often describe only one technical aspect of the production process. Consequently, the firm can have little if anything information about diseconomies of scale in the management of the entire production process.

(2) ***Statistical approaches*** *investigate the production processes of one firm over time, or the production processes of a number of different firms*. The statistical approach is valuable if the manager wishes to examine production relationships that go beyond a particular plant or operation within the firm.

There are two general ways of using statistical approach here:

► ***cross-section data method***, describing the production of different firms of a specific industry at *one point in time*;

► ***time-series data method***, describing the production of one firm or an entire industry *over time*.

The widely used algebraic form of the function of production is the ***Cobb-Douglas production function***:

$$Q = AK L ,$$

where:

A is a constant that depends on the units in which inputs and output are mesured;
K is the capital employed;
L is the labor employed;
* is a constant representing the relative importance of capital in the production process;
* is a constant representing the relative importance of labor in the production process.

10.2.3. ***Technical and economical efficiency***

The production function summarizes the ***technically efficient methods*** of combining inputs to produce output. A production method is technically *inefficient* if, to produce a given output, it uses more inputs than some other methods that could produce the same output. Profit-maximizing firms are not interested in wasteful (inefficient) production methods, that's why we will focus only those that are technically efficient.

The equation applies to a *given technology*, for instance, to a given state of knowledge concerning the various methods that might be used to transform inputs into outputs. As the technology becomes more advanced, the firm can obtain more output for a given set of inputs.

Presuming that the firm are technically efficient – it can use each combination of inputs as effectively as possible -, the function

of production do not allow for inefficient or wasteful production processes. This is the way to corectly understand the expresion "maximum output" in the definition of a production function.

Because production functions involve attaining a maximum output for a given set of inputs, they will never be used if a decreasing output will follow. It is reasonable to expect that profit-seeking firms will not waste their resources.

Exemple

Suppose, there are two methods available:

- *method A* produces 1 bungalow by 75 hours of labor and 40 hours of mashine time;
- *method B* produces 1 bungalow by 75 hours of labor and 50 hours of mashine time.

Method B is less efficient than method A because it uses the same amount of labor, but more mashine time to produce the same output as method A.

The *production function* links amounts of inputs with amounts of output. However, costs are calculated in value terms. That's why, to make the transition from the production function to a cost curve, we need to introduce the price paid by the firm for its inputs.

Suppose there are only three technically efficient production techniques, labelled by *M*, *N*, and *P* (Tab.10.2).

Tab.10.2. Selecting the most efficient production technique

Production techinique	Capital input	Labor input	Rental rate per machine (m.u./year)	Wage rate (m.u./year)	Capital Cost (m.u./year)	Labor Cost (m.u./year)	Total Cost (m.u./year)
Techique *M*	5	4	180	150	900	600	1.500
Techique *N*	2	6	180	150	360	900	1.260
Techique *P*	3	5	180	150	540	750	1.290

All these three techniques can be used to produce 80 units of bungalows per year. The firm knows the cost of :

► renting a machine - 180 monetary units per year;
► hiring the necessary labor - 150 monetary units per year.

From the production function the firm knows the quantities of labor and capital required to produce 80 units of bungalows per year using each technique.

The total costs implied are:

- 1.320 monetary units per year by using production techniques *M*;
- 1.260 monetary units per year by using production techniques *N*;
- 1.290 monetary units per year by using production techniques *P*.

The firm will select the production technique *N* due to its minimum total cost comparing with the others.. This is the ***economically efficient (lowest cost)*** production method.

To get the complete total cost curve we go through the same calculation for each output level, following several *steps*:

(1) From the production function we get the *input combinations* required by each technique.
(2) Knowing costs per unit for each input, we work out the cost of production by each technique and choose the *lowest-cost production method*.
(3) Joining up these points we get the *total cost curve*, which may embody switching from one production technique to another at different output levels.
(4) From the total cost curve we calculate *the marginal cost curve* - the increase in total costs at each output level as output is increased by one more unit.

10.3. PRODUCTION AND VARIATION OF INPUTS

Firm's production technology can vary because of changes made separately in its labor inputs, capital inputs, or simoultaneusly in both these factors of production.

10.3.1. **Average and Marginal Products of Labor**

In order to study the behavior of labor as factor of production, we will consider the capital as being fix and labor as a variable one. In this case, the firm can produce more output by increasing the labor inputs used.

The information about the production functions are shown in the table 10.3. It contains data about the amount of output that can

be produced with different amounts of labor (between 0 and 10), by maintaining a fixed amount of capital input (20 units).

Table 10.3. Production with Variable Labor and Fixed capital Inputs

Labor (units) (L)	Capital (units) (K)	Total output (Q)	Average product (Q/L)	Marginal product ($\Delta Q/\Delta L$)
0	5	0	-	-
1	5	10	10	10
2	5	30	15	20
3	5	60	20	30
4	5	80	20	20
5	5	95	19	15
6	5	108	18	13
7	5	112	16	4
8	5	112	14	0
9	5	108	12	-4
10	5	100	10	-8

Data contained in table 10.3 are plotted in figure 10.1.

Fig.10.1. *Production with One Variable Input (Labor)*

The average product of labor is *the output per unit of labor input*.

$$\frac{W}{L} = Q / L,$$

where:

W is the average product of labor,
Q is total output,
L is total input of labor.

As we can see in the table 10.3, the average product:

► *increases* initially;
► *falls* when the labor input becomes greater than 4 units.

Generally speaking, from a geometric point of view, the average product at a point on a total product curve is given by the slope of the line from the origin to that point. In our case, the average product of labor is measured by the slope of the line running from the origin to *Y* on the total product curve. The average product of labor:

► *increases* and reaches its maximum value where the line from the origin has the greatest slope, *M*;
► *decreases* after point *M*.

The marginal product of labor *is the additional output produced as the labor input increased by one unit.* The marginal product of labor depends on the amount of capital used. It can be calculated:

$$W_L = Q / L,$$

where:

W is the marginal product of labor,
Q is the change in output,
L is the change in labor input.

Similarly to the average product of labor, the marginal product:

► first *increases*;

► then *falls*, but it begins to decline just past the third unit of labor.

The marginal product is always:

► *positive* when output is increasing,

► *negative* when output is decreasing.

Generally speaking, from a geometric point of view, the marginal product at a point on a total product curve is given by the slope of the total product curve at that point. The line drawn tangent to the curve give the slope of a total product curve.

Exemple

Figure 10.1 shows that output increases until it reaches the maximum output of 112 units, diminishing thereafter. Beyond that point, the marginal product becomes negative. That portion of the total output is dashed to denote that production past an output of 8 is not technically efficient. Therefore, it is not part of the production function: technical efficency rules out the possibility of negative marginal products.

The marginal product curve crosses the horizontal axis of the graph at the point of maximum total product. The explanation is: adding a worker to a product line in a manner that slows up the line and actually decreases total output, implying a negative marginal product for that worker.

There is a *close relationship* between the average product of labor and the marginal product of labor (fig.10.1):

► when the marginal product is *greater* than the average product, the average product is *increasing* (in our figure, between outputs 1 and 4);

► when the marginal product *equals* the everage product, the average product curve reaches its *maximum* (point *M* in the figure 10.1).

► when the marginal product is *less* than the average product, the average product must be *decreasing* (in our figure, between outputs 4 and 10);

10.3.2. Labor Productivity

Applied to an industry or to the economy as a whole, the *average product of labor* is named ***labor productivity***. It can provide useful information across industries and for one industry over a long period of time.

