



NIILM
University



Microeconomic Analysis

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CHAPTER 1

Microeconomics

Microeconomics (from Greek prefix *mikro-* meaning "small" and economics) is a branch of economics that studies the behavior of individual households and firms in making decisions on the allocation of limited resources (see scarcity). Typically, it applies to markets where goods or services are bought and sold. Microeconomics examines how these decisions and behaviors affect the supply and demand for goods and services, which determines prices, and how prices, in turn, determine the quantity supplied and quantity demanded of goods and services.

This is in contrast to macroeconomics, which involves the "sum total of economic activity, dealing with the issues of growth, inflation, and unemployment." Microeconomics also deals with the effects of national economic policies (such as changing taxation levels) on the aforementioned aspects of the economy. Particularly in the wake of the Lucas critique, much of modern macroeconomic theory has been built upon 'microfoundations'—i.e. based upon basic assumptions about micro-level behavior.

One of the goals of microeconomics is to analyze market mechanisms that establish relative prices amongst goods and services and allocation of limited resources amongst many alternative uses. Microeconomics analyzes market failure, where markets fail to produce efficient results, and describes the theoretical conditions needed for perfect competition. Significant fields of study in microeconomics include general equilibrium, markets under asymmetric information, choice under uncertainty and economic applications of game theory. Also considered is the elasticity of products within the market system.

Assumptions and definitions

The fundamental of Microeconomics lies in the analysis of the preference relations. Preference relations are defined simply to be a set of different choices that an actor can choose (a k -cell metric space) that actors can also compare between any two bundles of choices (completeness of the relationship.) In order to analyze the problem further, the assumption of transitivity is added to the mix. These two assumptions of completeness and transitivity that is imposed upon the preference relations are what is termed rationality. Microeconomic analysis are conducted mainly through imposition of additional constraints on the preference relations or

even relaxation of the above stated assumptions (most often transitivity) although such relaxation makes the problem much harder to analyze.

The theory of supply and demand usually assumes that markets are perfectly competitive. This implies that there are many buyers and sellers in the market and none of them have the capacity to significantly influence prices of goods and services. In many real-life transactions, the assumption fails because some individual buyers or sellers have the ability to influence prices. Quite often, a sophisticated analysis is required to understand the demand-supply equation of a good model. However, the theory works well in situations meeting these assumptions.

Mainstream economics does not assume *a priori* that markets are preferable to other forms of social organization. In fact, much analysis is devoted to cases where so-called market failures lead to resource allocation that is suboptimal by some standard (defense spending is the classic example, profitable to all for use but not directly profitable for anyone to finance). In such cases, economists may attempt to find policies that avoid waste, either directly by government control, indirectly by regulation that induces market participants to act in a manner consistent with optimal welfare, or by creating "missing markets" to enable efficient trading where none had previously existed.

This is studied in the field of collective action and public choice theory. "Optimal welfare" usually takes on a Paretian norm, which in its mathematical application of Kaldor–Hicks method. This can diverge from the Utilitarian goal of maximizing utility because it does not consider the distribution of goods between people. Market failure in positive economics (microeconomics) is limited in implications without mixing the belief of the economist and their theory.

The demand for various commodities by individuals is generally thought of as the outcome of a utility-maximizing process, with each individual trying to maximize their own utility under a budget constraint and a given consumption set.

Opportunity cost

Opportunity cost of an activity (or goods) is equal to the best next alternative uses/foregone. Although *opportunity cost* can be hard to quantify, the effect of opportunity cost is universal and very real on the individual level. In fact, this principle applies to all decisions, not just economic ones.

Opportunity cost is one way to measure the cost of something. Rather than merely identifying and adding the costs of a project, one may also identify the next best alternative way to spend the same amount of money. The forgone profit of this *next best alternative* is the opportunity cost of the original choice. A common example is a farmer that chooses to farm their land rather than rent it to neighbors, wherein the opportunity cost is the forgone profit from renting. In this case, the farmer may expect to generate more profit alone. This kind of reasoning is a very important part of the calculation of discount rates in discounted cash flow investment valuation methodologies. Similarly, the opportunity cost of attending university is the lost wages a student could have earned in the workforce, rather than the cost of tuition, books, and other requisite items (whose sum makes up the total cost of attendance).

Note that opportunity cost is not the *sum* of the available alternatives, but rather the benefit of the single, best alternative. Possible opportunity costs of a city's decision to build a hospital on its vacant land are the loss of the land for a sporting center, *or* the inability to use the land for a parking lot, *or* the money that could have been made from selling the land, *or* the loss of any of the various other possible uses — but not all of these in aggregate. The true opportunity cost would be the forgone profit of the most lucrative of those listed.

Applied microeconomics

Applied microeconomics includes a range of specialized areas of study, many of which draw on methods from other fields. Industrial organization examines topics such as the entry and exit of firms, innovation, and the role of trademarks. Labor economics examines wages, employment, and labor market dynamics. Financial economics examines topics such as the structure of optimal portfolios, the rate of return to capital, econometric analysis of security returns, and corporate financial behavior. Public economics examines the design of government tax and expenditure policies and economic effects of these policies (e.g., social insurance programs). Political economy examines the role of political institutions in determining policy outcomes. Health economics examines the organization of health care systems, including the role of the health care workforce and health insurance programs. Urban economics, which examines the challenges faced by cities, such as sprawl, air and water pollution, traffic congestion, and poverty, draws on the fields of urban geography and sociology. Law and economics applies microeconomic principles to the selection and enforcement of competing legal regimes and their

relative efficiencies. Economic history examines the evolution of the economy and economic institutions, using methods and techniques from the fields of economics, history, geography, sociology, psychology, and political science.

Imperfect competition and game theory

In 1929 Harold Hotelling published "Stability in Competition" addressing the problem of instability in the classic Cournot model: Bertrand criticized it for lacking equilibrium for prices as independent variables and Edgeworth constructed a dual monopoly model with correlated demand which also lacked stability. Hotelling proposed that demand typically varied continuously for relative prices, not discontinuously as suggested by the later authors.

Following Sraffa he argued for "the existence with reference to each seller of groups who will deal with him instead of his competitors in spite of difference in price", he also noticed that traditional models that presumed the uniqueness of price in the market only made sense if the commodity was standardized and the market was a point: akin to a temperature model in physics, discontinuity in heat transfer (price changes) inside a body (market) would lead to instability. To show the point he built a model of market located over a line with two sellers in each extreme of the line, in this case maximizing profit for both sellers leads to a stable equilibrium. From this model also follows that if a seller is to choose the location of his store so as to maximize his profit, he will place his store the closest to his competitor: "the sharper competition with his rival is offset by the greater number of buyers he has an advantage". He also argues that clustering of stores is wasteful from the point of view of transportation costs and that public interest would dictate more spatial dispersion.

A new impetus was given to the field when around 1933 Joan Robinson and Edward H. Chamberlin, published respectively, *The Economics of Imperfect Competition* (1933) and *The Theory of Monopolistic Competition* (1933), introducing models of imperfect competition. Although the monopoly case was already exposed in Marshall's Principles of Economics and Cournot had already constructed models of duopoly and monopoly in 1838, a whole new set of models grew out of this new literature. In particular the monopolistic competition model results in a non efficient equilibrium. Chamberlin defined monopolistic competition as, "...challenge to traditional viewpoint of economics that competition and monopoly are alternatives and that individual prices are to be explained in terms of one or the

other." He continues, "By contrast it is held that most economic situations are composite of both competition and monopoly, and that, wherever this is the case, a false view is given by neglecting either one of the two forces and regarding the situation as made up entirely of the other."

Later, some market models were built using game theory, particularly regarding oligopolies. A good example of how microeconomics started to incorporate game theory, is the Stackelberg competition model published in 1934, which can be characterized as a dynamic game with a leader and a follower, and then be solved to find a Nash Equilibrium.

Externalities and market failure

In 1937, "The Nature of the Firm" was published by Coase introducing the notion of transaction costs (the term itself was coined in the fifties), which explained why firms have an advantage over a group of independent contractors working with each other. The idea was that there were transaction costs in the use of the market: search and information costs, bargaining costs, etc., which give an advantage to a firm that can internalize the production process required to deliver a certain good to the market. A related result was published by Coase in his "The Problem of Social Cost" (1960), which analyses solutions of the problem of externalities through bargaining, in which he first describes a cattle herd invading a farmer's crop and then discusses four legal cases: *Sturges v Bridgman*, *Cooke v Forbes*, *Bryant v Lejever*, and *Bass v Gregory*. He then states:

"In earlier sections, when dealing with the problem of rearrangement of legal rights through the market, it was argued that such a rearrangement would be made through the market whenever this would lead to an increase in the value of production. But this assumed costless market transactions. Once the costs of carrying out market transactions are taken into account it is clear that such rearrangement of rights will only be undertaken when the increase in the value of production consequent upon the rearrangement is greater than the costs which would be involved in bringing it about. When it is less, the granting of an injunction (or the knowledge that it would be granted) or the liability to pay damages may result in an activity being discontinued (or may prevent its being started) which would be undertaken if market transactions were costless. In these conditions the initial delimitation of legal rights does have an effect on the efficiency with which the economic system operates. One arrangement of rights may bring about a greater value

of production than any other. But unless this is the arrangement of rights established by the legal system, the costs of reaching the same result by altering and combining rights through the market may be so great that this optimal arrangement of rights, and the greater value of production which it would bring, may never be achieved."

Economies with Imperfect Information and Incomplete Markets" by Stiglitz and Greenwald: the basic model consists of households that maximize a utility function, firms that maximize profit—and a government that produces nothing, collects taxes, and distributes the proceeds. An initial equilibrium with no taxes is assumed to exist, a vector x of household consumption and vector z of other variables that affect household utilities (externalities) are defined, a vector π of profits is defined along with a vector E of households expenditures. Since the envelope theorem holds, if the initial non taxed equilibrium is Pareto optimal then it follows that the dot products (between x and the time derivative of z) and B (between E and the time derivative of z) must equal each other. They state:

Behavioral economics

Kahneman and Tversky published a paper in 1979 criticizing the very idea of the rational economic agent. The main point is that there an asymmetry in the psychology of the economic agent that gives a much higher value to losses than to gains. This article is usually regarded as the beginning of behavioral economics and has consequences particularly regarding the world of finance. The authors summed the idea in the abstract as follows:

"...In particular, people overweight outcomes that are merely probable in comparison with outcomes that are obtained with certainty. This tendency, called certainty effect, contributes to risk aversion in choices involving sure gains and to risk seeking in choices involving sure losses. In addition, people generally discard components that are shared by all prospects under consideration. This tendency, called the isolation effect, leads to inconsistent preferences when the same choice is presented in different forms."

More recently, the continuing Great Recession brought the principal–agent problem again to the center of debate, in particular regarding corporate governance.

CHAPTER 2

Microeconomic Analysis Concepts

Basic Economic Definitions

The first step in the course is to understand some basic definitions, to be used throughout the course of the semester. Some of the definitions will be modified slightly later in the course; once more background information is gained.

A. Economics.

What is economics? When I ask students who have not already taken an economics class this question, they often focus upon money and financial institutions. Sometimes, it is described as dealing with questions like unemployment and inflation. Although all of these answers are correct, in that these are issues that economists analyze, economics itself is much broader in application.

Economics is the study of the choices that people make, all of the choices, and the personal and social consequences of those choices.

It is easy to see that economics is relevant for the topics discussed above, but also for a wide range of other types of issues not normally considered by most people to be economic in nature. For example, economist Gary Becker first suggested more than twenty years ago that the choices that people make in families could be fruitfully analyzed with economic principles and procedures. His treatise on the family was primarily the reason why he was awarded the Nobel Prize in Economics in 1992. Economics considers an extremely wide range of topics ranging from explaining divorce to investigating the working of the law and legal institutions.

B. Microeconomics vs. Macroeconomics

Micro and macroeconomics are the two main branches of economics. In each branch, it remains the case that what is being studied is the choices that people make, and the personal and social

consequences of those choices. However, the particular types of choices being studied vary between the two branches.

As the word implies, macroeconomics deals with the large, or aggregated, economic choices faced by society. Thus, macroeconomics studies issues dealing with an aggregated, national or regional economy such as matters of unemployment, inflation, levels of government spending and taxation, and so forth.

In contrast, microeconomics deals with small, sometimes individual, economic choices faced within any society. Thus, microeconomics studies issues dealing with smaller choices including individual choice by consumers, the behavior of profit maximizing firms in different types of market scenarios, and other types of non-market organizations, such as the family.

C. Scarcity

We have already decided that economics is a study of choices, either collective societal choices or more individualized choices. However, what is it about the real world that requires that we make choices? A moment's thought about our individual lives, and the choices that we face, reveals that we must make choices because we have limited resources.

Scarcity is simply the concept that human wants (not human needs) exceed the resources available that are necessary to produce the goods used to satisfy those wants.

Thus, scarcity is fundamentally the most important concept in economics, upon which all of the rest of the discipline rests. For without scarcity, no need for choice, either individual or collective, exists. One need not make a choice between buying a nice lunch at a restaurant and buying a new sweater because one will always have enough resources to purchase both goods. Since economics is the study of how people make choices, without scarcity there would exist no choice and, hence, no economics.

Thus, scarcity is one of the fundamental premises of economics. However, scarcity is not necessarily universally true, especially for all times, all places, and all goods. Thus, a given good

at a specific place or time might not be scarce. Thus, we must define what we mean, not only by scarcity in general, but by scarcity for specific goods.

A good is considered scarce if the amount people demand of the good (quantity demanded) exceeds the amount that is supplied (quantity supplied), when the price of the good equals zero.

A good is considered free if the quantity demanded either equals or is less than the quantity supplied, when the price of the good equals zero.

D. Production

The following flow diagram describes what economists mean when they talk about production.

Resources are inputted into a production process, which yields an output. The production process itself embodies the technology used to produce the output. An increase in technology will make it possible to produce more output with the same level of resources or make it possible to produce the same output with fewer resources. There are four general types of resources:

Type of Resource	Abbreviation	Return
Labor	L	wages
Land (natural resources)	N	rent
Capital	K	interest
Entrepreneurship	E	profit

Labor is often referred to as "human capital," an acknowledgement that labor resources are often made more productive through education or training. Capital is one of the most confusing types of resources, largely because many students think of Capital as primarily financial rather than as a productive resource. However, not only is Capital a productive resource, but it is

also always itself the result of a production process. Land is an inclusive category that includes all kinds of natural resources. The only condition that must be met is that the resource cannot be the result of a production process, which would make the resource Capital rather than Land. Entrepreneurship is really just a particular type of Labor, that type of labor that organizes all of the other resources in a productive enterprise. As a result, Entrepreneurs receive profit – the amount of money that is left after all other resources have been paid.

E. Rationality

As noted above, scarcity implies that humans and human organizations must make choices. However, one of the crucial questions that must be answered, in order to investigate how people make choices, is the underlying goal followed by individuals. Economists assume that individuals are rational, that they make choices in order to maximize their own self-interest. Rationality may seem to be a rather narrow assumption. However, self-interest actually has quite a broad application because each individual can, obviously, define the limits of their own self-interest. Thus, for many people, their own self-interest includes quite a broad range of people or issues including, for example, their own families.

F. Basic Economic Choices/Questions

All economies face four basic choices, questions that must be answered for an economy to work well.

1. WHAT goods will be produced?

Initially society must decide what goods, specifically, they wish to produce.

2. HOW will resources be used in the production process?

Once it has been decided exactly what goods will be produced, the next question that must be addressed is exactly how these goods will be produced. This question focuses on issues such as the type of technology to be used, whether the production process should be labor intensive or capital intensive, and so forth. The most important focus for economists is on the issue of producing output with the fewest resources or the lowest costs.

3. **WHO** will receive the goods?

Once the goods have been produced, the next crucial question that remains deals with who, specifically, will get these goods. In a market economy, which relies upon money for many transactions, this question is essentially one of determining the distribution of income. Higher income, in a market economy, translates into the ability to purchase more goods and services. Thus, this question focuses on issues of taxation and subsidies.

4. **When** will production occur?

The final question deals with the timing of production. Sometimes the timing of production is determined by nature, as in the case of many agricultural products that are produced in a particular season. This leads us directly to another relevant issue for this question, the storage and wastage of perishables. For, while many goods can only be produced in a particular season, most often consumption of those goods takes place during the entire year. Sometimes the timing of production is determined by society. For example, in Western society the largest season for retail sales occurs just prior to Christmas.

G. Opportunity Costs

An opportunity cost equals the value of the next-best foregone alternative, whenever a choice is made.

Again, notice the common theme of the necessity of choice, and its consequences, running throughout all of these definitions. Economists are careful to consider all of the costs of making a choice. Consider, for example, the choice made by all of the students in this class, the choice to attend school. The costs of attending school can be divided into direct costs and indirect costs. Direct costs are actual, out-of-pocket payments for goods, services, or resources. Indirect costs are, on the other hand, the opportunity costs of goods, services, or resources that are consumed, even though no direct payment for them occurs. Carefully consider the costs, both direct and indirect (opportunity), of your choice to attend school. Let's suppose that they look something like the following:

These all represent, as given in the definition of the term "opportunity costs" above, not direct out-of-pocket dollar payments, but the value of foregone alternatives. For example, lost wages refer to the wages that a student loses because he chooses to attend college. Any resource can have an indirect cost associated with it, not just labor. For example, a person could have \$10,000 that she uses to finance the direct payments for college. However, she could have used this money as an investment, which would have yielded interest payments. The interest that she loses as a result of this decision is also a cost of attending college, albeit an opportunity cost.

It is important to note that each individual's total costs of attending college will vary because their choices and situation varies. For example, one person may bear none of the indirect costs because they had no other options besides attending college, at least none that involved such dollar losses. Another person may have lost wages, which may be quite low, while a second's lost wages might be quite high because they have different opportunities. Hence, one cannot simply add up all the numbers in the table above to discover the total cost of attending college for each individual.

Finally, only indirect costs are considered opportunity costs.

H. Monetary Price versus Relative Price

The monetary price of a good or resource is simply the actual dollar price paid. Other terms for the concept of "Monetary Price" are "Absolute Price" and "Nominal Price."

In contrast to the monetary price, the relative price measures the price of the good or resource relative to prices of other goods and resources. Thus, the relative price of a good or resource can either (1) remain unchanged even though its monetary price rises or falls or (2) rise or fall even though its monetary price remains unchanged. This is true because relative price can change, not only because of changes in the monetary price of a good or resource, but also because of changes in the monetary prices of other goods or resources.

Consider, for example, the price of oranges relative to apples when both cost \$1 per pound. If the dollar price of oranges rises to \$2 per pound, then both of the above situations are possible dependent upon what happens to the price of apples. If the price of apples also rises to \$2 per

pound, then the relative price of oranges has not changed. This is because giving up one orange will still buy one apple, and the reverse, just as it would before the monetary prices changed. However, if the price of apples does not change, then oranges have gotten more expensive relative to apples. Before the price change, one could buy one apple or one orange with a dollar. After the price change, one could buy one orange or two apples with the same amount of money.

Now that we understand the meaning of these two different types of prices, the next step is to consider which of the two concepts, monetary or relative price, is used by individuals as they make their consumption decisions. To illustrate the answer to this important question consider whether your behavior would change if all prices doubled, including the price paid for your labor and other resources. In other words, all the prices you pay for goods you consume would double as would your income. In this case, although monetary prices have changed, relative prices for all goods and resources remain unchanged. When faced with such a scenario, most people do not change their behavior. This serves as an indication that it is relative price, and not monetary price, that matters in individual decision making.

Finally, prices in a market economy have some additional functions. For example, the price of a good or resource conveys information about the availability of the good and, often, its quality. Prices also serve as an incentive to individuals in their decision making. Higher prices give people an incentive to ration scarce goods and resources.

I. Economic Efficiency

For society as a whole, economic efficiency is achieved when society produces the output of goods such that society's highest net value is obtained.

Net value equals the difference between the total benefit society reaps from all the goods currently being produced and the total costs of producing those goods.

The concept of economic efficiency can be broken down into two types of efficiency, technological and allocative efficiency, both of which must be achieved in order to achieve economic efficiency.

Technological efficiency focuses on answering the basic economic question of how goods and resources will be produced. That is, it focuses on the question of what production process (i.e., what technology) should be used in order to produce a given output, with the goal being to maximize society's net value. A production process is considered technologically efficient if, given the output being produced; the fewest resources possible are used to produce that output. Technological inefficiency is the result when this goal is not achieved.

J. The Scientific Method

People are often confused about which disciplines can legitimately be considered science. Are those who study English, for example, scientists? What about economists, are they scientists? To many only those disciplines included in the so-called "hard" sciences, such as biology and physics, should be considered scientists. However, for the purposes of this class we will consider a discipline a science if it follows the scientific method in its academic inquiry.

What is the scientific method? The scientific method is a process that attempts to objectively learn truth about the real world. It has three major components:

1. Initial identification of a real world problem to study.

In this step, the scientist looks at the real world to find some phenomenon that she thinks explaining will yield fruitful insights. For example, one problem that economists have addressed is how markets, with buyers and sellers, work. In addition to identifying the problem to study, in this stage the scientist also thinks about the nature of the problem and, perhaps, makes ad hoc observations that will help him formulate a method of modeling the problem, which is the next step of the process.

2. Build a model of the real world problem being studied. Model building includes the following three steps.

The first step is to make some assumptions that will serve as the foundation upon which the model is built. Assumptions serve two crucial purposes. Most importantly, they attempt to mimic the real world conditions that affect whatever problem is being studied. However, the real world

is often too complex to include all of its components within a scientific model. As a result, assumptions are often made in order to simplify the model, as opposed to reality, which has the benefit of making the model easier to understand and use. The key in this step of the process is to not make simplifying assumptions that are so far removed from reality that the model is incapable of providing insight into the problem under consideration.

The second step is to build a model or theory based upon the assumptions the scientist has made that describes the phenomenon being studied. Most of the time, mathematics is used to build scientific models.

The final step in the model building process is to use the model to get predictions about how the real world behaves. For example, one of the key purposes of building a model describing how markets work is to predict what will happen in different circumstances to prices and quantities exchanged in a given market.

3. The final step in the scientific method is to test the model. The scientist uses the predictions developed in step 2 above, gathers real world data, and then compares actual outcomes with the predictions. If the predictions are accurate, then the simplified scientific model is successful. However, when the predictions are inaccurate, the scientist must begin over with step 1 and go through the process again as many times as it takes until accuracy is achieved.

Economics is a science because it uses the scientific method to analyze real world problems. Other disciplines, like English, are not sciences because they do not use the scientific method. This does not mean that these disciplines are not useful to society, just that they are not science. In this course, we will use the scientific method to build a number of models describing real world phenomena. Our focus will be upon building models about how markets work and how consumers and firms make decisions. These models constitute the principles of economics. We will not do any systematic testing of the models, although economists have rigorously done such testing, because such testing is beyond the scope of the course. However, we will discuss applications of the model to the real world to give students some insight into the real world and to demonstrate that the models have real world applicability.

CHAPTER 3

Basic Assumptions

Microeconomics: Assumptions and Utility

The decision-making process of the individual consumer is critically important in the study of microeconomics because consumer spending accounts for about 70% of the economy.

Consumers also save money, invest it, stash it away for the future in banks, stocks, bonds, money market or mutual funds, or other forms of savings. Microeconomics also studies the decision-making processes that determine how much a household may save, where it is saved, for how long and why.

But because consumer spending is the engine that drives the economy, businesses continually pursue knowledge of how the consumer decision-making process works to better serve their markets with the most desired of products and services at usually, but not always, competitive prices.

Microeconomic Assumptions

A basic assumption of microeconomics is that because a consumer does not have an unlimited budget, his or her available cash for spending must be judiciously allocated for maximum benefit. Microeconomics also supposes that individual consumers make their buying decisions in an effort to obtain the most happiness at the least cost - in other words, maximizing happiness or benefit.

Happiness, of course, cannot be quantified. But there are methods and assumptions in the microeconomics tool box for calculating a reasonable approximation of this elusive concept. In microeconomics, happiness is measured by a concept called utility. The standard unit of measurement that microeconomics uses to measure utility is called theutil. (To learn more, read Economics Basics: Utility.)

Utils and Utility

The util has no concrete numerical value like an inch or a centimeter. It is merely an arbitrary, subjective and convenient way to assign value to consumer choices and to measure the consumer utility or utils of one choice against another choice.

As an example, a consumer may go to the supermarket with \$100 to spend, along with a phantom 100 utils representing 100% of the happiness the consumer expects to garner from all the purchases he makes. Two-thirds of that dollar amount is spent on necessities - meat, bread, milk, produce and other food staples. Although 67% of the money budgeted for purchases is spent on food stuffs, the number of utils assigned to those purchases - arbitrarily and subjectively - may only be 40. The remaining one-third of the money is spent on chocolate bars, ice cream, frozen pizza, soda pop and other unnecessary goodies. But the utils assigned to these purchases total 60.

So a rough numerical measure of consumer satisfaction is derived - what microeconomics calls cardinal utility, which refers to the cardinal numbers, starting with 1, 2, 3 and so on. There's a problem, however, with this concept, convenient though it may be: consumers don't as a rule calculate the numerical utility value of their purchases; only macroeconomists do.

Ordinal utility, another term widely used in microeconomics, may be a more useful way of determining consumer satisfaction because it simply denotes consumer preferences without assigning them numerical values.

5 Assumptions of Consumer Choice Theory

1. Consumers are knowledgeable
2. Consumers are rational
3. Consumers maximize utility
4. More is preferred to less
5. Law of Diminishing Rate of Marginal Substitution (LDMRS)

1. Consumers are knowledgeable

Consumers can rank their preferences ordinally, not cardinally

2. Consumers are rational

This follows transitivity; this is the reason utility curves can never cross or touch; if they did, it would suggest indifference between a combination with more and a combination with less

3. Consumers maximize utility

Consumers will choose the combination of goods that supplies the highest level of satisfaction

4. More is preferred to less

Consumers will prefer the utility curve that is furthest from the origin

5. LDMRS

The more and more of one good that is taken from a consumer, the more and more of the other good they'll need to maintain equal utility

5 Assumptions of Perfect Competition

1. Many firms

2. Homogeneous product

3. Equal Access to resources and info

4. Easy entry/exit

5. Firms maximize profit

1. Many firms

Firms are price-takers; no individual firm has any power over the market price

2. Homogeneous product

All products are identical; if there were differences between products (which there aren't), consumers would be told via advertisement

3. Equal access to resources and info

All firms can be illustrated by a single graph; No firm can get a "leg up" on the others in perfect competition

4. Easy entry/exit

There are low barriers for entry and exit in the market; zero economic profit in the long run

5. Firms maximize profit

The profit maximizing level of output is where $MR=MC$. (Where $MR=MC$ is where the quantity is)

Economies of Scale

- Bulk Discounts
- Specialization of labor
- Left (downward sloping part) of LRAC

Diseconomies of Scale

- Organizational costs
- Information problems
- Right (upward sloping part) of LRAC

4 Assumptions of Monopoly

1. One firm
2. Maximize profit
3. No substitutes
4. High barrier to entry

1. One firm

The firm is the industry

2. Maximize profit

Firm sets price by manipulating output (no competitive pressure)

3. No substitutes

One product

4. High barrier to entry

Various reasons: high start-up capital cost, etc.

3 Assumptions of Duality

1. Specialization of inputs

2. Law of diminishing marginal product

3. Perfectly elastic labor supply

1. Specialization of labor

As workers specialize, you get increasing additional productivity per worker. Causes the upward sloping part of MP curve

2. Law of diminishing marginal product

Beyond Max MP, Min MC, you get decreasing additional productivity per worker due to crowding, communication breakdowns, etc. This holds true in the short run, as some inputs are fixed. Causes the downward sloping part of MP. Ex: too many cooks in the kitchen

3. Perfectly elastic labor supply

At a constant wage rate, a firm can hire an infinite amount of workers

4 Assumptions of Monopolistic Competition

1. Many sellers

2. Products are differentiated

3. Low barriers to entry

4. Independent decision-making

1. Many sellers/firms

Competitive aspect

2. Products are differentiated

Monopolistic aspect, as each firm can be seen as a monopoly in their own "brand" market

3. Low barriers to entry

No long run economic profit

4. Independent decision-making

Unlike in oligarchy, firms act of their own accord

Further Considerations

A consumer, for example, may prefer hot dogs to hamburgers; or he may purchase a coat at Target (NYSE:TGT) rather than Wal-Mart (NYSE:WMT). These are consumer preferences - their rankings of one product or brand against another. These preferences may be influenced by pricing, quality, convenience and other measurable factors along with the subjective, which is unquantifiable.

Why are such arbitrary and seemingly inexact measurements used in microeconomics? They provide at least some insight into the complexities of consumer decision-making. Both the numerical data - cardinal utility and the preferences data, ordinal utility - are extremely useful to businesses. Using this information, businesses can decide how much of a product or service to offer in the marketplace, and determine their optimum price for maximum sales.

Another term for consumer utility - cardinal utility, in this case - is consumer benefit. In any situation where a consumer buys more than one item of a product, the utility value may start to diminish as the consumer purchases or consumes more the product.

For instance, a single ice cream cone at a certain price may have a 75% utility value for the consumer. A consumer with two children who also want ice cream cones may assign a utility value of 100%, if price discounts are given for the purchase of additional ice cream cones.

Additional ice cream cones at additional price reductions, however, would have a declining utility value. Why? It is because there are only three consumers of the theoretical ice cream cones. Furthermore, the consumer is disinclined to buy the additional ice cream cones at a discounted price because by the time he or she gets them home, they'll have melted away. Further, the consumer does not want his or her children to consume more than one cone a day.

Satisficing

Let's say that a consumer wants to buy a used car. Utility theory holds that consumers would evaluate an indeterminate number of used cars, calculate the value of their variables and then buy the car with the highest number derived from that formula. Simon's satisficing theory suggests that consumers may just evaluate a limited number of used cars in a used car lot conveniently nearby. The consumer then makes a buying choice he or she considers "good enough." This theory seems reasonable, and eliminates some of the flaws inherent in the utility theory.

Conclusion

Still, the utility theory remains a mainstay of the broader microeconomic theory, although economists continue to adjust it, propose new aspects of it, and tweak it in different subtle directions so that it encompasses all contingencies and variables in the phenomenon of consumer decision-making

CHAPTER 4

Opportunity Cost

In microeconomic theory, the opportunity cost of a choice is the value of the best alternative forgone, in a situation in which a choice needs to be made between several mutually exclusive alternatives given limited resources. Assuming the best choice is made, it is the "cost" incurred by not enjoying the benefit that would be had by taking the second best choice available. The *New Oxford American Dictionary* defines it as "the loss of potential gain from other alternatives when one alternative is chosen". Opportunity cost is a key concept in economics, and has been described as expressing "the basic relationship between scarcity and choice". The notion of opportunity cost plays a crucial part in ensuring that scarce resources are used efficiently. Thus, opportunity costs are not restricted to monetary or financial costs: the real cost of output forgone, lost time, pleasure or any other benefit that provides utility should also be considered opportunity costs.

History

The term was coined in 1914 by Austrian economist Friedrich von Wieser in his book *Theorie der gesellschaftlichen Wirtschaft*. It was first described in 1848 by French classical economist Frédéric Bastiat in his essay "What Is Seen and What Is Not Seen".

Opportunity costs in production

Opportunity costs may be assessed in the decision-making process of production. If the workers on a farm can produce either one million pounds of wheat or two million pounds of barley, then the opportunity cost of producing one pound of wheat is the two pounds of barley forgone (assuming the production possibilities frontier is linear). Firms would make rational decisions by weighing the sacrifices involved.

Explicit costs

Explicit costs are opportunity costs that involve direct monetary payment by producers. The opportunity cost of the factors of production not already owned by a producer is the price that the

producer has to pay for them. For instance, a firm spends \$100 on electrical power consumed; their opportunity cost is \$100.

Implicit costs

Implicit costs (Also called implied, imputed or notional costs) are the opportunity costs implied by the uses to which the actor (i.e. firm) allocates their existing (owned) resources, or factors of production. For example: a manufacturer has previously purchased 1000 tons of steel and the machinery to produce a widget. The opportunity costs of selling the steel and renting the machinery (instead of producing the widget) are implicit costs.

Evaluation

Note that opportunity cost is not the *sum* of the available alternatives when those alternatives are, in turn, mutually exclusive to each other – it is the value of the *next best* use. The opportunity cost of a city's decision to build the hospital on its vacant land is the loss of the land for a sporting center, or the inability to use the land for a parking lot, or the money which could have been made from selling the land. Use for any one of those purposes would preclude the possibility to implement any of the other.

When economists refer to the “opportunity cost” of a resource, they mean the value of the next-highest-valued alternative use of that resource. If, for example, you spend time and money going to a movie, you cannot spend that time at home reading a book, and you cannot spend the money on something else. If your next-best alternative to seeing the movie is reading the book, then the opportunity cost of seeing the movie is the money spent plus the pleasure you forgo by not reading the book.

The word “opportunity” in “opportunity cost” is actually redundant. The cost of using something is already the value of the highest-valued alternative use. But as contract lawyers and airplane pilots know, redundancy can be a virtue. In this case, its virtue is to remind us that the cost of using a resource arises from the value of what it could be used for instead.

This simple concept has powerful implications. It implies, for example, that even when governments subsidize college EDUCATION, most students still pay more than half of the cost.

Take a student who annually pays \$4,000 in tuition at a state college. Assume that the government subsidy to the college amounts to \$8,000 per student. It looks as if the cost is \$12,000 and the student pays less than half. But looks can be deceiving. The true cost is \$12,000 plus the income the student forgoes by attending school rather than working. If the student could have earned \$20,000 per year, then the true cost of the year's schooling is \$12,000 plus \$20,000, for a total of \$32,000. Of this \$32,000 total, the student pays \$24,000 (\$4,000 in tuition plus \$20,000 in forgone earnings). In other words, even with a hefty state subsidy, the student pays 75 percent of the whole cost. This explains why college students at state universities, even though they may grouse when the state government raises tuitions by, say, 10 percent, do not desert college in droves. A 10 percent increase in a \$4,000 tuition is only \$400, which is less than a 2 percent increase in the student's overall cost .

What about the cost of room and board while attending school? This is not a true cost of attending school at all because whether or not the student attends school, the student still has expenses for room and board.

Choices and opportunity cost

People's choices about what goods and services to buy and consume determine how resources will be used. The choices people make have both present and future consequences - consider for example the decision of students to stay on in full-time education after GCSE exams and A-Levels. You are forsaking some lost earnings in the short run (rarely can students study and hold down a full-time job!) but have the prospect of increased earnings potential in the future if you succeed on your course and achieve good grades.

There is a famous saying in economics that "there is no such thing as a free lunch". Even if we are not asked to pay for consuming a good or a service, scarce resources are used up in the production of it and there must be some opportunity cost involved - the next best alternative that might have been produced using those resources.

Opportunity cost measures the cost of any economic choice in terms of the next best alternative foregone

The opportunity cost of spending money on a foreign holiday is the lost opportunity to buy a new dishwasher or the chance to enjoy two short breaks inside the United Kingdom

The opportunity cost of the government spending £20 billion on interest payments on the national debt is the extra money it might have allocated to the National Health Service

The opportunity cost of an economy investing its resources in new capital goods is the current production of consumer goods that is given up

The opportunity cost of using arable farm land to produce wheat is that the land cannot be used in that production period to harvest potatoes

Example of Opportunity Costs

An opportunity cost equals the value of the next-best foregone alternative, whenever a choice is made.