In any particular year, the aggregate value of goods and services produced by an economy is equal to the payments made to all factors of production, including wages, rental payments to capital, and profit to firms. Consumers ultimately receive these factor payments in different forms. Consequently, consumers in the aggregate can increase their rate of consumption in the long-run only by increasing the total amount they produce. As we can see, there is a *strong relationship between standard of living and the labor productivity.*

10.3.3. **Production with Two Variable Inputs. The Isoquant and Isoquants Map**

We can now consider the firm's production technology varying because of its *both* inputs – labor and capital. Table 10.4. tabulates the maximum output obtainable for different combinations of outputs.

Tab. 10.4. Production with Two Variable Inputs

	1	2	3	4	5
1	10	30	45	55	65

2	30	50	65	75	80
3	45	65	80	90	95
4	55	75	90	100	105
5	65	80	95	105	110

The information contained in tables can also be represented graphically using curves named isoquants. An ***isoquant*** is *a curve that shows all the combinations of inputs that yield the same level of output.*

Isoquants show the *flexibility* of the firm in making production decisions. Because in most cases, a firm can obtain a particular output using various combinations of inputs, the manager of that firm must understand the nature of this flexibility: their knowledge allows him to choose input combinations that minimize costs and maximize profit.

The set of isoquants, each of which represents the maximum output that can be achieved for any corresponding set of inputs, is named ***isoquants map***. The set of isoquants (isoquants map) corresponding to information contained in table 10.3 is represented in figure 10.2.

In our picture:

► isoquant *Q1* represents all combinations of inputs that combine to yield 45 units of output;

► isoquant *Q2* represents all combinations of inputs that combine to yield 65 units of output;

► isoquant *Q3* represents all combinations of inputs that combine to yield 80 units of output.

Isoquant *Qn+1* lies above and to the right of *Qn* because it takes more of either labor or capital or both to obtain a higher level of output.

There are similarities and differences between isoquants and the indifference curves of the consumer theory:

► they are *similar* because where indifference curves order levels of satisfaction from low to high, isoquants order levels of output;

► they are however *different* because the numerical labels attached to indifference curves are meaningful only in an ordinal way – higher levels of utility are associated with higher indifference curves, but cannot estimate a specific level of utility the way we can estimate *a specific level of output* with an isoquant.

Remember, it is important to distinguish between short and long-run when talking about production and costs, on a case-by-case basis.

Fig.10.2. *Isoquants with Ttwo Variable Inputs*

10.4. FACTOR INTENSITY

From the viewpoint of the factor intensity, production techniques can be classified in two categories:

(1) ***capital-intensive technique***, *when it uses a lot of capital and relatively smaller amounts of labor*;
(2) ***labor-intensive technique***, *when it uses a lot of labor and relatively smaller amounts of capital*.

In the table 10.2:

► technique M is more capital-intensive and less labor-intensive;
► techniques N and P which are more labor-intensive comparing with technique M.

An useful indicator necessary to do this comparisons is the ***ratio of the units of capital input to labor input***.

Suppose a firm chooses the more labor-intensive technique because it is cheaper. After a time, the wage rate rises: labor has become more expensive, while the rental on capital remains unchanged. We say, the *relative* price of labor has risen.

The firm now faces with two new questions:

► what happens to the total cost of producing the planned level of output in a given time?
► is this necessary any change in the preffered production technique?

Any input whose amount used can be changed in the short-run is a *variable input.* Generally, after the wage increases, the higher

price of labor relative to capital leads the firm to substitute capital for labor.

KEY CONCEPTS

Efficiency
Economic efficiency
Technical efficiency
Allocative efficiency
Production function
Cross-section data method
Time-series data method
Cobb-Douglas production function
Average product of labor
Marginal product of labor
Labor productivity
Isoquant
Isoquants map
Capital-intensive technique
Labor-intensive technique

CHAPTER 11

FIRM'S LONG-RUN OUTPUT DECISION

In any market, firm looks after maximizing their profits. This implies long-run output decision: *how production costs and demand conditions must interact to determine the optimum level of production, which allow to the firm maximizing its profit*.

11.1. COMPETITION

11.1.1. Market Models

Competition exists in any market in which more than a single firm operates. It requires firm to consider and be affected by the actions of the other firms in the industry.

Competition for scarce resources exists in every economy. In all but the most centrally-controlled economies, there are private property rights to scarce resources. These rights are recognized, enforced, and defended by society's legal system. Without such rights, the acquisition and allocation of resources would be chaotic.

From the viewpoint of the competition, economists distinguish *four* relatively distinct market situations in terms of:

► the number of firms in the industry;

► whether the product is homogeneous (standardized) or differentiated;
► how easy or difficult it is for new firms to enter in and for the existing ones to exit from the industry.

The four basic ***market competitive situations*** are (Tab.11.1):

Tab.11.1. Characteristics of the Four Basic Market Models

Market model	Number of firms	Type of product	Control over price	Conditions of entry/exit	Non price
1.Pure (perfect) competition	many small sellers	homogeneous	none	very easy	none
2.Monopolistic competition	many	differentiated	some	relatively easy	strong advertising, brand names trademarks
3.Oligopoly	few	differentiated	circumscribed by mutual interdependence	signifiant barriers	particularly emphasis on product differentiation
4.Pure monopoly	one	no differentiation, no close substitutes	considerable	very difficult	mostly public relations, advertising

(1) ***pure (perfect) competition***, characterized by a *very large number of firms producing a homogeneous products and by free entry and exit*;
(2) ***monopolistic competition***, characterized by the existance of *many buyers of differentiated products and by relatively easy entry in the industry*;

(3) ***oligopoly***, characterized by a *few large firms, offering homogeneous or differentiated products and by significant barriers to penetrate that industry*;
(4) ***pure monopoly***, characterized by the action of *a single firm, offering a rather unique product and by considerable barriers to entry*.

11.1.2. Homogeneous (Standardized) and Differentiated Products

Homogeneous (standardized) products exists in an industry when *no firm's product can be distinguished from another firms'*. Products are called to be "the same".

To the buyer, the only possible reason for prefering one firm's product to another's is to lower price. Conversely, to the seller, the only possible device to face the competition in the market is to lower its price.

Product homogeneity exists in some industries and it is a characteristic of perfect (pure) competition.

Differentiated products exists in an industry when there is *at least one difference between different firms' products*. Product differentiation is a *nonprice competition.*. Firms try to develop customer loyalty by creating differentiated products, that offer superior advantages for their customers.

Strong customer loyalty makes the demand for such products less elastic. The firm loses fewer customers when new firms enter the market and it is less vulnerable to their competition.

On the other hand, through nonprice competition, the firm attempts to shift the demand curve of its product to the right (to increase demand), when customers are attracted by the firm's improved product or service. Furthermore, nonprice competition is improved by establishing a strong *brand name* for the product. This

way, product cannot be duplicated (copied). *Advertising* also creates customer loyalty through product differentiation, especially for establishing and supporting brand-name identification of the product.

Product differentiation is a characteristic of monopolistic competition and, sometimes, oligopoly.

11.1.3. Barriers to Entry/Exit

The degree to which firms can enter or leave an industry is a significant aspect of that industry, and the competitiveness within it. When entry and exit are easy, the industry are likely to be very competitive. Conversely, when exists some ***barriers to entry***, *firms faces with difficulties to penetrate that market*. It will be a less competitive market.

Easy of entry is, in economics, much more significant, since it affects the ability of new competition to arise within an industry or market. Entry into a market is easy when there are few or no effective barriers to new firms wishing to enter. Easy of entry is a condition for perfect (pure) competition.

On the other hand, ***exit from most markets*** is relatively easy, anyway, especially because there is anytime possible for a firm to close down.

A market with difficult entry has *barriers* of some kinds to new firm. The barriers, to some degree, insulate firms in the market from new competitors and tend to make the market less competitive. Barriers are:

- *inexistent* in perfect competition;
- *a few* in monopolistic competition;
- *strong* in oligopolistic competition;
- *insurmountable* in markets with monopol.

Barriers are economic and noneconomic.

There are many ***economic barriers*** to entry an industry. The most important are:

- ► *high startup costs*, simply insurmountable for newcomers who can't afford entering (costs of design, engineering, factories, sales outlets a.s.o.);
- ► *large economies of scale* further lead to higher startup costs.

There are also many ***noneconomic barriers*** to entry an industry. The most important are:

- ► *government franchise*, which grants a firm the exclusive right to operate within a certain area and effectively keeps all other firms out;
- ► *private franchise*, which protects a firm against local competition from the same brand-name franchisor, but cannot protect against other firms selling similar products of another brand.
- ► *licensing, zoning, and other government action*, which can keep out competition.

11.2. PROFIT MAXIMIZATION IN A PERFECT COMPETITION

11.2.1. Total Revenue and Marginal Revenue

The prfectly competitive firm is a *price-taker*; that means it receives the *same* market price (P) for *every* unit of its output. The perfectly competitive firm is so small that it cannot influence market

price in any way, and it accepts the market price as a given condition.

The firm's ***total revenue (TR)*** is *the total sum for which it is able to sell its supplied output in the market*. The firm's total revenue always rises by the market price P for each additional unit produced. Therefore, a graph of the perfectly competitive firm's total revenue curve is a *continually rising straight line* (Fig.11.1).

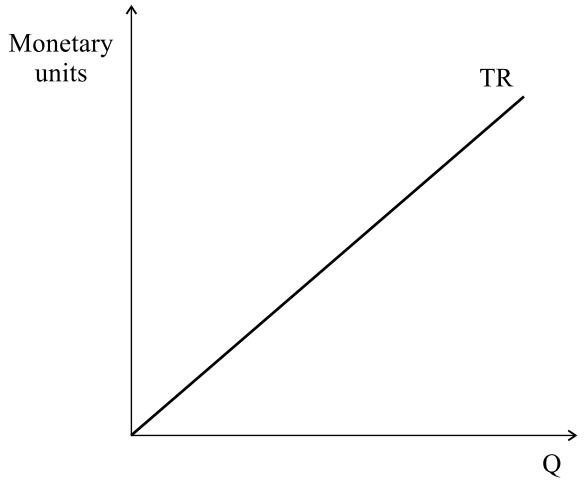

Fig.11.1. Total Revenue

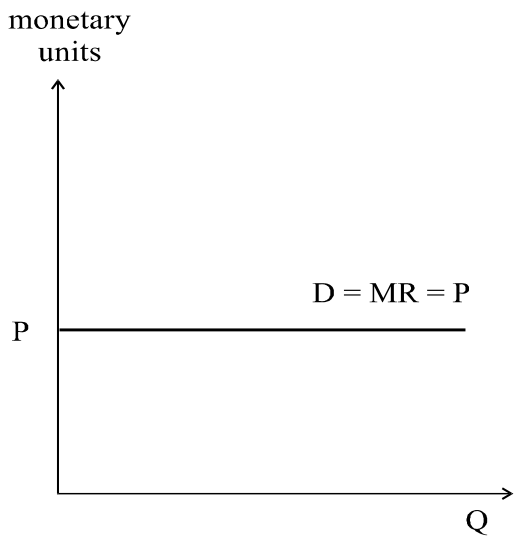

Fig.11.2. MarginalRrevenue

A firm's ***marginal revenue (MR)*** is *the increase in total revenue brought about by an increase of one unit of output in the firm's quantity supplied*. It is calculated starting from the change in total revenue divided by the change in the quantity of the product sold (demand).

The firm's marginal revenue is always the market price:

$$MR = P,$$

Where:

MR is the marginal revenue;

P is the price.

The firm considers market demand for its output as *perfectly elastic*. It can sell all it can for price P. Because P = MR, it results for the perfectly competitive firm (Fig.11.2):

$$\boldsymbol{D = MR = P},$$

Where:

D is the market demand;

MR is the marginal revenue;

P is the price.

11.2.2. Profit Maximization

As we already stated, the firm's primarly economic goal is to maximize its profit. Economists do this by maximizing the difference between firm's total revenue and its total cost.

Profit maximization *occurs at that output level (Q_M) where the marginal cost (MC) curve intersects the marginal revenue (MR) curve*. This is a general rule and it applies whether or not the firm is a perfect competitor.

The difference which appears between perfectly competitive firm and imperfectly competitive firm consists in the *shape* of the marginal revenue (MR) curve (Fig.11.3a and Fig.11.3b). In both cases, profit maximization occurs at output level Q_M, corresponding to the price level P_M.

Marginal revenue *is falling throughout*. It can even become negative at high output level. Marginal revenue falls steadly for two *reasons*:

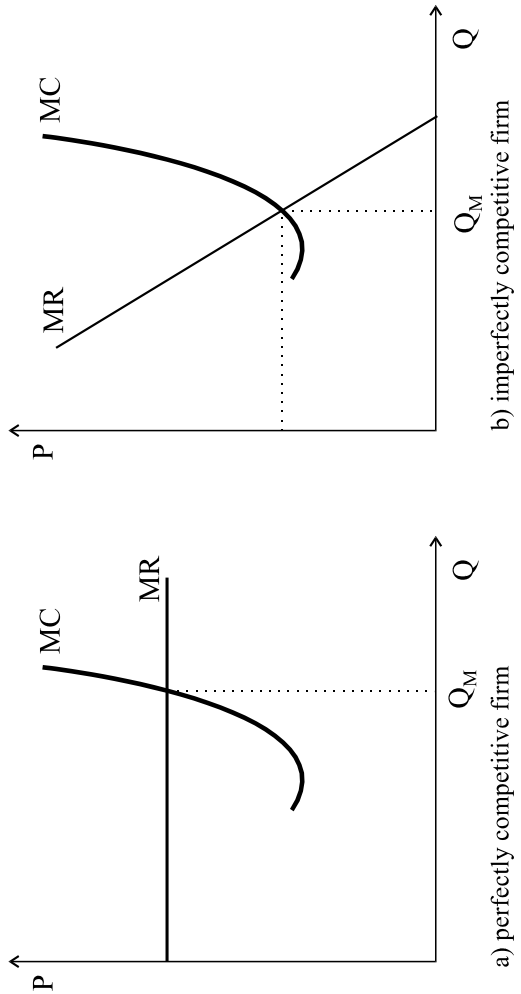

Fig.11.3. Profit Maximization

- ► because demand curve slopes down, the last unit itself must be sold at a lower price the higher is the output;
- ► succesive price reductions reduce the revenue earned from existing units of output.

When the firm's demand curve *slopes down*, we have thus established two propositions:

- ► marginal revenue falls as output rises;
- ► marginal revenue must be less than price for which the last unit is sold.