Again, notice the common theme of the necessity of choice, and its consequences, running throughout all of these definitions. Economists are careful to consider all of the costs of making a choice. Consider, for example, the choice made by all of the students in this class, the choice to attend school. The costs of attending school can be divided into direct costs and indirect costs. Direct costs are actual, out-of-pocket payments for goods, services, or resources. Indirect costs are, on the other hand, the opportunity costs of goods, services, or resources that are consumed, even though no direct payment for them occurs. Carefully consider the costs, both direct and indirect (opportunity), of your choice to attend school. Let's suppose that they look something like the following:

The Cost of Attending College		
Item	Cost	Type of Cost

<i>Tuition and fees</i>		
Residents	\$3,214	Direct
Non-residents	\$6,154	Direct
<i>Room and Board</i>	\$3,594	Direct
<i>Books and Supplies</i>	\$600	Direct
<i>Lost Wages</i>	\$6,592	Indirect
<i>Lost Interest</i>	\$652	Indirect
<i>Lost Rent</i>	\$5,102	Indirect
<i>Lost Profit</i>	\$8,100	Indirect
<p>Note: The Direct costs are yearly figures for Missouri State charges for each item. The Indirect costs are examples only.</p>		

The above includes both types of costs, direct and indirect. The direct costs are fairly straightforward, representing the dollar payments charged for goods many students must buy. However, the indirect costs require more explanation. These all represent, as given in the definition of the term "opportunity costs" above, not direct out-of-pocket dollar payments, but the value of foregone alternatives. For example, lost wages refer to the wages that a student loses because he chooses to attend college. Any resource can have an indirect cost associated with it, not just labor. For example, a person could have \$10,000 that she uses to finance the direct payments for college. However, she could have used this money as an investment, which would have yielded interest payments. The interest that she loses as a result of this decision is also a cost of attending college, albeit an opportunity cost.

It is important to note that each individual's total costs of attending college will vary because their choices and situation varies. For example, one person may bear none of the indirect costs because they had no other options besides attending college, at least none that involved such dollar losses. Another person may have lost wages, which may be quite low, while a second's lost wages might be quite high because they have different opportunities. Hence, one cannot

simply add up all the numbers in the table above to discover the total cost of attending college for each individual.

Finally, only indirect costs are considered opportunity costs.

Opportunity Cost And Monetary Cost

The opportunity cost of a decision is the value of the next best alternative this decision forces a person to do without, while the monetary cost is the market price of goods. Therefore, the opportunity cost of buying a blackberry is not its market price, but the value of the other things that could be purchased instead. Taking into consideration the opportunity cost of pending decisions, one has to make a rational choice. A rational choice is one that gives the greatest benefit, having weighed the benefits of the decision, against its opportunity cost.

The principle of opportunity cost can be made more vivid by using a *production possibility frontier*. This is a graph which shows the possible combinations of goods that a producer can manufacture given the available resources and the current level of technology. The following production possibility frontier shows the possible combinations of oranges and sugarcane an agriculture can yield on a plot of land.

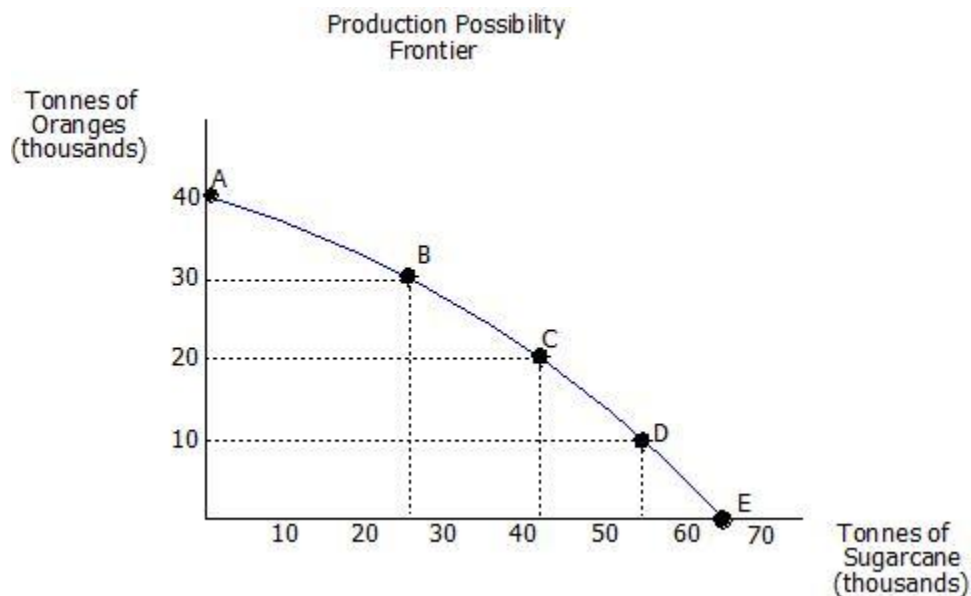


Figure 1.1

Figure 1.1 above shows a production possibility frontier.

The table below lists the combination of oranges and sugarcane depicted in the production possibility frontier.

Tones of Oranges	Tones of Sugarcane	Points
40000	0	A
30000	25000	B
20000	42000	C
10000	54000	D
0	65000	E

The production possibility frontier shows that the greater the quantity of one good that is produced, the smaller the quantity that can be produced of the other good. If the agriculture decides to grow only oranges, the yield will be 40,000 tones, but if he/she decides to grow 30,000 tones, then 25,000 tones of sugarcane can also be yielded. Therefore, the opportunity cost of obtaining 25,000 tones of sugarcane is the 10,000 tones of oranges the agriculture must forgo. Production possibility frontiers also illustrate the concept of efficiency. The combinations of goods depicted on the curve are attainable only if all the resources are fully employed, with the most efficient means of production possible. In reality, there is no guarantee that resources will be fully employed or that the latest technology is used in production. Where resources are not fully employed or the latest technology is not used, the production point will lie below the curve. This is point F in the production possibility frontier below.

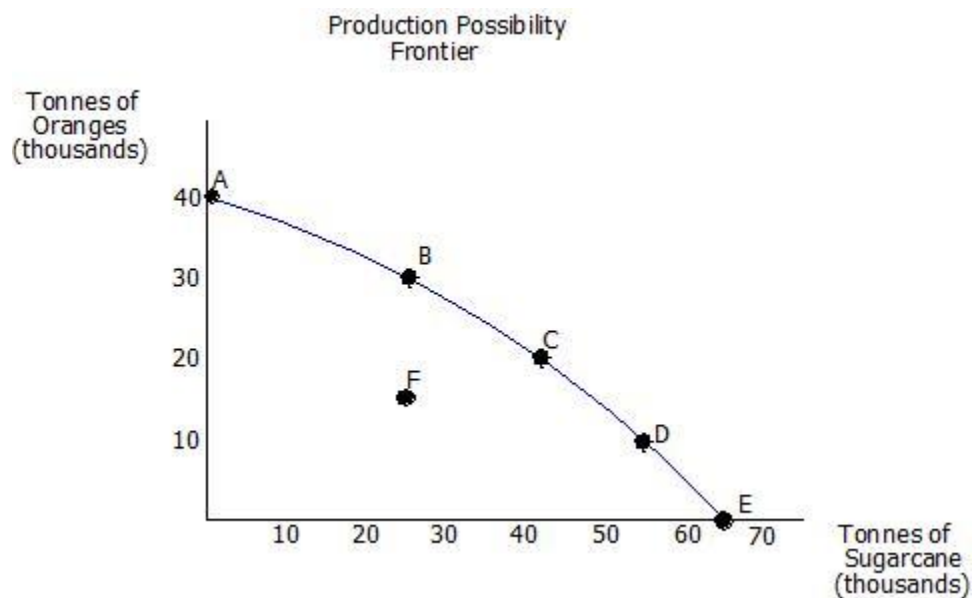


Figure 1.2

Figure 1.2 above shows a production possibility frontier with production point F.

CHAPTER 5

Supply And Demand

The price P of a product is determined by a balance between production at each price (supply S) and the desires of those with purchasing power at each price (demand D). The diagram shows a positive shift in demand from D_1 to D_2 , resulting in an increase in price (P) and quantity sold (Q) of the product.

In microeconomics, **supply and demand** is an economic model of price determination in a market. It concludes that in a competitive market, the unit price for a particular good will vary until it settles at a point where the quantity demanded by consumers (at current price) will equal the quantity supplied by producers (at current price), resulting in an economic equilibrium for price and quantity.

The four basic laws of supply and demand are

1. If demand increases and supply remains unchanged, a shortage occurs, leading to a higher equilibrium price.
2. If demand decreases and supply remains unchanged, a surplus occurs, leading to a lower equilibrium price.
3. If demand remains unchanged and supply increases, a surplus occurs, leading to a lower equilibrium price.
4. If demand remains unchanged and supply decreases, a shortage occurs, leading to a higher equilibrium price.

Graphical representation of supply and demand

Although it is normal to regard the quantity demanded and the quantity supplied as functions of the price of the good, the standard graphical representation, usually attributed to Alfred Marshall, has price on the vertical axis and quantity on the horizontal axis, the opposite of the standard convention for the representation of a mathematical function.

Since determinants of supply and demand other than the price of the good in question are not explicitly represented in the supply-demand diagram, changes in the values of these variables are represented by moving the supply and demand curves (often described as "shifts" in the curves). By contrast, responses to changes in the price of the good are represented as movements along unchanged supply and demand curves.

Supply schedule

A supply schedule is a table that shows the relationship between the price of a good and the quantity supplied. Under the assumption of perfect competition, supply is determined by marginal cost. Firms will produce additional output while the cost of producing an extra unit of output is less than the price they would receive.

By its very nature, conceptualizing a supply curve requires the firm to be a perfect competitor, namely requires the firm to have no influence over the market price. This is true because each point on the supply curve is the answer to the question "If this firm is *faced with* this potential price, how much output will it be able to and willing to sell?" If a firm has market power, its decision of how much output to provide to the market influences the market price, then the firm is not "faced with" any price, and the question is meaningless.

Economists distinguish between the supply curve of an individual firm and between the market supply curve. The market supply curve is obtained by summing the quantities supplied by all suppliers at each potential price. Thus, in the graph of the supply curve, individual firms' supply curves are added horizontally to obtain the market supply curve.

Economists also distinguish the short-run market supply curve from the long-run market supply curve. In this context, two things are assumed constant by definition of the short run: the availability of one or more fixed inputs (typically physical capital), and the number of firms in the industry. In the long run, firms have a chance to adjust their holdings of physical capital, enabling them to better adjust their quantity supplied at any given price. Furthermore, in the long run potential competitors can enter or exit the industry in response to market conditions. For both of these reasons, long-run market supply curves are flatter than their short-run counterparts.

The determinants of supply are:

1. Production costs: how much a good costs to be produced. Production costs are the cost of the inputs, primarily labor, capital, energy and materials. Production costs depend on the technology used in production, and/or technological advances. See: Productivity
2. Firms' expectations about future prices
3. Number of suppliers

Demand schedule

A demand schedule, depicted graphically as the demand curve, represents the amount of some good that buyers are willing and able to purchase at various prices, assuming all determinants of demand other than the price of the good in question, such as income, tastes and preferences, the price of substitute goods, and the price of complementary goods, remain the same. Following the law of demand, the demand curve is almost always represented as downward-sloping, meaning that as price decreases, consumers will buy more of the good

Just like the supply curves reflect marginal cost curves, demand curves are determined by marginal utility curves. Consumers will be willing to buy a given quantity of a good, at a given price, if the marginal utility of additional consumption is equal to the cost determined by the price, that is, the marginal utility of alternative consumption choices. The demand schedule is defined as the *willingness* and *ability* of a consumer to purchase a given product in a given frame of time.

It is aforementioned, that the demand curve is generally downward-sloping, there may be rare examples of goods that have upward-sloping demand curves. Two different hypothetical types of goods with upward-sloping demand curves are Giffen goods (an inferior but staple good) and Veblen goods (goods made more fashionable by a higher price).

By its very nature, conceptualizing a demand curve requires that the purchaser be a perfect competitor—that is, that the purchaser has no influence over the market price. This is true because each point on the demand curve is the answer to the question "If this buyer is *faced with* this potential price, how much of the product will it purchase?" If a buyer has market power, so its decision of how much to buy influences the market price, then the buyer is not "faced with" any price and the question is meaningless.

Like with supply curves, economists distinguish between the demand curve of an individual and the market demand curve. The market demand curve is obtained by summing the quantities demanded by all consumers at each potential price. Thus, in the graph of the demand curve, individuals' demand curves are added horizontally to obtain the market demand curve.

The determinants of demand are:

1. Income
2. Tastes and preferences
3. Prices of related goods and services
4. Consumers' expectations about future prices and incomes that can be checked
5. Number of potential consumers

SOME RELATED CONCEPTS

Equilibrium

Equilibrium is defined to be the price-quantity pair where the quantity demanded is equal to the quantity supplied, represented by the intersection of the demand and supply curves.

Market Equilibrium: A situation in a market when the price is such that the quantity that consumers demand is correctly balanced by the quantity that firms wish to supply.

Comparative static analysis: Examines the likely effect on the equilibrium of a change in the external conditions affecting the market.

Changes in market equilibrium: Practical uses of supply and demand analysis often center on the different variables that change equilibrium price and quantity, represented as shifts in the respective curves. Comparative statics of such a shift traces the effects from the initial equilibrium to the new equilibrium.

Demand curve shifts:

When consumers increase the quantity demanded *at a given price*, it is referred to as an *increase in demand*. Increased demand can be represented on the graph as the curve being shifted to the

right. At each price point, a greater quantity is demanded, as from the initial curve D1 to the new curve D2. In the diagram, this raises the equilibrium price from P1 to the higher P2. This raises the equilibrium quantity from Q1 to the higher Q2. A movement along the curve is described as a "change in the quantity demanded" to distinguish it from a "change in demand," that is, a shift of the curve. There has been an *increase* in demand which has caused an increase in (equilibrium) quantity. The increase in demand could also come from changing tastes and fashions, incomes, price changes in complementary and substitute goods, market expectations, and number of buyers. This would cause the entire demand curve to shift changing the equilibrium price and quantity. Note in the diagram that the shift of the demand curve, by causing a new equilibrium price to emerge, resulted in *movement along* the supply curve from the point to the point

If the *demand decreases*, then the opposite happens: a shift of the curve to the left. If the demand starts at D2, and *decreases* to D1, the equilibrium price will decrease, and the equilibrium quantity will also decrease. The quantity supplied at each price is the same as before the demand shift, reflecting the fact that the supply curve has not shifted; but the equilibrium quantity and price are different as a result of the change (shift) in demand.

Supply curve shifts:

When technological progress occurs, the supply curve shifts. For example, assume that someone invents a better way of growing wheat so that the cost of growing a given quantity of wheat decreases. Otherwise stated, producers will be willing to supply more wheat at every price and this shifts the supply curve S1 outward, to S2—an *increase in supply*. This increase in supply causes the equilibrium price to decrease from P1 to P2. The equilibrium quantity increases from Q1 to Q2 as consumers move along the demand curve to the new lower price. As a result of a supply curve shift, the price and the quantity move in opposite directions. If the quantity supplied *decreases*, the opposite happens. If the supply curve starts at S2, and shifts leftward to S1, the equilibrium price will increase and the equilibrium quantity will decrease as consumers move along the demand curve to the new higher price and associated lower quantity demanded. The quantity demanded at each price is the same as before the supply shift, reflecting the fact that the demand curve has not shifted. But due to the change (shift) in supply, the equilibrium quantity and price have changed.

The movement of the supply curve in response to a change in a non-price determinant of supply is caused by a change in the y-intercept, the constant term of the supply equation. The supply curve shifts up and down the y axis as non-price determinants of demand change.

Partial equilibrium

Partial equilibrium as the name suggests takes into consideration only a part of the market, *ceteris paribus* to attain equilibrium.

Jain proposes (attributed to George Stigler): "A partial equilibrium is one which is based on only a restricted range of data, a standard example is price of a single product, the prices of all other products being held fixed during the analysis."

The supply-and-demand model is a **partial equilibrium** model of economic equilibrium, where the clearance on the market of some specific goods is obtained independently from prices and quantities in other markets. In other words, the prices of all substitutes and complements, as well as income levels of consumers are constant. This makes analysis much simpler than in a equilibrium model which includes an entire economy.

Here the dynamic process is that prices adjust until supply equals demand. It is a powerfully simple technique that allows one to study equilibrium, efficiency and comparative statics. The stringency of the simplifying assumptions inherent in this approach make the model considerably more tractable, but may produce results which, while seemingly precise, do not effectively model real world economic phenomena.

Partial equilibrium analysis examines the effects of policy action in creating equilibrium only in that particular sector or market which is directly affected, ignoring its effect in any other market or industry assuming that they being small will have little impact if any.

Hence this analysis is considered to be useful in constricted markets.

Léon Walras first formalized the idea of a one-period economic equilibrium of the general economic system, but it was French economist Antoine Augustin Cournot and English political economist Alfred Marshall who developed tractable models to analyze an economic system.

Other markets

The model of supply and demand also applies to various specialty markets.

The model is commonly applied to wages, in the market for labor. The typical roles of supplier and demander are reversed. The suppliers are individuals, who try to sell their labor for the highest price. The demanders of labor are businesses, which try to buy the type of labor they need at the lowest price. The equilibrium price for a certain type of labor is the wage rate.

A number of economists (for example Pierangelo Garegnani, Robert L. Vienneau, and Arrigo Opocher & Ian Steedman), building on the work of Piero Sraffa, argue that this model of the labor market, even given all its assumptions, is logically incoherent. Michael Anyadike-Danes and Wynne Godley argue, based on simulation results, that little of the empirical work done with the textbook model constitutes a potentially falsifying test, and, consequently, empirical evidence hardly exists for that model.

This criticism of the application of the model of supply and demand generalizes, particularly to all markets for factors of production.

In both classical and Keynesian economics, the money market is analyzed as a supply-and-demand system with interest rates being the price. The money supply may be a vertical supply curve, if the central bank of a country chooses to use monetary policy to fix its value regardless of the interest rate; in this case the money supply is totally inelastic. On the other hand, the money supply curve is a horizontal line if the central bank is targeting a fixed interest rate and ignoring the value of the money supply; in this case the money supply curve is perfectly elastic. The demand for money intersects with the money supply to determine the interest rate.