For all firms, not just those in perfectly competitive markets, at the ***profit maximization point*** (*Q* in Fig.11.3a or Fig.11.3b), it has no incentive to increase or decrease output. At this point firm's output is in *equilibrium*.

If the firm produces at *any other* output level, profit can be increased by moving to the profit maximization point (Fig.11.4).

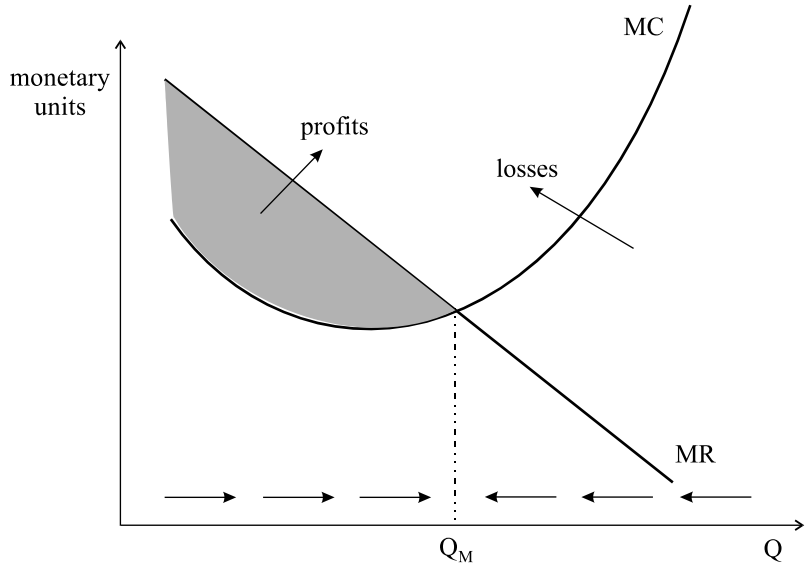

Fig.11.4. Output Decisions Around the Profit Maximization Point

► If the firm produces *more than* Q_M, then marginal cost will exceed marginal revenue (MC>MR) for all units in excess of Q_M. The firm *loses* money on them, and its profit is reduced. Firm's output decision will be to increase profit by eliminating these units, and reducing its quantity supplied to Q_M.

► If the firm produces *less than* Q_M, then marginal cost will be less than marginal revenue (MC<MR) for additional units produced up to Q_M. The firm can make *marginal profit* on these units and so increase total profit by producing them. Firm's output decision will be to increase profit by increasing production to Q_M.

11.2.3. An Exemple

Suppose a construction firm that produces and offers in the market as output bungalows. Information concerning its output are gathered in table 11.2.

Tab.11.2. Firm's Output Decisions (Profit Maximization)

OUTPUT	TOTAL COST	PRICE RECEIVED PER UNIT	TOTAL REVENUE (1) X(3)	PROFITS (4)-(2)	MARGINAL COSTS Δ(2)	MARGINAL REVENUE Δ(4)	MARGINAL REVENUE - MARGINAL COST (7)-(6)	OUTPUT DECISION
1	2	3	4	5	6	7	8	9
0	5	-	0	-5				Increase
1	20	19	19	-1				Increase
2	31	18	36	5				Increase
3	39	17	51	12				Increase
4	46	16	64	18	15	19	4	Increase
5	54	15	75	21	11	17	6	Decrease
6	64	14	84	20	8	15	7	Decrease
7	76	13	91	15	7 8	13 11	6 3	Decrease
8	90	12	96	6	10 12 14 16	9 7 5 3	-1 -5 -9 -13	Decrease
9	106	11	99	-7	18	1	-17	Decrease
10	124	10	100	-24				Decrease

► At a price of 19 monetary units firm can sell only one bungalow. The lower the price, the more units it can sell: its demand curve slopes down.

► At *low levels* of output, profits are negative.

► At *the highest level* of output (10 units), profits are again negative.

► At *intermediate levels* of output, the firm is making profits. The highest level of profits is 21 monetary units on week, and the corresponding output level is 5 bungalows per week.

As we saw, *maximizing profit is not the same as maximizing revenue*. The firm calculates the level of profit associated with each possible output level. To do this, it must know both the revenue received at each output level and the cost of producing each output level. From revenues and costs it then calculates profit at each output level and *selects* the level of output that maximizez total economic profit.

Marginal analysis introduces a better way of thinking about the output decision problem faced by firm. If there is a small change that could make the firm better off, then the current position isn't the best possible one and changes should be made.

► So long as marginal revenue *exceeds* marginal cost (between 1 and 5 units), the firm should increase its level of output because producing and selling one more unit is adding more to total revenue than to total cost, thereby increasing total profit.

► So long as marginal cost *exceeds* marginal revenue (more than 5 units of bungalows per week), the extra unit of output reduces total profit.

Firm's manager keeps increasing output so long as marginal revenue exceeds marginal cost. As soon as marginal revenue falls short of marginal cost, he stops increasing output. This is the ***optimum output level***.

11.3. IMPACTS ON OUTPUT LEVEL

There are two main impacts possible on the output level: the impact of shift in demand curve and the impact of changing cost.

11.3.1. Impact of Shift in Demand Curve on Output

Suppose the firm's demand curve and, consequently, marginal revenue (MR) curve shifts upwards (Fig.11.5). At each output level, price and marginal revenue are higher than before. *Higher demand has led the firm to expand output level* from Q_0 to Q_1.

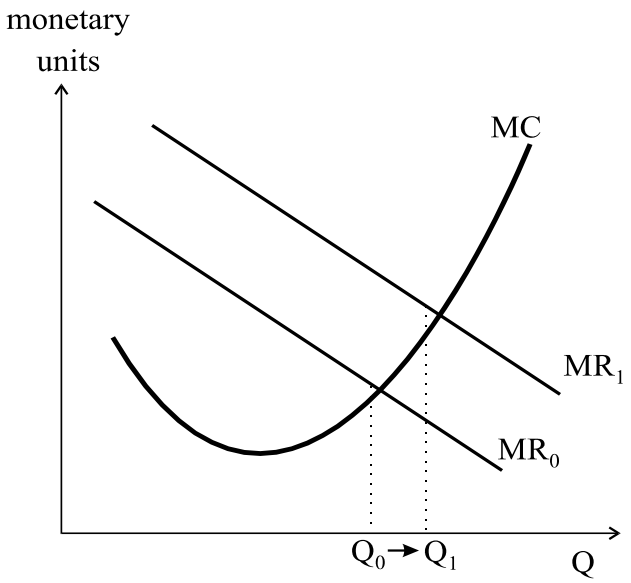

Fig.11.5. Impact of Shift in Demand Curve

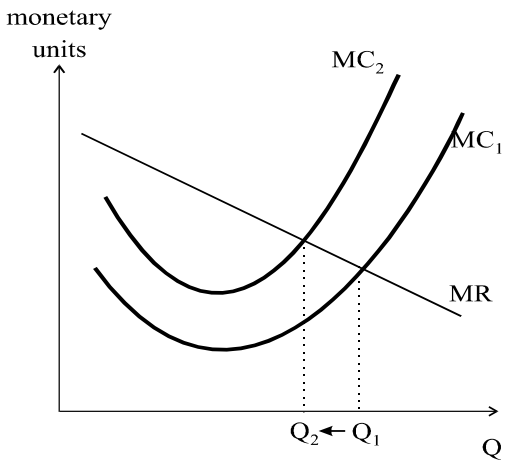

Fig.11.6. Impact of Changing Cost on Output

11.3.2. Impact of Changing Cost on Output

Suppose the firm agrees to pay a higher wage rate or faces a price increase for a raw material. At each output level, marginal cost will rise (Fig.11.6). *Higher marginal costs reduce profit-maximizing output* from Q_1 to Q_2.