Empirical estimation

Demand and supply relations in a market can be statistically estimated from price, quantity, and other data with sufficient information in the model. This can be done with *simultaneous-equation methods of estimation* in econometrics. Such methods allow solving for the model-relevant "structural coefficients," the estimated algebraic counterparts of the theory. The *Parameter identification problem* is a common issue in "structural estimation." Typically, data on exogenous variables (that is, variables other than price and quantity, both of which are endogenous variables) are needed to perform such estimation. An alternative to "structural estimation" is form estimation, which regresses each of the endogenous variables on the respective exogenous variables.

Macroeconomic uses of demand and supply

Demand and supply have also been generalized to explain macroeconomic variables in a market economy, including the quantity of total output and the general price level. The Aggregate Demand-Aggregate Supply model may be the most direct application of supply and demand to macroeconomics, but other macroeconomic models also use supply and demand. Compared to microeconomic uses of demand and supply, different (and more controversial) theoretical considerations apply to such macroeconomic counterparts as aggregate and aggregate supply. Demand and supply are also used in macroeconomic theory to relate money supply and money demand to interest rates, and to relate labor supply and labor demand to wage rates.

CHAPTER 6

Concept of Scarcity

Scarcity

Scarcity is the fundamental economic problem of having seemingly unlimited human wants and needs in a world of limited resources. It states that society has insufficient productive resources to fulfill all human wants and needs. Additionally, scarcity implies that not all of society's goals can be pursued at the same time; trade-offs are made of one good against others. In an influential 1932 essay, Lionel Robbins defined economics as "the science which studies human behavior as a relationship between ends and scarce means which have alternative uses."

In biology, *scarcity* can refer to the uncommonness or rarity of certain species. Such species are often protected by local, national or international law in order to prevent extinction

We have already decided that economics is a study of choices, either collective societal choices or more individualized choices. However, what is it about the real world that requires that we make choices? A moment's thought about our individual lives, and the choices that we face, reveals that we must make choices because we have limited resources.

Scarcity is simply the concept that human wants (not human needs) exceed the resources available that are necessary to produce the goods used to satisfy those wants.

Thus, scarcity is fundamentally the most important concept in economics, upon which all of the rest of the discipline rests. For without scarcity, no need for choice, either individual or collective, exists. One need not make a choice between buying a nice lunch at a restaurant and buying a new sweater because one will always have enough resources to purchase both goods. Since economics is the study of how people make choices, without scarcity there would exist no choice and, hence, no economics.

In other words, a good is not scarce if enough of the good is freely available at a zero price. The definitions of scarce and free goods depend upon the price of the good, which must equal zero to determine whether the good is scarce or free. However, this does not mean that the price must equal zero before one can determine whether or not a good is scarce.

Consider, for example, a good that is free. We already know that this good has quantity demanded less than or equal to quantity supplied when the price of the good equals zero. What happens to the relationship between quantity demanded and quantity supplied, for this free good, as the price of the good rises from zero? After reflection on their behavior, most people will recognize that they will buy less of the good as the price rises, all else equal. Likewise, as the price rises, suppliers of a good will tend to be willing to supply more of the good, all else equal. However, at a zero price there was already more than enough of the good available for those who wanted to consume the good. Therefore, as the price rises this excess supply of the good available will only increase. However, in a free market (one with no government interference in the market) no one will be willing to pay a more than a zero price for this good because they can get all they want when the price is zero. It is only when the good is scarce at the zero price that people will be willing to pay a higher price. In this case, there will not be enough of the good to go around and the people who are not lucky enough to obtain it will try to get it by offering a higher price for the good.

Thus, one can look at the price that occurs for a good in a free market to determine whether or not the good is free or scarce. If a positive market price exists, then the good must be scarce. However, if the market price is zero, then the good must be free.

SCARCITY AND ITS SOCIAL IMPACTS: LIKELY POLITICAL RESPONSES

This essay is an exercise in prediction. It predicts the societal responses of institutionally developed societies to two possible scenarios for the next half century: one of long term economic growth and one of non growth or decline due to environmental constraints and problems. The latter we label scarcity. This article explores the scarcity scenario more fully, because much more is known about the impacts of economic growth on society than the impacts of scarcity. Our analysis is based on a macro theory of social change which we have developed over the years (Finsterbusch 1973, 1985). Our conclusion is that economic growth tends to have far more beneficial impacts on society than does scarcity. Economic growth tends to increase equality, integration, democracy, the rule of law, and freedoms while scarcity tends to increase inequality, conflict, authoritarianism, and repression. What is uncertain, however, is how nation states will respond to these negative impacts of scarcity. It is conceivable that society's

responses to scarcity will involve progressive reforms. More ominous responses, however, seem more likely.

Impacts of Economic growth and Scarcity on Inequality

Until recent globalization weakened the power of labor relative to capital, economic growth has decreased inequality while scarcity has increased inequality, as empirically demonstrated in the painstaking work of Simon Kuznets. Although economic growth may have had negative effects on equality up to the nineteenth century as the majority of the people in many countries remain at a subsistence level and the new wealth goes mainly to a small elite, the longer term impact of economic growth is to increase equality. The main reason for this as expounded by Gerhard Lenski in *Power and Privilege: A Theory of Social Stratification* (1966) is that economic growth provides a positive climate for business which makes it worthwhile for elites to highly reward professionals and skilled workers as a means to enlarge their own incomes through the resulting increases in productivity..

In contrast to the positive effects of economic growth, scarcity has negative effects. There is consensus among scholars that scarcity increases inequality. Five arguments support this proposition. **First**, since scarcity is the opposite of economic growth it should have the opposite effects. Economic growth expands jobs and opportunities. This generally allows lower groups choices between jobs and reduces the number who must accept truly exploitive wages

The **second** explanation for scarcity's negative impact on equality is that scarcity translates into inflation which more adversely impacts lower groups. They spend a greater percent of their income than do upper groups on consumer goods which have high resource inputs and will inflate substantially with scarcity. Upper groups buy greater quantities of goods but less proportionally. They also spend more on quality which increases the value of most goods without using much more resources.

The **third** explanation of why scarcity increases inequality is that upper groups are better able to protect themselves from the negative effects of scarcity They organize faster and more effectively to advance and protect their interests The managerial and professional classes and unionized labor have some control over the terms of their remuneration and will try to keep them up to the level of inflation which increases inflation even more for the politically and

economically weak.

The **fourth** explanation is that the controllers of resources, who are predominantly the rich, will actually gain in times of scarcity while the rest of the population suffers. Just as homeowners and rentiers profit from inflation and scarcity, so do those who control the natural resources which are becoming scarce. Finally, the **fifth** explanation is based on the few empirical studies connecting scarcity with inequality. They show that when resources become more scarce they become more unevenly distributed. On the whole the empirical linkage between scarcity and inequality is not strong. The consensus on this proposition, however, is largely due to the absence of a counter argument.

Impacts of Economic growth and scarcity on Integration

Economic growth increases integration and scarcity decreases it. Economic growth does not eliminate group identities and intergroup conflict, but it does mitigate the conflict between groups, reduces its violent expression, and channels it into legal political actions and compromiseable demands. Economic growth leads to expectations that each generation will be better off so the system will be perceived as relatively effective. Discontent will be low and the system of inequalities which becomes identified with rising standards of living will not be seriously challenged. Thus, class conflict will be low and system legitimacy high.

First, Scarcity negates the positive functions of economic growth for integration. Boulding's exposition of this point is particularly stark.

Another problem with a shrinking pie is that the conflict between classes and groups becomes a zero sum game in which someone must lose if someone else gains. When the contest results in big winners and little winners as with the distribution of the expanding pie, the conflict is not as intense as when it results in winners and losers or big losers and little losers. Furthermore, scarcity removes the justification for inequality which is that the inequality is needed to produce economic growth. If economic growth is not possible due to environmental limits, this argument loses force, gross inequality becomes less tolerable and conflict increases.

The **second** explanation of why scarcity decreases integration is derived from deprivation theory as developed by Ted Gurr in *Why Men Rebel* (1970). Unless scarcity arrives very slowly to

allow for gradual adjustments, scarcity will cause strong feelings of deprivation as reality falls far short of expectations

The **third** explanation is derived from Tilly's mobilization theory of collective action (see *From Mobilization to Revolution* (1978)). In times of economic decline competition increases and groups that organize to protect or advance their special interests will do far better than individuals or weakly organized groups. Those who act first will gain the most benefits, because scarcity will rapidly deplete the government's capacity to confer benefits.

The **fourth** explanation focuses on the legitimacy problems of governments in times of economic decline. Unpopular governments can often stay in power and the public remain acquiescent in times of economic growth, but economic failure will likely facilitate a government breakdown and the growth of challenging groups. Established democracies generally have a reservoir of popular support and may survive economic decline for a while. Over time, however, scarcity erodes legitimacy making even democracies vulnerable to growing unrest and authoritarian movements as in the 1930s.

The **fifth** explanation is that scarcity aggravates all fissures in society. The shrinking pie intensifies the class struggle as discussed earlier, but Blumberg in *Inequality in an Age of Decline* (1980:220) adds that scarcity "will almost inevitably increase the overall level of social nastiness" and aggravates all fissures and cleavages, "creating social conflict amid a general scramble for self-aggrandizement." He goes on to describe how racial, gender, educational, generational, and regional conflicts are likely to intensify in the United States.

Impact of Economic growth and Scarcity on Democracy

Economic growth strengthens democracy and scarcity threatens it. The explanation, in part, is due to the positive effects of economic growth on equality and integration because both strengthen democracy. Economic growth also expands the middle class, the educated, and the percent of the population which have a stake in the system, and therefore, would be adversely affected by political instability. With the class pyramid bulging at the middle instead of polarized between a small elite and the poor masses, power holders have much less to fear from losing the reigns of government in an election since the change in policies would not be very radical. Finally, economic growth reduces the intensity of conflict as pointed out above and

accommodates the resolving of issues and handling of demands through a democratic bargaining process.

There is widespread agreement that scarcity is a threat to democracy. We give five explanations for this view. **First**, as with equality and integration, scarcity cancels the positive effects of economic growth. However, it does not necessarily produce the opposite effects. For example, it does not necessarily shrink the middle class. On the other hand, it could stimulate radicalism which a large middle class tends to inhibit. Scarcity also increases inequality and decreases integration which in turn threatens or weakens democracy. The aggravated conflict and loss of legitimacy that scarcity is likely to cause are particularly troublesome for the survival of democracy.

The **second** explanation of why scarcity weakens or threatens democracy is that it creates problems and crises that are hard for democracies to solve. Then when a democracy fails and the problems deepen, the public is tempted to jettison democracy for a more decisive, forceful, active, and authoritarian government. The strength of democracy is its responsiveness to the will of the people. This strength becomes a weakness in times of scarcity.

The **third** explanation is that scarcity generates many technical issues that lend themselves poorly to participatory decision making procedures. Considerable scientific inputs are required for sound environmental policies, so many important decisions with significant distributional side effects are best handled by experts. We would expect, therefore, that some amount of democracy would be sacrificed to technocracy as a practical matter.

The **fourth** explanation is that scarcity can cause fear and potentially even panic which can undermine the confidence in democratic institutions which is required for them to function without a strong show of force. This line of argument is more speculative than the others but still highly plausible. Heilbroner (1992) observes:

The **fifth** explanation is that lower groups in times of scarcity are ineffective in getting their demands met by peaceful means so some of them turn to more radical and even violent means. The state is likely to become more authoritarian and repressive to deal with the dynamics of the resulting civil conflict.

Societal Response to Scarcity

It goes without saying that predictions about how society will respond to relatively long term scarcity are speculative. They are contingent upon many factors including the nature and extent of the crisis, public readiness for change, degree of government autonomy from control by the economic elite, and the idiosyncrasies of the leader(s). Accordingly we offer the following comments as an initial exploration of the topic for democratic capitalist societies.

It is safe to predict that society will respond to scarcity problems by collecting information on the issues, because there would be little opposition to such low cost and relatively non threatening actions. In fact, some people will call for research as a way to delay action. Individuals on their own would also produce information on the issues so public and private actions should increase public awareness of and concern about scarcity. The result would be that environmental issues will be perceived as getting worse and requiring more collective action.

The second societal response that we predict is technological innovation to reduce the costs of depleting resources and to protect the environment. Businesses will respond to rising costs of resources by using resource saving technologies and practices. Market forces should spur the development of new conserving technologies. Other innovations will be directed at protecting the environment in ways that do not threaten current lifestyles. Many of the innovations will be stimulated by subsidies or by regulations concerning pollution, recycling, conservation, and hazardous substances. Regulations that are politically feasible are likely to have relatively low costs to industry or be widely perceived as important enough to pass over industry resistance. Often regulations are necessary to make it worthwhile for industry to develop new technologies and practices for protecting the environment or more efficiently use and reuse resources. Another source for new technologies is the academic research community which is subsidized by government and foundation contracts and grants. As awareness of the crisis increases, it is likely that subsidies for research addressing relevant environmental issues would increase substantially.

The third response that we predict is a range of minor behavior changes on the part of individuals. Increasingly the public wants to do something to help solve the problems. They participate in recycling programs, buy “save the bay” license plates, and contribute in other relatively costless ways.

CHAPTER 7

Price and Its Theory

Price

In ordinary usage, **price** is the quantity of payment or compensation given by one party to another in return for goods or services.

In modern economies, prices are generally expressed in units of some form of currency. (For commodities, they are expressed as currency per unit weight of the commodity, e.g. Euros per kilogram.) Although prices could be quoted as quantities of other goods or services this sort of barter exchange is rarely seen. Prices are sometimes quoted in terms of vouchers such as trading stamps and air miles. In some circumstances, cigarettes have been used as currency, for example in prisons, in times of hyperinflation, and in some places during World War 2. In a black market economy, barter is also relatively common.

In many financial transactions, it is customary to quote prices in other ways. The most obvious example is in pricing a loan, when the cost will be expressed as the percentage rate of interest. The total amount of interest payable depends upon credit risk, the loan amount and the period of the loan. Other examples can be found in pricing financial derivatives and other financial assets. For instance the price of inflation-linked government securities in several countries is quoted as the actual price divided by a factor representing inflation since the security was issued.

Price sometimes refers to the quantity of payment *requested* by a seller of goods or services, rather than the eventual payment amount. This requested amount is often called the asking price or **selling price**, while the actual payment may be called the **transaction price** or **traded price**. Likewise, the bid price or **buying price** is the quantity of payment *offered* by a buyer of goods or services, although this meaning is more common in asset or financial markets than in consumer markets.

Economists sometimes define price more generally as the ratio of the quantities of goods that are exchanged for each other.

Price theory

Economic theory asserts that in a free market economy the market price reflects interaction between supply and demand: the price is set so as to equate the quantity being supplied and that

being demanded. In turn these quantities are determined by the utility of the asset to different buyers and to different sellers. In reality, the price may be distorted by other factors, such as tax and other government regulations.

When a commodity is for sale at multiple locations, the law of one price is generally believed to hold. This essentially states that the cost difference between the locations cannot be greater than that representing shipping, taxes, other distribution costs etc. In the case of the majority of consumer goods and services, distribution costs are quite a high proportion of the overall price, so the law may not be very useful.

Price and value

The paradox of value was observed and debated by classical economists. Adam Smith described what is now called the *diamond – water paradox*: diamonds command a higher price than water, yet water is essential for life and diamonds are merely ornamentation. Use was supposed to give some measure of usefulness, later refined as marginal benefit (which is marginal utility counted in common units of value) while exchange value was the measure of how much one good was in terms of another, namely what is now called relative price.

Austrian School theory

One solution offered to the paradox of value is through the theory of marginal utility proposed by Carl Menger, one of the founders of the Austrian School of economics.

As William Barber put it, human volition, the human subject, was "brought to the centre of the stage" by marginalist economics, as a bargaining tool. Neoclassical economists sought to clarify choices open to producers and consumers in market situations, and thus "fears that cleavages in the economic structure might be unbridgeable could be suppressed.

Without denying the applicability of the Austrian theory of value as *subjective* only, within certain contexts of price behavior, the Polish economist Oskar Lange felt it was necessary to attempt a serious *integration* of the insights of classical political economy with neo-classical economics. This would then result in a much more realistic theory of price and of real behavior in response to prices. Marginalist theory lacked anything like a theory of the social framework of real market functioning, and criticism sparked off by the capital controversy initiated by Piero

Sraffa revealed that most of the foundational tenets of the marginalist theory of value either reduced to tautologies, or that the theory was true only if counter-factual conditions applied

One insight often ignored in the debates about price theory is something that businessmen are keenly aware of: in different markets, prices may not function according to the same principles except in some very abstract (and therefore not very useful) sense. From the classical political economists to Michal Kalecki it was known that prices for industrial goods behaved differently from prices for agricultural goods, but this idea could be extended further to other broad classes of goods and services

Price as productive human labor time

Marxists assert that value derives from the volume of socially necessary abstract labor time exerted in the creation of an object. This value does not relate to price in a simple manner, and the difficulty of the conversion of the mass of values into the actual prices is known as the transformation problem. However, many recent Marxists deny that any problem exists. Marx was not concerned with proving that prices derive from values. In fact, he admonished the other classical political economists (like Ricardo and Smith) for trying to make this proof. Rather, for Marx, price equals the cost of production (capital-cost and labor-costs) plus the average rate of profit. So if the average rate of profit (return on capital investment) is 22% then prices would reflect cost-of-production plus 22%. The perception that there is a transformation problem in Marx stems from the injection of Walrasian equilibrium theory into Marxism where there is no such thing as equilibrium

Confusion between prices and costs of production

Price is commonly confused with the notion of cost of production, as in “I paid a high cost for buying my new plasma television”; but technically these are different concepts. Price is what a buyer pays to acquire products from a seller. Cost of production concerns the seller’s investment (e.g., manufacturing expense) in the product being exchanged with a buyer. For marketing organizations seeking to make a profit, the hope is that price will exceed cost of production so that the organization can see financial gain from the transaction.