11.4. FIRM'S LONG-RUN OUTPUT DECISION

11.4.1. Long-run Market Equilibrium

Long-run competitive equilibrium deals with the profit-maximizing reasons why firms enter and leave markets. Long-run

market equilibrium occurs in perfectly competitive markets when no firms enter or leave the industry.

$$\boldsymbol{P_E = MR = MC = ATC},$$

where:

P_E is the long-run market equilibrium price for the output.

This relationship applies to all firms in the industry in long-run equilibrium. When market price is at P_E, firms earn normal profit. Determined in the market by market supply and market demand, for competitive firms, P_E is the same as marginal revenue (Fig.11.7).

The graph from figure 11.7 shows:

► on the left, marginal cost and average total cost curves for an individual firm;
► on the right, market demand (D) curve and different market supply (S) curves - S_A, S_E, and S_B.

The curve S is the long-run equilibrium market supply curve, which yields the equilibrium market price of P_E.

We have to work with some specific *assumptions*:

- input prices do not change;
- production methods, the production function, does not change;
- market demand does not change.

Given these assumptions, the only way a market supply curve can shift in or out is if the number of firms in the market decreases (an inward shift) or increases (an outward shift).

It results three possible *situations*: short-run profits, long-run market equilibrium, and short-run losses.

(1) If market supply curve is at $\boldsymbol{S_A}$, market price will be P_A, which is higher than P_E. Consequently, firms will be able to sell their output for more than their average total cost. This means that their profit will excees normal profit and they will have ***short-run profits***

The excess profit is graphically represented by the shaded area.

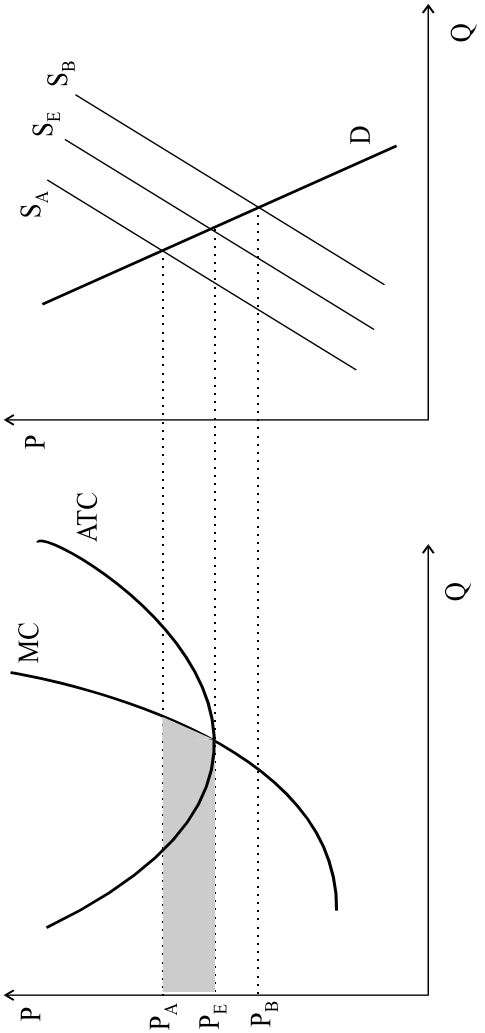

Fig.11.7. Long-run Market Equilibrium

(2) These excess profits will be attractive for new entrepreneurs, because it is easier to penetrate this market and to make profits here. When more firms enter the industry, the market supply curve will shift *outward*, resulting in a higher market quantity demanded, but at a lower market price. New firms will continue to enter the industry until price falls to $\boldsymbol{P_E}$. At this price level, the excess profits will be eliminated, the market supply curve will be at S_E, and this market as a whole will be back in ***long-run equilibrium***.

(3) If market supply is at $\boldsymbol{S_B}$, then at the market price P_B, firms will not be able to sell their output for as much as average total cost and, consequently, they will face ***losses***. Firms then will leave this un attractive market to seek better profits elsewhere. Market supply will shift inward, toward S_E. The process continues until enough firms have left the market to bring market supply back to S_E.

This is the process of ***long-run market equilibrium***.

11.4.2. Firm's shut-down

Shut-down refers to *ceasing production* ***temporarily***, *without leaving the business (industry).* If marginal revenue falls below average total cost, the firm earns less than normal (it sustains abnormal losses) and there is the question of whether to shut the firm down in the short-run.

There are two different *situations*, depending on relationship between marginal revenue and average variable cost.

(1) If *marginal revenue exceeds average variable cost,*

(MR>AVC),

the firm should not shut down in the short-run, whether or not it produces anything: it is still able to sustain its fixed costs. Despite

the fact that firm is producing looses, if marginal revenue exceeds average variable cost, that means it is able to cover its variable costs and has revenue left over to apply toward fixed costs.

In this situation, *loss is less than fixed costs*, and the firm should continue to produce.

(2) If *marginal revenue is less than average variable cost*,

$$(MR<AVC),$$

the firm should *shut-down*. If the firm decides to continue producing, it does not even cover variable costs, so it losses money on variable costs and has to pay fixed costs as well. Consequently, their losses will exceed fixed costs and the only solutin is to shut-down. In this situation, the firm eliminates all variable costs and limits the loss to only the amount of fixed cost.

The point where

$$MR = minimum\ AVC$$

is called the ***shut-down point***. Here, *the firm is exactly covering its variable cost*. The firm's decision will be to cease production and to conserve for a while their assets.

11.4.3. Firm's Long-run Output Decision

The output level of maximum profit occurs at the output level at which marginal revenue equals marginal cost:

$$MR = MC,$$

where:

MR is the marginal revenue;

MC is the marginal cost.

The firm then has to check whether it makes profits or losses at a specific output level. If it makes losses for ever, it should not stay in business. Comparing with the shut-down, the ***close-down*** is, this time, *a **permanently** going out of business*.

Because *total profits* are average profits per unit of output multiplied by the number of units of output, total profits will be positive only when average profits per unit of output exceeds zero. ***Average profits*** are *average revenue per unit minus average cost per unit*, where average revenue per unit is simply the price for which each output unit is sold.