Finally, while pricing is a topic central to a company's profitability, pricing decisions are not limited to for-profit companies. The behavior of non-profit organizations, such as charities,

educational institutions and industry trade groups, can be described as setting prices. For instance, charities seeking to raise money may set different “target” levels for donations that reward donors with increases in status (e.g., name in newsletter), gifts or other benefits. These targets can be seen as prices if they are interpreted as specifying a cost that must be paid by buyers (donors) in order to obtain something of value

Price point

The price of an item is also called the "price point", especially where it refers to stores that set a limited number of price points. For example, Dollar General is a general store or "five and dime" store that sets price points only at even amounts, such as exactly one, two, three, five, or ten dollars (among others). Other stores will have a policy of setting most of their prices ending in 99 cents or pence. Other stores (such as dollar stores, pound stores, euro stores, 100-yen stores, and so forth) only have a single price point (\$1, £1, 1€, ¥100), though in some cases this price may purchase more than one of some very small items. Price is relatively less than the cost price

HOW DO ECONOMISTS DEVELOP ECONOMIC THEORIES

Theories in the sciences generally deal with isolable subsystems, and describe a fairly complete set of relevant causes and effects. In contrast, economics has an insurmountable selection problem: there are no isolable systems; any “subsystem” chosen is not a subset of the system, but rather a subset of causes and effects. Those causes which an economic theorist wishes to emphasize (ie, offer for policy change) are called causes, and the rest are called “preconditions” or etc. The choice of which “causes” are to be open to change and which are fixed as “preconditions” is often a matter of policy and requires cognizance of one's values.

Economic principles are limited by two problems that separate economics from basic sciences. First, the relationships involved in deciding what a society chooses to produce are so complex and historical that any economic principle needs much non-quantitative context to determine its applicability or use - i.e., any useful (compact) theory must choose a tiny subset of causes and effects to take on, and cannot be expected to be relevant to a majority of well-posed questions.

Second, economics is full of reflexive ideas and theories: that is, beliefs about economic causes, effects, and predictions can have positive feedback (*e.g.*, inflation, recession, *etc.*) or negative feedback on what actually happens. Therefore, such predictions, though ostensibly falsifiable propositions, can be intrinsically neither correct nor incorrect. Clearly, historical analysis and awareness of beliefs and values (thus debate) is crucial for the best available understanding of causality. A related problem is that, unlike lower sciences, and maybe even more so than history, the language of economics is non-neutral. It is full of loaded words such as "perfect," "efficiency," etc; it is hard in such a socially important and contentious discipline to formulate concepts which are objective.

As a result, I wonder whether microeconomics, for example, has been generally successful in predicting many real things beyond built-in relationships which were otherwise already known to any entrepreneur who is making choices regarding changing demand. Businesspeople are more likely to think in terms of causal principles of psychology and to focus on the formation of tastes and preferences, rather than to consider price, wealth, and tastes as independent variables (*i.e.* there's the problem of selection of "causes" vs "conditions").

ASSUMPTIONS MADE BY ECONOMISTS ON BUYERS AND SELLERS

The first assumption is that of "self-interested behavior." This is described in the text as being entirely tautologous, since it is not falsifiable -- all behavior is considered by followers of this ideology to be self-interested. Tautologous statements have no prediction or explanation value. This seems especially dangerous since people who are not adherents of the ideology but are exposed to it are not likely to assume a tautologous meaning for "self-interested." Indeed, the idea is superficially absurd to mammalian biologists, social psychologists, and most people, especially those from most cultures without a strong social/academic influence from microeconomists. It appears to describe not a universal trait of behavior, but a rhetorical prescription for a particular hypothetical society.

The second and third assumptions are those of rational behavior and limitless wants. These "assumptions" are things which could be related directly to observations -- *i.e.*, assessed for

legitimacy -- in the textbook. Are these statements thought to be true by experts who study human behavior?

To assume rational behavior as a fundamental cause and then consider non-rational behavior (I am guessing we must consider this later in microecon?) as a perturbation on the model is an example of normative selection of causes. One could just as well choose psychological, moral-driven behavior fundamental, and then consider other kinds deviations.

The limitless desires assumption seems bizarre to me, and flies in the face of many contemporary cultures. Rather than an insight, it seems more to reflect a western corporate marketing message, likely in light of massive frustrated demand (ie certain wants not available at any cost).

Other price terms

Basic price is the price a seller gets after removing any taxes paid by a buyer and adding any subsidy the seller gets for selling.

Producer price is the amount the producer gets from a buyer for a unit of a good or service produced as output minus any tax; it excludes any transport charges invoiced separately by the producer.

CHAPTER 8

Production Theory

Production theory

Production theory is the study of production, or the economic process of converting inputs into outputs. Production uses resources to create a good or service that is suitable for use, gift-giving in a gift economy, or exchange in a market economy. This can include manufacturing, storing, shipping, and packaging. Some economists define production broadly as all economic activity other than consumption. They see every commercial activity other than the final purchase as some form of production.

Production is a process, and as such it occurs through time and space. Because it is a flow concept, production is measured as a “rate of output per period of time”. There are three aspects to production processes:

1. the quantity of the good or service produced,
2. the form of the good or service created,
3. the temporal and spatial distribution of the good or service produced.

A production process can be defined as any activity that increases the similarity between the pattern of demand for goods and services, and the quantity, form, shape, size, length and distribution of these goods and services available to the market place.

Factors of production

The inputs or resources used in the production process are called *factors of production* by economists. The myriad of possible inputs are usually grouped into five categories. These factors are:

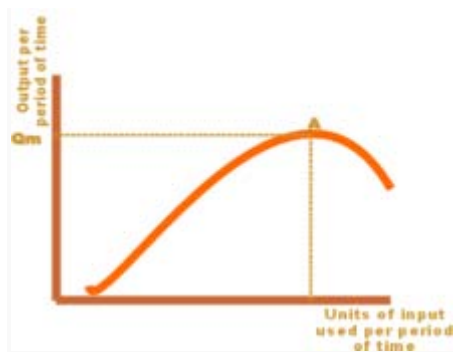
- Raw material
- Machinery
- Labor services
- Capital goods
- Land

In the “long run”, all of these factors of production can be adjusted by management. The “short run”, however, is defined as a period in which at least one of the factors of production is fixed.

A fixed factor of production is one whose quantity cannot readily be changed. Examples include major pieces of equipment, suitable factory space, and key managerial personnel.

A variable factor of production is one whose usage rate can be changed easily. Examples include electrical power consumption, transportation services, and most raw material inputs. In the short run, a firm’s “scale of operations” determines the maximum number of outputs that can be produced. In the long run, there are no scale limitations.

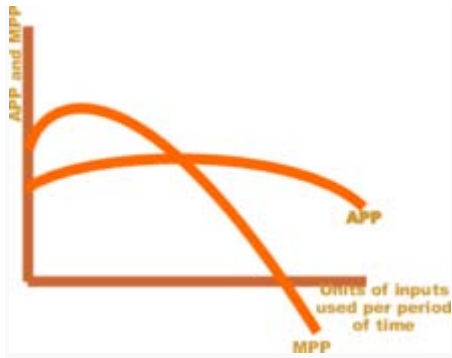
Total, average, and marginal product



Total Product Curve

The total product (or total physical product) of a variable factor of production identifies what outputs are possible using various levels of the variable input. This can be displayed in either a chart that lists the output level corresponding to various levels of input, or a graph that summarizes the data into a “total product curve”. The diagram shows a typical total product curve. In this example, output increases as more inputs are employed up until point A. The maximum output possible with this production process is Q_m . (If there are other inputs used in the process, they are assumed to be fixed.)

The average physical product is the total production divided by the number of units of variable input employed. It is the output of each unit of input. If there are 10 employees working on a production process that manufactures 50 units per day, then the average product of variable labor input is 5 units per day.



Average and Marginal Physical Product Curves

The average product typically varies as more of the input is employed, so this relationship can also be expressed as a chart or as a graph. A typical average physical product curve is shown (APP). It can be obtained by drawing a vector from the origin to various points on the total product curve and plotting the slopes of these vectors.

The marginal physical product of a variable input is the change in total output due to a one unit change in the variable input (called the discrete marginal product) or alternatively the rate of change in total output due to an infinitesimally small change in the variable input (called the continuous marginal product). The discrete marginal product of capital is the additional output resulting from the use of an additional unit of capital (assuming all other factors are fixed). The continuous marginal product of a variable input can be calculated as the derivative of quantity produced with respect to variable input employed. The marginal physical product curve is shown (MPP). It can be obtained from the slope of the total product curve.

Because the marginal product *drives* changes in the average product, we know that when the average physical product is falling, the marginal physical product must be less than the average. Likewise, when the average physical product is rising, it must be due to a marginal physical product greater than the average. For this reason, the marginal physical product curve must intersect the maximum point on the average physical product curve.

Notes: MPP keeps increasing until it reaches its maximum. Up until this point every additional unit has been adding more value to the total product than the previous one. From this point onwards, every additional unit adds less to the total product compared to the previous one – MPP is decreasing. But the average product is still increasing till MPP touches APP. At this point, an

additional unit is adding the same value as the average product. From this point onwards, APP starts to reduce because every additional unit is adding less to APP than the average product. But the total product is still increasing because every additional unit is still contributing positively. Therefore, during this period, both, the average as well as marginal products, are decreasing, but the total product is still increasing. Finally we reach a point when MPP crosses the x-axis. At this point every additional unit starts to diminish the product of previous units, possibly by getting into their way. Therefore the total product starts to decrease at this point. This is point A on the total product curve. (Courtesy: Dr. Shehzad Inayat Ali).

Diminishing returns

Diminishing returns can be divided into three categories:

1. **Diminishing Total returns**, which implies reduction in total product with every additional unit of input. This occurs after point A in the graph.
2. **Diminishing Average returns**, which refers to the portion of the APP curve after its intersection with MPP curve.
3. **Diminishing Marginal returns**, refers to the point where the MPP curve starts to slope down and travels all the way down to the x-axis and beyond.

Ordered by input, at first the marginal returns start to diminish, then the average returns, followed finally by the total returns.

Diminishing marginal returns

These curves illustrate the principle of **diminishing marginal returns to a variable input** (not to be confused with diseconomies of scale which is a long term phenomenon in which all factors are allowed to change). This states that as you add more and more of a variable input, you will reach a point beyond which the resulting increase in output starts to diminish. This point is illustrated as the maximum point on the marginal physical product curve. It assumes that other factor inputs (if they are used in the process) are held constant. An example is the employment of labor in the use of trucks to transport goods. Assuming the number of available trucks (capital) is fixed, then the amount of the variable input labor could be varied and the resultant efficiency determined. At least one laborer (the driver) is necessary. Additional workers per vehicle could be productive in loading, unloading, navigation, or around the clock continuous driving. But at

some point the returns to investment in labor will start to diminish and efficiency will decrease. The most efficient distribution of labor per piece of equipment will likely be one driver plus an additional worker for other tasks (2 workers per truck would be more efficient than 5 per truck).

Resource allocations and distributive efficiencies in the mix of capital and labor investment will vary per industry and according to available technology. Trains are able to transport much more in the way of goods with fewer "drivers" but at the cost of greater investment in infrastructure. With the advent of mass production of motorized vehicles, the economic niche occupied by trains (compared with transport trucks) has become more specialized and limited to long haul delivery.

P.S.: There is an argument that if the theory is holding everything constant, the production method should not be changed, i.e., division of labor should not be practiced. However, the rise in marginal product means that the workers use other means of production method, such as in loading, unloading, navigation, or around the clock continuous driving. For this reason, some economists think that the "keeping other things constant" should not be used in this theory.

Many ways of expressing the production relationship

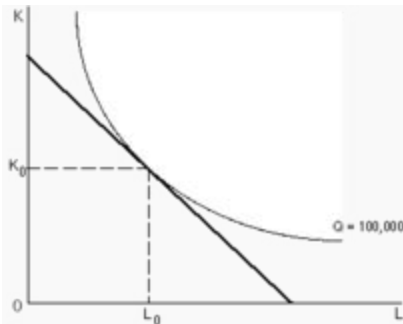
The total, average, and marginal physical product curves mentioned above are just one way of showing production relationships. They express the quantity of output relative to the amount of variable input employed while holding fixed inputs constant. Because they depict a short run relationship, they are sometimes called short run production functions. If all inputs are allowed to be varied, then the diagram would express outputs relative to total inputs, and the function would be a long run production function. If the mix of inputs is held constant, then output would be expressed relative to inputs of a fixed composition, and the function would indicate long run economies of scale.

Rather than comparing inputs to outputs, it is also possible to assess the mix of inputs employed in production. An isoquant (see below) relates the quantities of one input to the quantities of another input. It indicates all possible combinations of inputs that are capable of producing a given level of output.

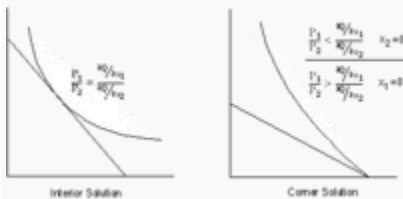
Rather than looking at the inputs used in production, it is possible to look at the mix of outputs that are possible for any given production process. This is done with a production possibilities

frontier. It indicates what combinations of outputs are possible given the available factor endowment and the prevailing production technology.

Isoquants



Isoquant Curve/Isocost Curve



Two Isoquants (Interior and Corner Solutions)

An isoquant represents those combinations of inputs, which will be capable of producing an equal quantity of output; the producer would be indifferent between them. The isoquants are thus contour lines, which trace the loci of equal outputs. As the production remains the same on any point of this line, it is also called equal product curve. Let $Q_0 = f(L,K)$ be a production factor, where $Q_0 = A$ is a fixed level of production.

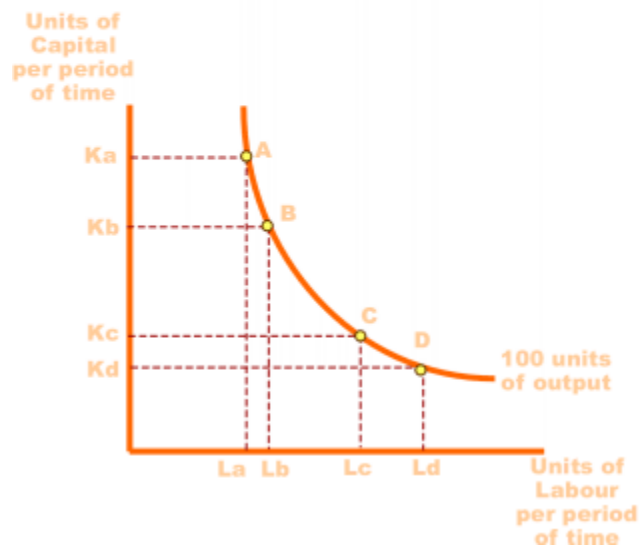
$L = \text{Labor}$

$K = \text{Capital}$

If three combinations of labour and capital A, B and C produce 10 units of product, then the isoquant will be like Figure 1.

Here we see that the combination of L1 labor and K3 capital can produce 10 units of product, which is A on the isoquant. Now to increase the labor keeping the production the same the organization has to decrease capital. In Figure 1 B is the point where capital decreases to K2, while labor increases to L2. Similarly, 10 units of product may be produced at point C on the isoquant with capital K1 and labor L3. Each of the factor combinations A, B and C produces the same level of output, 10 units.

The marginal rate of technical substitution



Marginal Rate of Technical Substitution

Isoquants are typically convex to the origin reflecting the fact that the two factors are substitutable for each other at varying rates. This rate of substitutability is called the “marginal rate of technical substitution” (MRTS) or occasionally the “marginal rate of substitution in production”. It measures the reduction in one input per unit increase in the other input that is just sufficient to maintain a constant level of production. For example, the marginal rate of

substitution of labor for capital gives the amount of capital that can be replaced by one unit of labor while keeping output unchanged.

To move from point A to point B in the diagram, the amount of capital is reduced from K_a to K_b while the amount of labor is increased only from L_a to L_b . To move from point C to point D, the amount of capital is reduced from K_c to K_d while the amount of labor is increased from L_c to L_d . The marginal rate of technical substitution of labor for capital is equivalent to the absolute slope of the isoquant at that point (change in capital divided by change in labor). It is equal to 0 where the isoquant becomes horizontal, and equal to infinity where it becomes vertical.

The opposite is true when going in the other direction (from D to C to B to A). In this case we are looking at the marginal rate of technical substitution capital for labour (which is the reciprocal of the marginal rate of technical substitution labor for capital).

It can also be shown that the marginal rate of substitution labour for capital, is equal to the marginal physical product of labor divided by the marginal physical product of capital.

In the unusual case of two inputs that are perfect substitutes for each other in production, the isoquant would be linear (linear in the sense of a function $y = a - bx$). If, on the other hand, there is only one production process available, factor proportions would be fixed, and these zero-substitutability isoquants would be shown as horizontal or vertical lines.

CHAPTER 9

Consumer Behaviour

Consumer behavior

Consumer behavior is the study of individuals, groups, or organizations and the processes they use to select, secure, and dispose of products, services, experiences, or ideas to satisfy needs and the impacts that these processes have on the consumer and society. It blends elements from psychology, sociology, social anthropology and economics. It attempts to understand the decision-making processes of buyers, both individually and in groups. It studies characteristics of individual consumers such as demographics and behavioral variables in an attempt to understand people's wants. It also tries to assess influences on the consumer from groups such as family, friends, reference groups, and society in general.

Customer behavior study is based on consumer buying behavior, with the customer playing the three distinct roles of user, payer and buyer. Research has shown that consumer behavior is difficult to predict, even for experts in the field. Relationship marketing is an influential asset for customer behavior analysis as it has a keen interest in the re-discovery of the true meaning of marketing through the re-affirmation of the importance of the customer or buyer. A greater importance is also placed on consumer retention, customer relationship management, personalization, customization and one-to-one marketing. Social functions can be categorized into social and welfare functions.