There are *three* different situations, depending on the relationship between long-run average cost (LAC) at the point S, where LMC = MR, and the price level for which the corresponding output level can be sold (Fig.11.8):

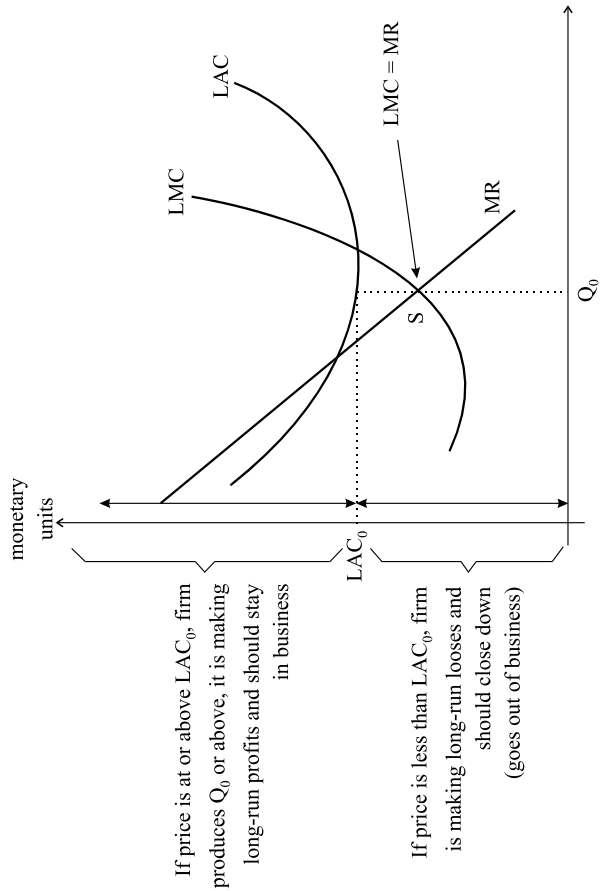

Fig.11.8. Firm's Long-run Output Decision (Close-down Point)

► if $\boldsymbol{LAC_0 < P_0}$, the firm is making long-run profits and should *stay in business;*

► if $\boldsymbol{LAC_0 = P_0}$, the firm just covers its costs and has *no losses*, but also *no profits;*

► if $\boldsymbol{LAC_0 > P_0}$, the firm is making looses even in the long-run and should *close-down (going out of business).*

These are the alternatives for the firm's long-run output decision.

KEY CONCEPTS

Market competitive models
Pure (perfect) competition
Monopolistic competition
Oligopoly
Pure monopoly
Economic barriers to entry/exit
Homogeneous (standardized) products
Differentiated products
Noneconomic barriers to entry/exit
Profit maximization
Profit maximization point
Impact of shifts in demand curve on output
Impact of changing cost on output
Short-run output decision
Long-run output decision
Long-run market equilibrium
Firm's shut down
Firm's close down

GLOSSARY

Abstraction: elimination of irrelevant and noneconomic facts to obtain an economic principle.

Aggregate demand: a schedule or curve which shows the total quantity of goods and services that will be demanded (purchased) at different price levels.

Aggregate supply: a schedule or curve which shows the total quantity of goods and services that will be supplied (produced) at different price levels.

Asset: anythin with a monetary value owned by a firm or individual.

Average fixed costs: the total fixed cost of a firm divided by its output.

Average product: the total output produced per unit of resource employed.

Average product of labor: the output per unit of labor input.

Average product of capital: the output per unit of capital input.

Average (total) cost: the total cost of a firm divided by its output; equal to average fixed cost plus average variable cost.

Average variable cost: the total variable cost of a firm divided by its output.

Balance sheet: a statement of the assets, liabilities, and net worth of a firm or an individual at some given time.

Barrier to entry: anything that artificially prevents the entry of firms into a industry.

Benefit-cost analysis: deciding whether to employ resources and the quantity of resources to employ for a project or program by comparing the benefit with the cost.

Budget line: a line which shows the different combinations of two products a consumer can purchase with a given money income.

Budget restraint: the limit the size of the consumer's income (and the prices that must be paid for the goods and services) imposes upon the ability of an individual consumer to obtain goods and services.

Capital: human-made resources used to produce goods and services; goods which do not directly satisfy human wants; capital goods.

Causation: a cause-and-effect relationship; one or several events bring about or result in another event.

Ceteris paribus assumption: see "other things being equal" assumption**.**

Change in demand: a movement of the demand curve to a different location, resulting in different quantities demanded in the market at every price.

Change in supply: a movement of the supply curve to a different location, resulting in different quantities supplied in the market at every price.

Close-down case: the circumstance in which a firm would experience a loss greater than its total fixed cost if it were to produce any output greater than zero; alternatively, a situation in which a firm would cease to operate when the price at which it can sell its product is less than its average variable cost.

Cobb-Douglas production function: method from which one can easily obtain direct measures of the presence or absence of returns to scale.

Command economy: an economic system (method of organization) in which property resources are publicly owned and Central economic planning is used to direct and coordinate economic activities.

Competition: the presence in a market of a large number of independent buyers and sellers and the freedom of buyers and sellers to enter and to leave the market.

Complementary goods: goods or services for which there is an inverse relationship between the price of one and the demand for the other; when the price of one falls (rises) the demand for the other increases (decreases).

Consumer goods: goods and services which satisfy human wants directly.

Corporate income tax: a tax levied on the net income (profit) of corporations.

Cross-section data method: method that describes the production of different firms in an industry at one point in time.

Deduction: reasoning from assumption to conclusion; a method of reasoning that tests a hypothesis (an assumption) by comparing the conclusion to which it leads with economic facts.

Demand: a demand schedule or a demand curve.

Demand curve: a curve which shows the amounts of a good or service buyers wish to purchase at various prices during some period of time.

Demand schedule: a schedule which shows the amounts of a good or service buyers wish to purchase at various prices during some period of time.

Derived demand: the demand for a good or service which is dependent upon or related to the demand for some other good or service; the demand for a resource which depends upon the demand for the products it can be used to produce.

Descriptive economics: the gathering of relevant economic facts (data).

Differentiated product: a product which differs physically or in some other way from the similar products produced by other firms.

Directly related: two sets of economic data that change in the same direction; when one variable increases (decreases) the other increases (decreases).

Direct relationship: the relationship between two variables which change in the same direction.

Diseconomies of scale: the forces which increase the average cost of producing a product as the firm expands the size of its plant (output) in the long-run.

Diseconomies of scope: are present when a firm's joint output is less than could be achieved by separate firms

Disposable income: personal income less personal taxes; income available for personal consumption expenditures and personal saving.

Economic analysis: deriving economic principles from relevant economic facts.

Economic cost: a payment that must be made to obtain and retain the services of a resource.

Economic efficiency: the relatinship between the input of scarce resourcs and the resulting output of a good or service.

Economic law: see Economic principle.

Economic model: a simplified picture of reality; an abstract generalization.

Economic perspective: a viewpoint which envisions individuals and institutions making rational or purposeful decisions based upon a consideration of the benefits and costs associated with their actions.

Economic policy: course of action that will correct or avoid a problem.

Economic principle: generalization of the economic behavior of individuals and institutions.

Economic profit: the total revenue of a firm less all its economic costs.

Economics: social science concerned with using scarce resources to obtain the maximum satisfaction of the unlimited material wants of society.

Economic theory: deriving economic principles from relevant economic facts.

Economies of scale: the forces which reduce the average cost of producing a product as the firm expands the size of its plant in the long-run.

Economies of scope: are present when the joint output of a single firm is greater than the output that could be achieved by two different firms each producing a single product.

Economizing problem: society's material wants are unlimited but the resources available to produce the goods and services that satisfy wants are limited (scarce).

Efficient allocation of resources: that allocation of the resources of an economy among the production of different products which leads to the maximum satisfaction of the wants of consumers.

Elastic demand: the elasticity coefficient is greater than one.

Elasticity: for demand or supply curves, the ratio of the percent change in quantity demanded/supplied to the percent change in the price of the good.

Elasticity coefficient: the number obtained when the percentage change in quantity demanded (or supplied) is divided by the percentage change in the price of the good.

Elastic supply: the elasticity coefficient is greater than one.

Entrepreneurial ability: the human resource which combines the other resources to produce a product, makes nonroutine decisions, innovates, and bears risks.

Equilibrium: the state in which there are no market forces that will cause a firm to change its output, a household to change its consumption pattern, or a market to effect any changes in price or quantity supplied.

Equilibrium price: the price in a competitive market at which the quantity demanded and the quantity supplied are equal.

Equilibrium price level: the price level at which the aggregate demand curve intersects the aggregate supply curve.

Equilibrium quantity: the quantity demanded and the quantity supplied at the equilibrium price in a competitive market.

Expectations: what consumers, business firms, and others believe will happen or what conditions will be in the future.

Explicit cost: a monetary payment a firm must make to an outsider to obtain a resource.

Factors of production: economic resources: land, capital, labor, and entrepreneurial ability.

Final goods: goods which have been purchased for final use and not for resale or further processing or manufacturing.

Firm: an organization that employs resources to produce a good or service for profit and owns and operates one or more plants.

(The) firm's short-run supply curve: a curve which shows the quantities of a product a firm in a purely competitive industry will offer to sell at various prices in the short-run; the portion of the firm's short-run marginal cost curve which lies above its average variable cost curve.

(The) firm's short-run supply schedule: a schedule which shows the quantities of a product a firm in a purely competitive industry will offer to sell at varoius prices in the short-run; the portion of the firm's short-run marginal cost schedule in which marginal cost is equal to or greater than average variable cost.

Fixed cost: any cost which in total does not change when the firm changes its output.

Fixed resource: any resource employed by a firm the quantity of which the firm cannot change.

Household: an economic unit of one or more persons which provides the economy with resources and uses the money paid to it for these resources to purchase goods and services that satisfy material wants.

Imperfect competition: all markets except pure competition (monopoly, monopsony, monopolistic competition, oligopoly, and oligopsony).

Implicit cost: the monetary income a firm sacrifices when it employs a resource it owns to produce a product rather than supplying the resource in the market.

Income effect: the effect which a change in the price of a product has upon the real income (purchasing power) of a consumer and the resulting effect upon the quantity of that product the consumer would purchase after the consequences of the substitution effect have been taken into account (eliminated).

Increase in demand: an increase in the quantity demanded of a good or service at every price.

Increase in supply: an increase in the quantity supplied of a good or service at every price.

Independent goods: goods and services such that there is no relationship between the price of one and the demand for the other.

Independent variable: the variable which causes a change in some other (dependent) variable.

Indifference curve: a curve which shows the different combinations of two products which give a consumer the same satisfaction (utility).

Indifference map: a series of indifference curves each of which represents a different level of utility and which together show the preferences of the consumer.

Individual demand: the demand schedule or demand curve of a single buyer of a good or service.

Individual supply: the supply schedule or supply curve of a single seller of a good or service.

Induction: a method of reasoning that proceeds from facts to generalization.

Inelastic demand: the elasticity coefficient is less than one.

Inelastic supply: the elasticity coefficient is less than one.

Inferior good: a good or service of which consumers purchase less (more) at every price when their incomes increase (decrease).

Inverse relationship: the relationship between two variables which change in opposite directions.

Isoquant: a curve that represents all the combinations of inputs that yield the same level of output.

Isoquants map: a set of isoquants, each of which representing the maximum output that can be achieved for any set of inputs.

Land: natural resources ("free gifts of nature") which can be used to produce goods and services.

Law of demand: the inverse relationship between the price and the quantity demanded of a good or service during some period of time.

Law of diminishing marginal utility: as a consumer increases the consumption of a good or service, the marginal utility obtained from each additional unit of the good or service decreases.

Law of diminishing returns: when succesive equal increments of a variable resource are added to the fixed resources, beyond some level of emplyment, the marginal product of the variable resource will decrease.

Law of increasing opportunity cost: as the amount of a product produced is increased, the opportunity cost - marginal cost - of producing an additional unit of the product increases.

Law of supply: the direct relationship between the price and the quantity supplied of a good or service during some period of time.

(The) Learning curve: describes the relationship between a firm's cumulative output and the amount of inputs needed to produce a unit of output.

Liability: a debt with a monetary value; an amount owed by a firm or an individual.

Long-run: a period of time long enough to enable producers of a product to change the quantities of all the resources they employ.

Long-run aggregate supply curve: the aggregate supply curve associated with a time period in which input prices are fully responsive to changes in the price level.

Long-run average cost curve: the curve that shows the firm's average costs in the long-run.

Long-run supply: a schedule or curve which shows the prices at which a purely competitive industry will make various quantities of the product available in the long-run.

Macroeconomics: the part of economics concerned with the economy as a whole.

Marginal cost: the extra (additional) cost of producing one more unit of output.

Marginal product: the additional output produced when one additional unit of a resource is employed, the quantity of all other resources employed remaining constant.

Marginal product of labor: the additional output produced as the labor input is increased by one unit.

Marginal product of capital: the additional output produced as the capital input is increased by one unit.

Marginal revenue: the change in the total revenue of the firm that results from the sale of one additional unit of its product.

Marginal revenue-marginal cost approach: the mathod which finds the total output at which economic profit is a maximum (or losses are minimum) by comparing the marginal revenue and the marginal cost of additional units of output.

Marginal revenue product: the change in the total revenue of the firm when it employs one additional unit of resource, the quantity of all other resources employed remaining constant.

Marginal utility: the extra utility a consumer obtains from the consumption of one additional unit of a good or service.

Market: any institution or mechanism that brings together the buyers and sellers of a particular good or service.

Market demand: see Total demand.

Market economy: an economy in which only the private decisions of consumers, resource suppliers, and business firms determine how resources are allocated.

Market period: a period of time in which producers of a product are unable to change the quantity produced in response to a change in its price.

Market system: all the product and resource matkets of the economy and the relationships among them; a method which allows the prices determined in these markets to allocate the economy's scare resources and to communicate and coordinate the decisions made by consumers, business firms, and resource suppliers.

Medium of exchange: money; a convenient means of exchanging goods and services without engaging in barter; what sellers generally accept and buyers generally use to pay for a good or service.

Microeconomics: the part of economics concerned with such individual units within the economy as industries, firms, and households.

Model: a theoretical representation of a real-world phenomenon, usually simplified in order to make its examination easier.

Monopolistic competition: a market in which many firms sell a differentiated product, into which entry is relatively easy, inwhich the firm has some control over the price at which the product it produces is sold, and in which there is considerable nonprice competition.

Monopoly: a market in which the number of sellers is so few that each seller is able to influence the total supply and the price of the good or service.

Monopsony: a market in which there is only one buyer of the good, service, or resource.

MR=MC rule: a firm will maximize its economic profit (or minimize its losses) by producing the output at which marginal revenue and marginal cost are equal - provided the price at which it can sell its products is equal to or greater than average variable cost.

MRP=MRC rule: to maximize economic profit (or minimize its losses) a firm should employ the quantity of a resource at which its marginal revenue product is equal to its marginal resource cost.

Negative relationship: see Inverse relationship

Net worth: the total assets less the total libilities of a firm or an individual.

Nondurable good: a consumer good with an expected life (use) of less than one year.

Nonprice competition: the means other than decreasing the prices of their products which firms employ to attempt to increase the sale of their products; includes product differentiation, advertising, and sales promotion activities.

Nonprice determinants of demand: factors other than its price which determine the quantities demanded of a good or service.

Nonprice determinants of supply: factors other than its price which determine the quantities supplied of a good or service.

Normal good: a good or service of which consumers will purchase more (less) at every price when their incomes increase (decrease).

Normal profit: payment that must be made by a firm to obtain and retain entrepreneurial ability

Normative economics: that part of economics which pertains to value judgments about what the economy should be alike; concerned with economic goals and policies.