Black box model

The black box model shows the interaction of stimuli, consumer characteristics, and decision process and consumer responses. It can be distinguished between interpersonal stimuli (between people) or intrapersonal stimuli (within people). The black box model is related to the black box theory of behaviorism, where the focus is not set on the processes *inside* a consumer, but the *relation* between the stimuli and the response of the consumer. The marketing stimuli are planned and processed by the companies, whereas the environmental stimulus is given by social factors, based on the economical, political and cultural circumstances of a society. The buyer's black box contains the buyer characteristics and the decision process, which determines the buyer's response.

Environmental factors		Buyer's black box		Buyer's response
Marketing Stimuli	Environmental Stimuli	Buyer Characteristics	Decision Process	
Product Price Place Promotion	Economic Technological Political Cultural Demographic Natural	Attitudes Motivation Perceptions Personality Lifestyle Knowledge	Problem recognition Information search Alternative evaluation Purchase decision Post-purchase behavior	Product choice Brand choice Dealer choice Purchase timing Purchase amount

The black box model considers the buyer's response as a result of a conscious, rational decision process, in which it is assumed that the buyer has recognized the problem. However, in reality many decisions are not made in awareness of a determined problem by the consumer.

Information search

Once the consumer has recognized a problem, they search for information on products and services that can solve that problem. Belch and Belch (2007) explain that consumers undertake both an internal (memory) and an external search. Sources of information include personal sources and experience, and commercial and public sources.

The relevant internal psychological process associated with information search is perception, which can be defined as "the process by which an individual receives, selects, organizes, and interprets information to create a meaningful picture of the world". Consumers' tendency to search for information on goods and services makes it possible for researchers to forecast the purchasing plans of consumers using brief descriptions of the products of interest.

The selective perception process can be divided into:-

- Selective exposure: consumers select which promotional messages they will expose themselves to.
- Selective attention: consumers select which promotional messages they will pay attention to.
- Selective comprehension: consumer interpret messages in line with their beliefs, attitudes, motives and experiences.
- Selective retention: consumers remember messages that are more meaningful or important to them.

The implications of this process help to develop an effective promotional strategy, and suggest which sources of information are more effective for the brand.

Evaluation of alternatives

At this time the consumer compares the brands and products that are in their evoked set. The evoked set refers to the number of alternatives that are considered by consumers during the problem-solving process. Sometimes also known as consideration, this set tends to be small relative to the total number of options available. How can the marketing organization increase the likelihood that their brand is part of the consumer's evoked set? Consumers evaluate alternatives in terms of the functional and psychological benefits that they offer. The marketing organization needs to understand what benefits consumers are seeking and therefore which attributes are most important in terms of making a decision. It also needs to check other brands of the customer's consideration set to prepare the right plan for its own brand.

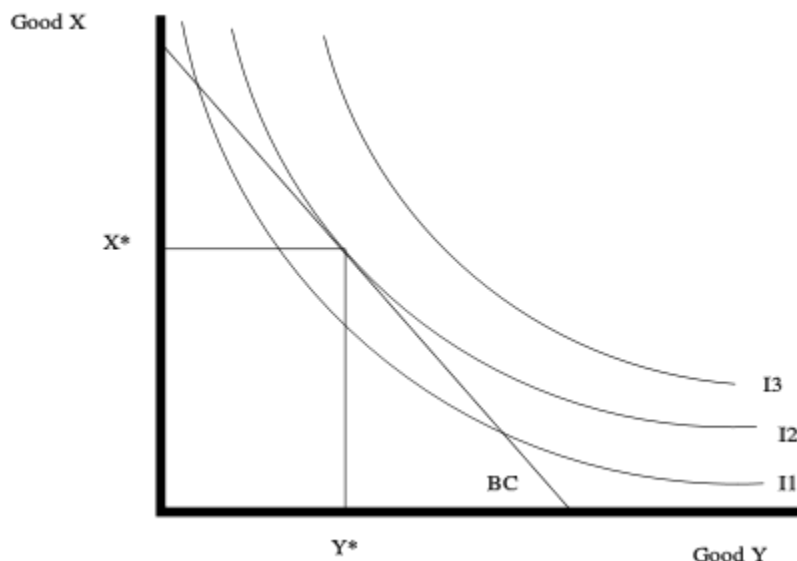
Consumer choice

In microeconomics, the theory of **consumer choice** relates preferences (for the consumption of both goods and services) to consumption expenditures; ultimately, this relationship between preferences and consumption expenditures is used to relate preferences to consumer demand curves. The link between personal preferences, consumption, and the demand curve is one of the most closely studied relations in economics. Consumer choice theory is a way of analyzing how consumers may achieve equilibrium between preferences and expenditures by maximizing utility as subject to consumer budget constraints.

Preferences are the desires by each individual for the consumption of goods and services that translate into choices based on income or wealth for purchases of goods and services to be combined with the consumer's time to define consumption activities. Consumption is separated from production, logically, because two different consumers are involved. In the first case consumption is by the primary individual; in the second case, a producer might make something that he would not consume himself. Therefore, different motivations and abilities are involved. The models that make up consumer theory are used to represent prospectively observable demand patterns for an individual buyer on the hypothesis of constrained optimization. Prominent variables used to explain the rate at which the good is purchased (demanded) are the price per unit of that good, prices of related goods, and wealth of the consumer.

Model setup

Economists' modern solution to the problem of mapping consumer choices is analysis. For an individual, indifference curves and an assumption of constant prices and a fixed income in a two-good world will give the following diagram. The consumer can choose any point on or below the budget constraint line BC. This line is diagonal since it comes from the equation $xp_X + yp_Y \leq \text{income}$. In other words, the amount spent on both goods together is less than or equal to the income of the consumer. The consumer will choose the indifference curve with the highest utility that is within his budget constraint. Every point on I3 is outside his budget constraint so the best that he can do is the single point on I2 that is tangent to his budget constraint. He will purchase X^* of good X and Y^* of good Y.



Indifference curve analysis begins with the utility function. The utility function is treated as an index of utility. All that is necessary is that the utility index change as more preferred bundles are consumed. Indifference curves are typically numbered with the number increasing as more preferred bundles are consumed. However, it is not necessary that numbers be used - any indexing system would suffice - colors for example. The advantage of numbers is that their use makes the math simpler. Numbers used to index indifference curves have no cardinal significance. For example if three indifference curves are labeled 1, 4, and 16 respectively that means nothing more than the bundles "on" indifference curve 4 are more preferred than the bundles "on" indifference curve 1. The fact that the index number is a multiple of another is of no significance. For example, the bundles of good on 4 do not mean that they are four times more satisfying than those on 1. As noted they merely mean they are more satisfying.

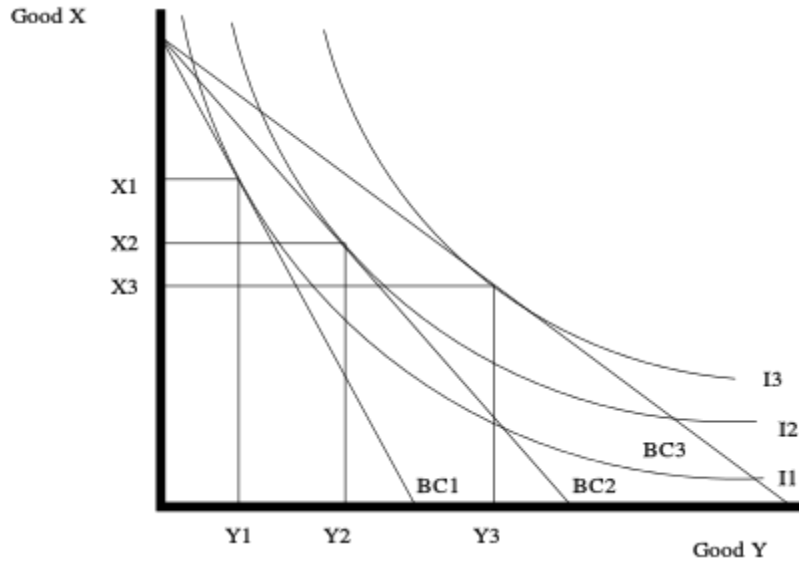
Income effect and price effect deal with how the change in price of a commodity changes the consumption of the good. The theory of consumer choice examines the trade-offs and decisions people make in their role as consumers as prices and their income changes.

Substitution effect

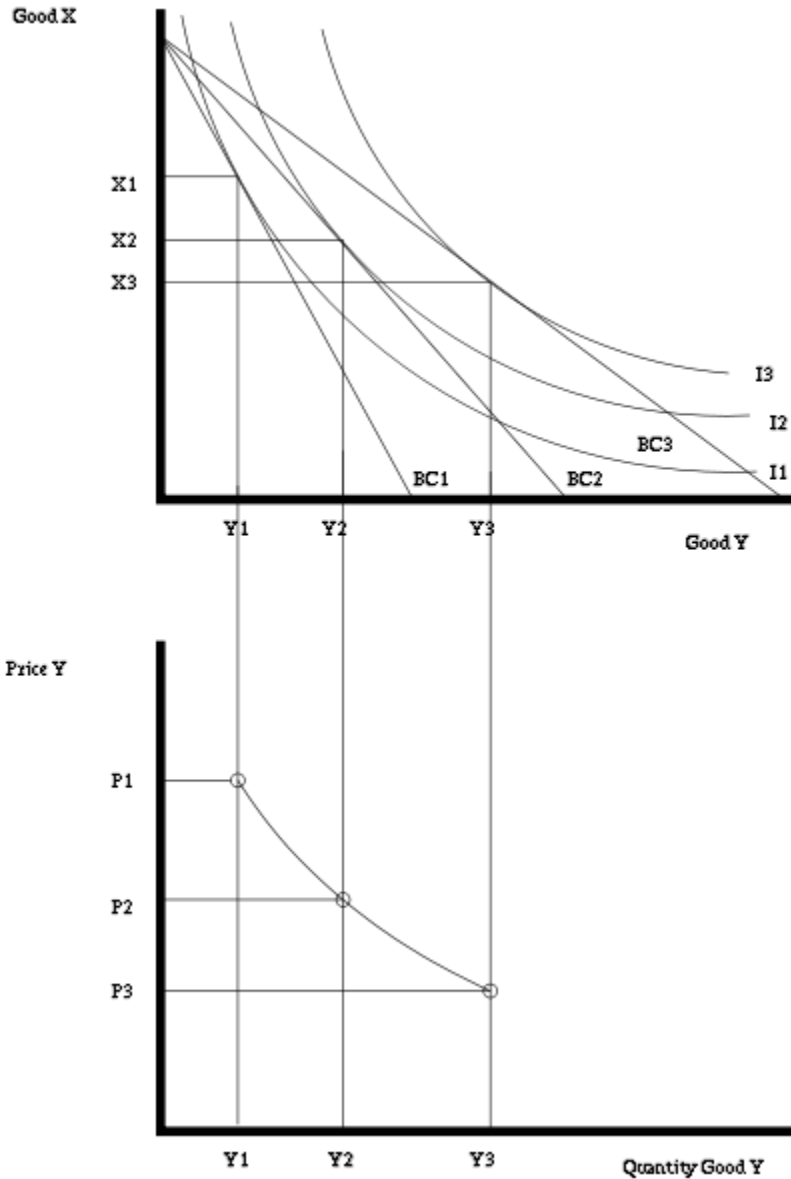
The substitution effect is the effect observed with changes in relative price of goods. This effect basically affects the movement along the curve.

These curves can be used to predict the effect of changes to the budget constraint. The graphic below shows the effect of a price increase for good Y. If the price of Y increases, the budget constraint will pivot from BC2 to BC1. Notice that because the price of X does not change, the consumer can still buy the same amount of X if he or she chooses to buy only good X. On the other hand, if the consumer chooses to buy only good Y, he or she will be able to buy less of good Y because its price has increased.

To maximize the utility with the reduced budget constraint, BC1, the consumer will re-allocate consumption to reach the highest available indifference curve which BC1 is tangent to. As shown on the diagram below, that curve is I1, and therefore the amount of good Y bought will shift from Y2 to Y1, and the amount of good X bought to shift from X2 to X1. The opposite effect will occur if the price of Y decreases causing the shift from BC2 to BC3, and I2 to I3.

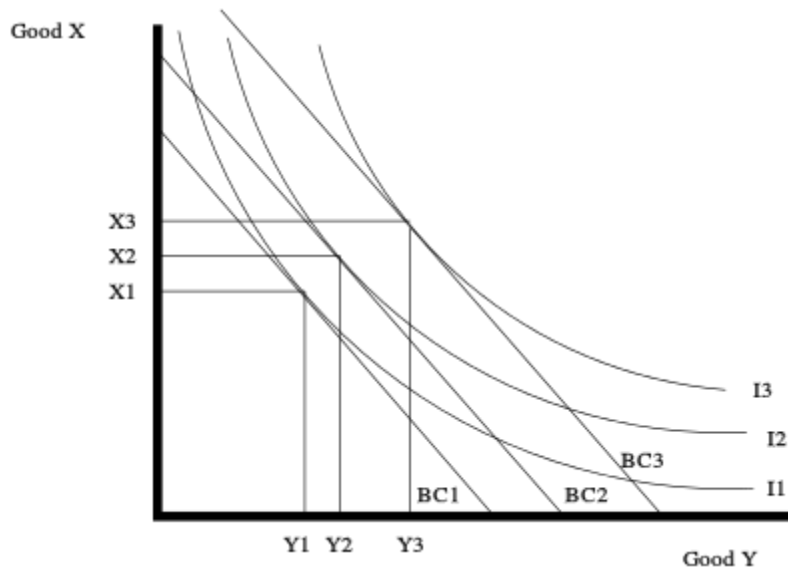


If these curves are plotted for many different prices of good Y, a demand curve for good Y can be constructed. The diagram below shows the demand curve for good Y as its price varies. Alternatively, if the price for good Y is fixed and the price for good X is varied, a demand curve for good X can be constructed.

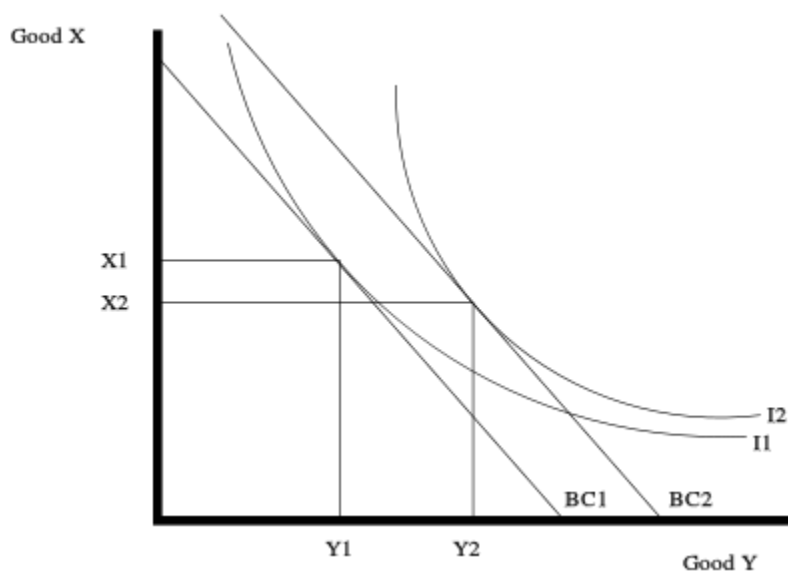


Income effect

Another important item that can change is the money income of the consumer. The income effect is the phenomenon observed through changes in purchasing power. It reveals the change in quantity demanded brought by a change in real income (utility). Graphically, as long as the prices remain constant, changing the income will create a parallel shift of the budget constraint. Increasing the income will shift the budget constraint right since more of both can be bought, and decreasing income will shift it left.



Depending on the indifference curves, as income increases, the amount purchased of a good can either increase, decrease or stay the same. In the diagram below, good Y is a normal good since the amount purchased increased as the budget constraint shifted from BC1 to the higher income BC2. Good X is an inferior good since the amount bought decreased as the income increases.



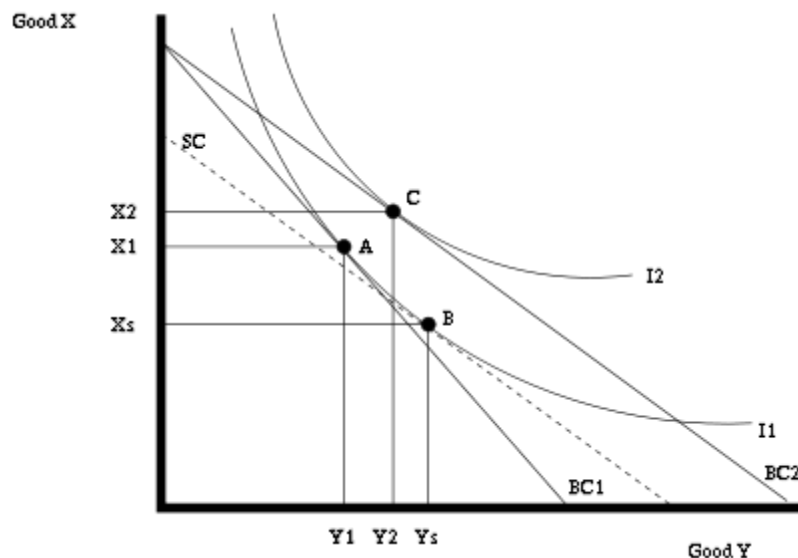
Δy_1^n is the change in the demand for good 1 when we change income from m' to m , holding the price of good 1 fixed at p'_1 :

$$\Delta y_1^n = y_1(p'_1, m) - y_1(p'_1, m').$$

Price effect as sum of substitution and income effects

Every price change can be decomposed into an income effect and a substitution effect; the price effect is the sum of substitution and income effects.

The substitution effect is a price change that alters the slope of the budget constraint but leaves the consumer on the same indifference curve. In other words, it illustrates the consumer's new consumption basket after the price change while being compensated as to allow the consumer to be as happy as he or she was previously. By this effect, the consumer is posited to substitute toward the good that becomes comparatively less expensive. In the illustration below this corresponds to an imaginary budget constraint denoted SC being tangent to the indifference curve I1. Then the income effect from the rise in purchasing power from a price fall reinforces the substitution effect. If the good is an *inferior good*, then the income effect will offset in some degree the substitution effect. If the income effect for an inferior good is sufficiently strong, the consumer will buy less of the good when it becomes less expensive, a Giffen good (commonly believed to be a rarity).



In the figure, the substitution effect, Δy_1^s , is the change in the amount demanded for y when the price of good y falls from p_1 to p'_1 (increasing purchasing power for y) and, at the same time, the money income falls from m to m' to keep the consumer at the same level of utility on $I1$:

$$\Delta y_1^s = y_1(p'_1, m') - y_1(p_1, m).$$

The substitution effect increases the amount demanded of good Y from Y_1 to Y_s . In the example, the income effect of the price fall in Y_1 partly offsets the substitution effect as the amount demanded of Y goes from Y_s to Y_2 . Thus, the price effect is the algebraic sum of the substitution effect and the income effect.

Purchase decision

Once the alternatives have been evaluated, the consumer is ready to make a purchase decision. Sometimes purchase intention does not result in an actual purchase. The marketing organization must facilitate the consumer to act on their purchase intention. The organization can use a variety of techniques to achieve this. The provision of credit or payment terms may encourage purchase, or a sales promotion such as the opportunity to receive a premium or enter a competition may provide an incentive to buy now. The relevant internal psychological process that is associated with purchase decision is integration. Once the integration is achieved, the organization can influence the purchase decisions much more easily.

There are 5 stages of a consumer buying process they are: The problem recognition stage, meaning the identification of something a consumer needs. The search for information, which means you search your knowledge bases or external knowledge sources for information on the product. The possibility of alternative options, meaning whether there is another better or cheaper product available. The choice to purchase the product and then finally the actual purchase of the product. This shows the complete process that a consumer will most likely, whether recognizably or not, go through when they go to buy a product.

Post purchase evaluation

The EKB (Engel, Kollat, Blackwell) model was further developed by Rice (1993) which suggested there should be a feedback loop, Foxall (2005) further suggests the importance of the post purchase evaluation and that it is key because of its influences on future purchase patterns.

CHAPTER 10

Game Theory

Game theory

Game theory is a study of strategic decision making. More formally, it is "the study of mathematical of conflict and cooperation between intelligent rational decision-makers". An alternative term suggested "as a more descriptive name for the discipline" is *interactive decision theory*. Game theory is mainly used in economics, political science, and psychology, as well as logic and biology. The subject first addressed zero-sum games, such that one person's gains exactly equal net losses of the other participant(s). Today, however, game theory applies to a wide range of behavioral relations, and has developed into an umbrella term for the logical side of decision science, to include both human and non-humans, like computers.

Modern game theory began with the idea regarding the existence of mixed-strategy equilibrium in two-person zero-sum games and its proof by John von Neumann. Von Neumann's original proof used Brouwer's fixed-point theorem on continuous mappings into compact convex sets, which became a standard method in game theory and mathematical economics. His paper was followed by his 1944 book *Theory of Games and Economic Behavior*, with Oskar Morgenstern, which considered cooperative games of several players. The second edition of this book provided an axiomatic theory of expected utility, which allowed mathematical statisticians and economists to treat decision-making under uncertainty.

Representation of games

The games studied in game theory are well-defined mathematical objects. To be fully defined, a game must specify the following elements: the *players* of the game, the *information* and *actions* available to each player at each decision point, and the *payoffs* for each outcome. (Rasmusen refers to these four "essential elements" by the acronym PAPI.) A game theorist typically uses these elements, along with a solution concept of their choosing, to deduce a set of equilibrium strategies for each player such that, when these strategies are employed, no player can profit by unilaterally deviating from their strategy. These equilibrium strategies determine an equilibrium to the game—a stable state in which either one outcome occurs or a set of outcomes occur with known probability.

Most cooperative games are presented in the characteristic function form, while the extensive and the normal forms are used to define non-cooperative games.

Extensive form

The extensive form can be used to formalize games with a time sequencing of moves. Games here are played on trees (as pictured to the left). Here each vertex (or node) represents a point of choice for a player. The player is specified by a number listed by the vertex. The lines out of the vertex represent a possible action for that player. The payoffs are specified at the bottom of the tree. The extensive form can be viewed as a multi-player generalization of a decision tree.

In the game pictured to the left, there are two players. *Player 1* moves first and chooses either *F* or *U*. *Player 2* sees *Player 1*'s move and then chooses *A* or *R*. Suppose that *Player 1* chooses *U* and then *Player 2* chooses *A*, then *Player 1* gets 8 and *Player 2* gets 2.

The extensive form can also capture simultaneous-move games and games with imperfect information. To represent it, either a dotted line connects different vertices to represent them as being part of the same information set (i.e., the players do not know at which point they are), or a closed line is drawn around them.

Normal form

The normal (or strategic form) game is usually represented by a matrix which shows the players, strategies, and pay-offs (see the example to the right). More generally it can be represented by any function that associates a payoff for each player with every possible combination of actions. In the accompanying example there are two players; one chooses the row and the other chooses the column. Each player has two strategies, which are specified by the number of rows and the number of columns. The payoffs are provided in the interior. The first number is the payoff received by the row player (Player 1 in our example); the second is the payoff for the column player (Player 2 in our example). Suppose that Player 1 plays *Up* and that Player 2 plays *Left*. Then Player 1 gets a payoff of 4, and Player 2 gets 3.

When a game is presented in normal form, it is presumed that each player acts simultaneously or, at least, without knowing the actions of the other. If players have some information about the choices of other players, the game is usually presented in extensive form.

Every extensive-form game has an equivalent normal-form game, however the transformation to normal form may result in an exponential blowup in the size of the representation, making it computationally impractical.

Characteristic function form

In games that possess removable utility separate rewards are not given; rather, the characteristic function decides the payoff of each unity. The idea is that the unity that is 'empty', so to speak, does not receive a reward at all.

The origin of this form is to be found in John von Neumann and Oskar Morgenstern's book; when looking at these instances, they guessed that when a union appears, it works against the fraction as if two individuals were playing a normal game. The balanced payoff of C is a basic function. Although there are differing examples that help determine coalitional amounts from normal games, not all appear that in their function form can be derived from such.

Formally, a characteristic function is seen as: (N,v) , where N represents the group of people and v is a normal utility.

Such characteristic functions have expanded to describe games where there is no removable utility.

General and applied uses

As a method of applied mathematics, game theory has been used to study a wide variety of human and animal behaviors. It was initially developed in economics to understand a large collection of economic behaviors, including behaviors of firms, markets, and consumers. The first use of game-theoretic analysis was by Antoine Augustin Cournot in 1838 with his solution of the Cournot Duopoly. The use of game theory in the social sciences has expanded, and game theory has been applied to political, sociological, and psychological behaviors as well.

Game-theoretic analysis, in biology, was initially used to study animal behavior by Ronald Fisher in the 1930s (although even Charles Darwin makes a few informal game-theoretic statements). This work predates the name "game theory", but it shares many important features with this field. The developments in economics were later applied to biology largely by John Maynard Smith in his book *Evolution*.

In addition to being used to describe, predict, and explain behavior, game theory has also been used to develop theories of ethical or normative behavior and to prescribe such behavior. In economics and philosophy, scholars have applied game theory to help in the understanding of good or proper behavior. Game-theoretic arguments of this type can be found as far back as Plato.

Description and modeling

The first known use is to describe and model how human populations behave. Some scholars believe that by finding the equilibria of games they can predict how actual human populations will behave when confronted with situations analogous to the game being studied. This particular view of game theory has come under recent criticism. First, it is criticized because the assumptions made by game theorists are often violated. Game theorists may assume players always act in a way to directly maximize their wins (the Homo economicus model), but in practice, human behavior often deviates from this model. Explanations of this phenomenon are many; irrationality, new models of deliberation, or even different motives (like that of altruism). Game theorists respond by comparing their assumptions to those used in physics. Thus while their assumptions do not always hold, they can treat game theory as a reasonable scientific ideal akin to the models used by physicists. However, in the centipede game, guess 2/3 of the average game, and the dictator game, people regularly do not play Nash equilibria. These experiments have demonstrated that individuals do not play equilibrium strategies. There is an ongoing debate regarding the importance of these experiments.

Prescriptive or normative analysis

On the other hand, some scholars see game theory not as a predictive tool for the behavior of human beings, but as a suggestion for how people ought to behave. Since a strategy, corresponding to a Nash equilibrium of a game constitutes one's best response to the actions of the other players – provided they are in (the same) Nash equilibrium – playing a strategy that is part of a Nash equilibrium seems appropriate.

	Cooperate	Defect
Cooperate	-1, -1	-10, 0
Defect	0, -10	-5, -5

The Prisoner's Dilemma

However, the rationality of such a decision has been proved only for special cases. This normative use of game theory has also come under criticism. First, in some cases it is appropriate

to play a non-equilibrium strategy if one expects others to play non-equilibrium strategies as well. For an example, see guess $2/3$ of the average.

Second, the prisoner's dilemma presents another potential counterexample. In the prisoner's dilemma, each player pursuing their own self-interest leads both players to be worse off than had they not pursued their own self-interests.

Types of games

Cooperative or non-cooperative

A game is *cooperative* if the players are able to form binding commitments. For instance the legal system requires them to adhere to their promises. In no cooperative games this is not possible.

Often it is assumed that *communication* among players is allowed in cooperative games, but not in no cooperative ones. However, this classification on two binary criteria has been questioned, and sometimes rejected (Harsanyi 1974).

Of the two types of games, noncooperative games are able to model situations to the finest details, producing accurate results. Cooperative games focus on the game at large. Considerable efforts have been made to link the two approaches. The so-called Nash-programme (Nash program is the research agenda for investigating on the one hand axiomatic bargaining solutions and on the other hand the equilibrium outcomes of strategic bargaining procedures) has already established many of the cooperative solutions as no cooperative equilibria.

Hybrid games contain cooperative and non-cooperative elements. For instance, coalitions of players are formed in a cooperative game, but these play in a non-cooperative fashion.

Symmetric and asymmetric

A symmetric game is a game where the payoffs for playing a particular strategy depend only on the other strategies employed, not on who is playing them. If the identities of the players can be changed without changing the payoff to the strategies, then a game is symmetric. Many of the commonly studied 2×2 games are symmetric. The standard

	E	F
E	1, 2	0, 0
F	0, 0	1, 2

An asymmetric game

representations of chicken, the prisoner's, and the stag hunt are all symmetric games. Some scholars would consider certain asymmetric games as examples of these games as well. However, the most common payoffs for each of these games are symmetric.

Most commonly studied asymmetric games are games where there are not identical strategy sets for both players. For instance, the ultimatum game and similarly the dictator game have different strategies for each player. It is possible, however, for a game to have identical strategies for both players, yet be asymmetric. For example, the game pictured to the right is asymmetric despite having identical strategy sets for both players.

Zero-sum and non-zero-sum

Zero-sum games are a special case of constant-sum games, in which choices by players can neither increase nor decrease the available resources. In zero-sum games the total benefit to all players in the game, for every combination of strategies, always adds to zero (more informally, a player benefits only at the equal expense of others). Poker exemplifies a zero-sum game (ignoring the possibility of the house's cut), because one wins exactly the amount one's opponents lose. Other zero-sum games include matching pennies and most classical board games including Go and chess.

	A	B
A	-1, 1	3, -3
B	0, 0	-2, 2

A zero-sum game

Many games studied by game theorists (including the infamous prisoner's dilemma) are non-zero-sum games, because the out come has net results greater or less than zero. Informally, in non-zero-sum games, a gain by one player does not necessarily correspond with a loss by another.

Constant-sum games correspond to activities like theft and gambling, but not to the fundamental economic situation in which there are potential gains from trade. It is possible to transform any game into a (possibly asymmetric) zero-sum game by adding a dummy player (often called "the board"), whose losses compensate the players' net winnings.

Simultaneous and sequential

Simultaneous games are games where both players move simultaneously, or if they do not move simultaneously, the later players are unaware of the earlier players' actions (making

them *effectively* simultaneous). Sequential games (or dynamic games) are games where later players have some knowledge about earlier actions. This need not be perfect information about every action of earlier players; it might be very little knowledge. For instance, a player may know that an earlier player did not perform one particular action, while he does not know which of the other available actions the first player actually performed.

The difference between simultaneous and sequential games is captured in the different representations discussed above. Often, normal form is used to represent simultaneous games, and extensive form is used to represent sequential ones. The transformation of extensive to normal form is one way, meaning that multiple extensive form games correspond to the same normal form. Consequently, notions of equilibrium for simultaneous games are insufficient for reasoning about sequential games; see sub game perfection.

In short, the differences between sequential and simultaneous games are as follows:

	Sequential	Simultaneous
Normally denoted by:	Decision Trees	Payoff Matrices
Prior knowledge of opponent's move:	Yes	No
Time Axis:	Yes	No
Also known as:	Extensive Game	Strategic Game

Perfect information and imperfect information

An important subset of sequential games consists of games of perfect information. A game is one of perfect information if all players know the moves previously made by all other players. Thus, only sequential games can be games of perfect information because players in simultaneous games do not know the actions of the other players. Most games studied in game theory are imperfect-information games. Interesting examples of perfect-information games include

the ultimatum game and centipede game. Recreational games of perfect information include chess, go, and Mancala. Many card games are games of imperfect information, for instance poker or contract bridge.

Perfect information is often confused with complete information, which is a similar concept. Complete information requires that every player know the strategies and payoffs available to the other players but not necessarily the actions taken. Games of incomplete information can be reduced, however, to games of imperfect information by introducing "moves by nature" (Leyton-Brown & Shoham 2008, p. 60).

Combinatorial games

Games in which the difficulty of finding an optimal strategy stems from the multiplicity of possible moves are called combinatorial games. Examples include chess and go. Games that involve imperfect or incomplete information may also have a strong combinatorial character, for instance backgammon. There is no unified theory addressing combinatorial elements in games. There are, however, mathematical tools that can solve particular problems and answer general questions.

Games of perfect information have been studied in combinatorial game theory, which has developed novel representations, e.g. surreal numbers, as well as combinatorial and algebraic (and sometimes non-constructive) proof methods to solve games of certain types, including "loopy" games that may result in infinitely long sequences of moves. These methods address games with higher combinatorial complexity than those usually considered in traditional (or "economic") game theory. A typical game that has been solved this way is hex. A related field of study, drawing from computational complexity theory, is game complexity, which is concerned with estimating the computational difficulty of finding optimal strategies.

Infinitely long games

Games, as studied by economists and real-world game players, are generally finished in finitely many moves. Pure mathematicians are not so constrained, and set theorists in particular study games that last for infinitely many moves, with the winner (or other payoff) not known until *after* all those moves are completed.

The focus of attention is usually not so much on what is the best way to play such a game, but simply on whether one or the other player has a winning strategy. (It can be proven, using the axiom of choice, that there are games – even with perfect information, and where the only outcomes are "win" or "lose" – for which *neither* player has a winning strategy.) The existence of such strategies, for cleverly designed games, has important consequences in descriptive set theory.

Discrete and continuous games

Much of game theory is concerned with finite, discrete games, that have a finite number of players, moves, events, outcomes, etc. Many concepts can be extended, however. Continuous games allow players to choose a strategy from a continuous strategy set. For instance, Cournot competition is typically modeled with players' strategies being any non-negative quantities, including fractional quantities.

Differential games

Differential games such as the continuous pursuit and evasion game are continuous games where the evolution of the players' state variables is governed by differential equations. The problem of finding an optimal strategy in a differential game is closely related to the optimal control theory. In particular, there are two types of strategies: the open-loop strategies are found using the Pontryagin maximum principle while the closed-loop strategies are found using Bellman's Dynamic Programming method.

A particular case of differential games are the games with random time horizon. In such games, the terminal time is a random variable with a given probability distribution function. Therefore, the players maximize the mathematical expectation of the cost function. It was shown that the modified optimization problem can be reformulated as a discounted differential game over an infinite time interval.

Metagames

These are games the play of which is the development of the rules for another game, the target or subject game. Metagames seek to maximize the utility value of the rule set developed. The theory of metagames is related to mechanism design theory.

The term metagame analysis is also used to refer to a practical approach developed by Nigel Howard (Howard 1971) whereby a situation is framed as a strategic game in which stakeholders try to realize their objectives by means of the options available to them. Subsequent developments have led to the formulation of confrontation analysis.

CHAPTER 11

Economic Policy

Economic policy

Economic policy refers to the actions that governments take in the economic field. It covers the systems for setting interest rates and government budget as well as the labor market, national ownership, and many other areas of government interventions into the economy.

An **economic policy** is a course of action that is intended to influence or control the behavior of the economy. Economic policies are typically implemented and administered by the government. Examples of economic policies include decisions made about government spending and taxation, about the redistribution of income from rich to poor, and about the supply of money

Such policies are often influenced by international institutions like the International Monetary Fund or World Bank as well as political beliefs and the consequent policies of parties.

Types of economic Policy

Almost every aspect of government has an economic aspect involving a near superfluous quantity of terms. A few examples of the kinds of economic policies that exist include:

- Macroeconomic stabilization policy, which attempts to keep the money supply growing at a rate that doesn't result in excessive inflation.
- Trade policy, which refers to tariffs, trade agreements and the international institutions that govern them.
- **Policies designed to create economic growth**
 - Policies related to development economics
 - Policies dealing with the redistribution of income, property and/or wealth
 - As well as: regulatory policy, anti-trust policy, industrial policy and technology-based economic development policy

Macroeconomic stabilization policy

Stabilization policy attempts to stimulate an economy out of recession or constrain the money supply to prevent excessive inflation.