Oligopoly: a market in which a few firms sell either a standardized or differentiated product, into which entry is difficult, in which

the firm's control over the price at which it sells its product is limited by mutual interdependence, and in which there is typically a great deal of nonprice competition.

Oligopsony: a market in which there are a few buyers.

Opportunity cost: the amount of other products that must be forgone or sacrificed to produce a unit of a product.

"Other things being equal" assumption: assuming that factors other than those being considered are constant.

Output: the quantity of a good or service that a firm makes available in the market.

Output effect: Perfect elasticity of demand: the impact which a change in the price of a resource has upon the output a firm finds it most profitable to produce and the resulting effect upon the quantity of the resource employed by the firm after the consequences of the substitution effect have been taken into account (eliminated).

Perfect competition: a market in which there are many firms, none of which is large enough to affect the marketby itself, product is undifferentiated, perfect knowledge exists, MR = P, and there is easy entry.

Perfect elasticity of demand: a change in the quantity demanded requires no change in the price of the commodity.

Perfect elasticity of supply: a change in the quantity supplied requires no change in the price of the commodity.

Perfect inelasticity of demand: a change in price results in no change in the quantity demanded of a commodity.

Perfect inelasticity of supply: a change in price results in no change in the quantity supplied of a commodity.

Personal consumption expenditures: the expenditures of households for durable and nondurable consumer goods and services.

Planned economy: an economy in which only government determines how resources are allocated.

P=MC rule: a firm in pure competition will maximize its economic profit or minimize its losses by producing the output at which the price of the product is equal to marginal cost, provided that price is equal to or greater than average variable cost in the short-run and equal to or greater than average total cost in the long-run.

Policy economics: the formulation of courses of action to bring about desired results or to prevent undesired occurences (to control economic events).

Positive economics: the analysis of facts or data for the purpose of establishing scientific generalization about economic behavior.

Positive relationship: the relationship between two variables which change in the same direction.

Price: the quantity of money paid and received for a unit of a good or service.

Price elasticity of demand: the ratio of the percentage change in quantity demanded of a commodity to the percentage change in its price.

Price elasticity of supply: the ratio of the percentage change in quantity supplied of a commodity to the percentage change in its price.

Price increasing effect: the effect in a competitive market of an increase in demand or a decrease in supply upon the equilibrium price.

Price level: the weighted average of the prices paid for the final goods and services produced in the economy.

Price-taker: a seller (or buyer) of a commodity thet is unable to affect the price at which a commodity sells by changing the amount it sells (or buys).

Private property: the right of private persons and firms to obtain, own, control, employ, dispose of, and bequeath land, capital, and other assets.

Private sector: the households and business firms of the economy.

Product differentiation: physical or other differences between the products produced by different firms which result in individual buyers preferring (so long as the price changed by all sellers is the same) the product of one firm to the products of the other firms.

Production possibilities curve (frontier): a curve which shows the different combinations of two goods or services that can be produced in a full-employment, full-production economy in which the available supplies of resources and technology are constant.

Production possibilities table: a table which shows the different combinations of two goods or services that can be produced in a full-employment, full-production economy in which the available supplies of resources and technology are constant.

Profit: economic profit and normal profit.

Production transformation curve: describes the different combinations of two outputs that can be produced with a fixed amount of production inputs.

Profit-maximizing rule (combination of resources): the quantity of each resource a firm must employ if its economic profit is to be a maximum or its losses a minimum.

Public sector: the part of the economy that contains all its governments.

Pure competition: a market in which a very large number of firms sells a standardized product, into which entry is very easy, in which the individual seller has no control over the price at which the product sells, and in which the is no nonprice competition.

Pure monopoly: a market in which one firm sells a unique product (one for which there are no close substitutes), into which entry is blocked, in which the firm has considerable control over the price at which the product sells, and in which nonprice competition may or may not be found.

Quantity-decreasing effect: the effect in a competitive market of a decrease in demand or a decrease in supply upon the equilibrium quantity.

Quantity demanded: the amount of a good or service buyers whish to purchase at a particular price during some period of time.

Quantity-increasing effect: the effect in a competitive market of an increase in demand or an increase in supply upon the equilibrium quantity.

Quantity supplied: the amount of a good or service sellers offer to sell at a particular price during some period of time.

Rational: an adjective that describes the behavior of any individual who consistently does those things that will enable him or her to achieve the declared objective of the individual.

Rationing function of price: the ability of a price in a competitive market to equalize quantity demanded and quantity supplied and to eliminate shortage and surpluses by rising or falling.

Resource market: a market in which households sell and firms buy the services of resources

Scarce resources: the fixed (limited) quantities of land, capital, labor, and entrepreneural ability which are never sufficient to satisfy the material wants of humans because their wants are unlimited.

Short run: a period of time in which producers of a product are able to change the quantity of some but not all of the resources they employ.

Short-run aggregate supply curve: the aggregate supply curve relevant to a time period wherein input prices (particularly nominal wages) remain constant when the price level changes.

Short-run competitive equilibrium: the price at which the total quantity of a product supplied in the short-run by a purely competitive industry and the total quantity of a product

demanded are equal and which is equal to or greater than the average variable cost of producing the product.

Slope of a line: the ratio of the vertical change (the rise or fall) to the horizontal change (the run) in moving between two points on a line.

Specialization: the use of the resources of an individual, a firm, a region, or a nation to produce one or a few goods or services.

Standardized product: a product such that buyers are indifferent to the seller from whom they purchase it so long as the price charged by all sellers is the same.

Store of value: any asset or wealth set aside for future use.

Substitute goods: goods or services such that there is a direct relationship between the price of one and the demand for the other.

Substitution effect: the effect which a change in the price of a consumer good would have upon the relative expensiveness of that good and the resulting effect upon the quantity of the good a consumer would purchase if the consumer's real income remained constant.

Superior good: see Normal good.

Supply: a supply schedule or a supply curve.

Supply curve: a curve which shows the amounts of a good or service sellers will offer to sell at various prices during some period of time.

Supply schedule: a schedule which shows the amounts of a good or service sellers will offer to sell at various prices during some period of time.

Three fundamental economic questions: the three questions which every economy must answer: what to produce, how to produce, and for whom to produce.

Time-series data method: method that describes the production of one firm or an entire industry over time.

Total cost: the sum of fixed cost and variable cost.

Total demand: the demand schedule or the demand curve of all buyers of a good or service.

Total product: the total output of a particular good or service produced by a firm, by a group of firms or by the entire economy.

Total revenue: the total number of monetary units received by a firm from the sale of a product.

Total-revenue - total-cost approach: the method which finds the output at which economic profit is a maximum or losses a minimum by comparing the total revenue and the total costs of a firm at different outputs.

Total-revenue test: a test to determine whether demand is elastic, inelastic, or of unitary elasticity between any two prices.

Total spending: the total amount buyers of goods and services spend or plan to spend.

Total supply: the supply schedule or the supply curve of all sellers of a good or service.

Total utility: the sum of the utility received by a household from all the goods and services upon which it spends its income.

Utility: the want-satisfying power of a good or service.

Utility-maximizing rule: to obtain the greatest utility the consumer should allocate his money income so that the last monetary unit spent on each good or service yields the same marginal utility.

Variable cost: a cost which in total increases (decreases) when the firm increases (decreases) its output.

Variable resource: any resource employed by a firm the quantity of which can be increased or decreased (varied).

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