- Fiscal policy, often tied to Keynesian economics, uses government spending and taxes to guide the economy.
 - Fiscal stance: The size of the deficit or surplus
 - Tax policy: The taxes used to collect government income.
 - Government spending on just about any area of government
- Monetary policy controls the value of currency by lowering the supply of money to control inflation and raising it to stimulate economic growth. It is concerned with the amount of money in circulation and, consequently, interest rates and inflation.
 - Interest rates, if set by the Government
 - Incomes policies and price controls that aim at imposing non-monetary controls on inflation
 - Reserve requirements which affect the money multiplier

Economic Policy

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

Positive and normative economics. **Positive economics** attempts to describe how the economy and economic policies work without resorting to value judgments about which results are best. The distinguishing feature of positive economic hypotheses is that they *can be tested* and either confirmed or rejected. For example, the hypothesis that “an increase in the supply of money leads to an increase in prices” belongs to the realm of positive economics because it can be tested by examining the data on the supply of money and the level of prices.

Normative economics involves the use of **value judgments** to assess the performance of the economy and economic policies. Consequently, normative economic hypotheses *cannot be tested*. For example, the hypothesis that “the inflation rate is too high” belongs to the realm of

normative economics because it is based on a value judgment and therefore cannot be tested, confirmed, or refuted. Not surprisingly, most of the disagreements among economists concern normative economic hypotheses.

Goals of economic policy. The **goals of economic policy** consist of value judgments about what economic policy should strive to achieve and therefore fall under the heading of normative economics. While there is much disagreement about the appropriate goals of economic policy, several appear to have wide, although not universal, acceptance. These widely accepted goals include:

1. **Economic growth:** Economic growth means that the incomes of all consumers and firms (after accounting for inflation) are increasing over time.
2. **Full employment:** The goal of full employment is that every member of the labor force who wants to work is able to find work.
3. **Price stability:** The goal of price stability is to prevent increases in the general price level known as inflation, as well as decreases in the general price level known as deflation.

CONCEPT OF COST

Production cost is the rent and wages of physical and human capital used for production, plus interest (or dividends) on any money capital borrowed for production, plus the cost of materials bought and used for production. Rents may be replaced by capital depreciation/maintenance costs if the producer owns the capital (private property, slave labor, etc).

The rhetoric of hiding profit as a cost in the description of businesses, and then speaking of zero-sum profits in markets, rather than speaking of a normal/expected/optimum rate of profit on financial capital, is problematic. It puts the microeconomic market analysis at the mercy of a macroeconomic equilibrium to explain the appropriate rate of profit (10% per year is proposed several times in the text!). It also helps to promote the false assertion that the money system (financial capital) has as natural / neutral a rôle as physical and human capital, when in fact the chosen implementation of debt and money has a huge effect on the issues at hand (e.g., growth and expected rate of profit). It also discriminates against the farmer and small family-owned business (*i.e.*, the ones which come closest to the perfect market), for which the ideas of easy

reinvestment and a fixed rate of profit are most absurd (for example, owners live on the business property).

Tools and goals

Policy is generally directed to achieve particular objectives, like targets for inflation, unemployment, or economic growth. Sometimes other objectives, like military spending or nationalization are important.

These are referred to as the **policy goals**: the outcomes which the economic policy aims to achieve.

To achieve these goals, governments use **policy tools** which are under the control of the government. These generally include the interest and money supply, tax and government spending, tariffs, exchange rates, labor market regulations, and many other aspects of government.

Selecting tools and goals

Government and central banks are limited in the number of goals they can achieve in the short term. For instance, there may be pressure on the government to reduce inflation, reduce unemployment, and reduce interest rates while maintaining currency stability. If all of these are selected as goals for the short term, then policy is likely to be incoherent, because a normal consequence of reducing inflation and maintaining currency stability is increasing unemployment and increasing interest rates.

Demand-side vs. supply-side tools

This dilemma can in part be resolved by using microeconomics, supply-side policy to help adjust markets. For instance, unemployment could potentially be reduced by altering laws relating to trade unions or unemployment insurance, as well as by macroeconomic (demand-side) factors like interest rates.

Discretionary policy vs policy rules

For much of the 20th century, governments adopted discretionary policies like demand management designed to correct the business cycle. These typically used fiscal and monetary policy to adjust inflation, output and unemployment.

However, following the stagflation of the 1970s, policymakers began to be attracted to policy rules.

A discretionary policy is supported because it allows policymakers to respond quickly to events. However, discretionary policy can be subject to dynamic inconsistency: a government may say it intends to raise interest rates indefinitely to bring inflation under control, but then relax its stance later. This makes policy non-credible and ultimately ineffective.

A rule-based policy can be more credible, because it is more transparent and easier to anticipate. Examples of rule-based policies are fixed exchange rates, interest rate rules, the stability and growth pact and the Golden Rule. Some policy rules can be imposed by external bodies, for instance the Exchange Rate Mechanism for currency.

A compromise between strict discretionary and strict rule-based policy is to grant discretionary power to an independent body. For instance, the Federal Reserve Bank, European Central Bank, Bank of England and Reserve Bank of Australia all set interest rates without government interference, but do not adopt rules.

Another type of non-discretionary policy is a set of policies which are imposed by an international body. This can occur (for example) as a result of intervention by the International Monetary Fund.

Economic policy through history

The first economic problem was how to gain the resources it needed to be able to perform the functions of an early government: the military, roads and other projects like building the Pyramids.

Early governments generally relied on tax in kind and forced labor for their economic resources. However, with the development of money came the first policy choice. A government could raise money through taxing its citizens. However, it could now also debase the coinage and so increase the money supply.

Early civilizations also made decisions about whether to permit and how to tax trade. Some early civilizations, such as Ptolemaic Egypt adopted a **closed currency policy** whereby foreign merchants had to exchange their coin for local money. This effectively levied a very high tariff on foreign trade.

By the early modern age, more policy choices had been developed. There was considerable debate about mercantilism and other restrictive trade practices like the Navigation Acts, as trade policy became associated with both national wealth and with foreign and colonial policy.

Throughout the 19th Century, monetary standards became an important issue. Gold and silver were in supply in different proportions. Which metal was adopted influenced the wealth of different groups in society.

The first fiscal policy

With the accumulation of private capital in the Renaissance, states developed methods of financing deficits without debasing their coin. The development of capital markets meant that a government could borrow money to finance war or expansion while causing less economic hardship.

This was the beginning of modern fiscal policy.

The same markets made it easy for private entities to raise bonds or sell shares to fund private initiatives.

Business cycles

The business cycle became a predominant issue in the 19th century, as it became clear that industrial output, employment, and profit behaved in a cyclical manner. One of the first proposed policy solutions to the problem came with the work of Keynes, who proposed that fiscal policy could be used actively to ward off depressions, recessions and slumps. The Austrian school argues that central banks create the business cycle.

CHAPTER 12

International Economics

International economics

International economics is concerned with the effects upon economic activity of international differences in productive resources and consumer preferences and the international institutions that affect them. It seeks to explain the patterns and consequences of transactions and interactions between the inhabitants of different countries, including trade, investment and migration.

- **International trade** studies goods-and-services flows across international boundaries from supply-and-demand factors, economic integration, international factor movements, and policy variables such as tariff rates and trade quotas.
- **International finance** studies the flow of capital across international financial markets, and the effects of these movements on exchange rates.
- **International monetary economics** and **macroeconomics** studies money and macro flows across countries
- **International political economy** from **international relations** studies issues and impacts from for example international conflicts, international negotiations, and international; national security and economic nationalism; and international agreements and observance

International trade

Scope and methodology

The economic theory of international trade differs from the remainder of economic theory mainly because of the comparatively limited international mobility of the capital and labor. In that respect, it would appear to differ in degree rather than in principle from the trade between remote regions in one country. Thus the methodology of international trade economics differs little from that of the remainder of economics. However, the direction of academic research on the subject has been influenced by the fact that governments have often sought to impose

restrictions upon international trade, and the motive for the development of trade theory has often been a wish to determine the consequences of such restrictions.

The branch of trade theory which is conventionally categorized as "classical" consists mainly of the application of deductive logic, originating with Ricardo's Theory of *Comparative Advantage* and developing into a range of theorems that depend for their practical value upon the realism of their postulates. "Modern" trade theory, on the other hand, depends mainly upon *empirical analysis*.

Classical theory

The law of *comparative advantage* provides a logical explanation of international trade as the rational consequence of the comparative advantages that arise from inter-regional differences - regardless of how those differences arise. Since its exposition by David Ricardo the techniques of neo-classical economics have been applied to it to model the patterns of trade that would result from various postulated sources of comparative advantage. However, extremely restrictive (and often unrealistic) assumptions have had to be adopted in order to make the problem amenable to theoretical analysis.

The best-known of the resulting models, the Heckscher-Ohlin theorem (H-O) depends upon the assumptions of no international differences of technology, productivity, or consumer preferences; no obstacles to pure competition or free trade and no scale economies. On those assumptions, it derives a model of the trade patterns that would arise solely from international differences in the relative abundance of labor and capital (referred to as factor endowments). The resulting theorem states that, on those assumptions, a country with a relative abundance of capital would export capital-intensive products and import labor-intensive products. The theorem proved to be of very limited predictive value, as was demonstrated by what came to be known as the "Leontief Paradox" (the discovery that, despite its capital-rich factor endowment, America was exporting labor-intensive products and importing capital-intensive products) Nevertheless the theoretical techniques (and many of the assumptions) used in deriving the H-O model were subsequently used to derive further theorems.

Modern theory

Modern trade theory moves away from the restrictive assumptions of the H-O theorem and explores the effects upon trade of a range of factors, including technology and scale economies.

It makes extensive use of *econometrics* to identify from the available statistics, the contribution of particular factors among the many different factors that affect trade. The contribution of differences of technology has been evaluated in several such studies. The temporary advantage arising from a country's development of a new technology is seen as contributory factor in one study

Other researchers have found research and development expenditure, patents issued, and the availability of skilled labor, to be indicators of the technological leadership that enables some countries to produce a flow of such technological innovations and have found that technology leaders tend to export hi-tech products to others and receive imports of more standard products from them. Another econometric study also established a correlation between country size and the share of exports made up of goods in the production of which there are scale economies. The study further suggested that internationally traded goods fall into three categories, each with a different type of comparative advantage:

- goods that are produced by the extraction and routine processing of available natural resources – such as coal, oil and wheat, for which developing countries often have an advantage compared with other types of production – which might be referred to as "Ricardo goods";
- low-technology goods, such as textiles and steel, that tend to migrate to countries with appropriate factor endowments - which might be referred to as "Heckscher-Ohlin goods"; and,
- high-technology goods and high scale-economy goods, such as computers and aero planes, for which the comparative advantage arises from the availability of R&D resources and specific skills and the proximity to large sophisticated markets.

Factor price equalization

Nevertheless there have been widespread misgivings about the effects of international trade upon wage earners in developed countries. Samuelson's factor price equalization theorem indicates that, if productivity were the same in both countries, the effect of trade would be to bring about equality in wage rates. As noted above, that theorem is sometimes taken to mean that trade between an industrialized country and a developing country would lower the wages of the

unskilled in the industrialized country. However, it is unreasonable to assume that productivity would be the same in a low-wage developing country as in a high-wage developed country. A 1999 study has found international differences in wage rates to be approximately matched by corresponding differences in productivity.

(Such discrepancies that remained were probably the result of over-valuation or under-valuation of exchange rates, or of inflexibilities in labor markets.) It has been argued that, although there may sometimes be short-term pressures on wage rates in the developed countries, competition between employers in developing countries can be expected eventually to bring wages into line with their employees' *marginal products*. Any remaining international wage differences would then be the result of productivity differences, so that there would be no difference between unit labor costs in developing and developed countries, and no downward pressure on wages in the developed countries.

Terms of trade

There has also been concern that international trade could operate against the interests of developing countries. Influential studies published in 1950 by the Argentine economist Raul Prebisch and the British economist Hans Singer suggested that there is a tendency for the prices of agricultural products to fall relative to the prices of manufactured goods; turning the *terms of trade* against the developing countries and producing an unintended transfer of wealth from them to the developed countries.

Their findings have been confirmed by a number of subsequent studies, although it has been suggested that the effect may be due to *quality bias* in the index numbers used or to the possession of *market power* by manufacturers. The Prebisch/Singer findings remain controversial, but they were used at the time - and have been used subsequently - to suggest that the developing countries should erect barriers against manufactured imports in order to nurture their own "infant industries" and so reduce their need to export agricultural products. The arguments for and against such a policy are similar to those concerning the *protection* of infant industries in general.

Infant industries

The term "infant industry" is used to denote a new industry which has prospects of gaining comparative advantage in the long-term, but which would be unable to survive in the

face of competition from imported goods. This situation can occur when time is needed either to achieve potential *economies of scale*, or to acquire potential *learning curve* economies. Successful identification of such a situation, followed by the temporary imposition of a barrier against imports can, in principle, produce substantial benefits to the country that applies it – a policy known as “import substitution industrialization”. Whether such policies succeed depends upon the governments’ skills in picking winners, with reasonable expectations of both successes and failures. It has been claimed that South Korea’s automobile industry owes its existence to initial protection against imports but a study of infant industry protection in Turkey reveals the absence of any association between productivity gains and degree of protection, such as might be expected of a successful import substitution policy.

Another study provides descriptive evidence suggesting that attempts at import substitution industrialization since the 1970s have usually failed but the empirical evidence on the question has been contradictory and inconclusive. It has been argued that the case against import substitution industrialization is not that it is bound to fail, but that subsidies and tax incentives do the job better. It has also been pointed out that, in any case, trade restrictions could not be expected to correct the domestic market imperfections that often hamper the development of infant industries

Trade policies

Economists’ findings about the benefits of trade have often been rejected by government policy-makers, who have frequently sought to protect domestic industries against foreign competition by erecting barriers, such as *tariffs* and *quotas*, against imports. Average tariff levels of around 15 per cent in the late 19th century rose to about 30 percent in the 1930s, following the passage in the United States of the Smoot-Hawley Act. Mainly as the result of international agreements under the auspices of the General Agreement on Tariffs and Trade (GATT) and subsequently the World Trade Organization (WTO), average tariff levels were progressively reduced to about 7 per cent during the second half of the 20th century, and some other trade restrictions were also removed. The restrictions that remain are nevertheless of major economic importance: among other estimates the World Bank estimated in 2004 that the removal of all trade restrictions would yield benefits of over \$500 billion a year by 2015.

The largest of the remaining trade-distorting policies are those concerning agriculture. In the OECD countries government payments account for 30 per cent of farmers' receipts and tariffs of over 100 per cent are common. OECD economists estimate that cutting all agricultural tariffs and subsidies by 50% would set off a chain reaction in realignments of production and consumption patterns that would add an extra \$26 billion to annual world income

International finance

Scope and methodology

The economics of international finance do not differ in principle from the economics of international trade but there are significant differences of emphasis. The practice of international finance tends to involve greater uncertainties and risks because the assets that are traded are claims to flows of returns that often extend many years into the future. Markets in financial assets tend to be more volatile than markets in goods and services because decisions are more often revised and more rapidly put into effect. There is the share presumption that a transaction that is freely undertaken will benefit both parties, but there is a much greater danger that it will be harmful to others.

For example, mismanagement of mortgage lending in the United States led in 2008 to banking failures and credit shortages in other developed countries, and sudden reversals of international flows of capital have often led to damaging financial crises in developing countries. And, because of the incidence of rapid change, the methodology of *comparative statics* has fewer applications than in the theory of international trade, and *empirical analysis* is more widely employed. Also, the consensus among economists concerning its principal issues is narrower and more open to controversy than is the consensus about international trade. Given by Mahendra

Exchange rates and capital mobility

A major change in the organization of international finance occurred in the latter years of the twentieth century, and economists are still debating its implications. At the end of the second world war the national signatories to the Bretton Woods Agreement had agreed to maintain their currencies each at a fixed exchange rate with the United States dollar, and the United States government had undertaken to buy gold on demand at a fixed rate of \$35 per ounce. In support

of those commitments, most signatory nations had maintained strict control over their nationals' use of foreign exchange and upon their dealings in international financial assets.

But in 1971 the United States government announced that it was suspending the convertibility of the dollar, and there followed a progressive transition to the current regime of *floating exchange rates* in which most governments no longer attempt to control their exchange rates or to impose controls upon access to foreign currencies or upon access to international financial markets. The behavior of the international financial system was transformed. Exchange rates became very volatile and there was an extended series of damaging financial crises. One study estimated that by the end of the twentieth century there had been 112 banking crises in 93 countries, another that there had been 26 banking crises, 86 currency crises and 27 mixed banking and currency crises - many times more than in the previous post-war years.

Policies and institutions

Although the majority of developed countries now have "floating" exchange rates, some of them – together with many developing countries – maintain exchange rates that are nominally "fixed", usually with the US dollar or the euro. The adoption of a fixed rate requires intervention in the foreign exchange market by the country's central bank, and is usually accompanied by a degree of control over its citizens' access to international markets.

A controversial case in point is the policy of the Chinese government who had, until 2005, maintained the renminbi at a fixed rate to the dollar, but has since "pegged" it to a basket of currencies. It is frequently alleged that in doing so they are deliberately holding its value lower than if it were allowed to float (but there is evidence to the contrary).

Some governments have abandoned their national currencies in favor of the common currency of a currency area such as the "*eurozone*" and some, such as Denmark, have retained their national currencies but have pegged them at a fixed rate to an adjacent common currency. On an international scale, the economic policies promoted by the International Monetary Fund (IMF) have had a major influence, especially upon the developing countries.

International financial stability

From the time of the Great Depression onwards, regulators and their economic advisors have been aware that economic and financial crises can spread rapidly from country to country, and

that financial crises can have serious economic consequences. For many decades, that awareness led governments to impose strict controls over the activities and conduct of banks and other credit agencies, but in the 1980s many governments pursued a policy of deregulation in the belief that the resulting efficiency gains would outweigh any *systemic risks*. The extensive financial innovations that followed are described in the article on financial economics.

One of their effects has been greatly to increase the international inter-connectedness of the financial markets and to create an international financial system with the characteristics known in control theory as "complex-interactive". The stability of such a system is difficult to analyze because there are many possible failure sequences. The internationally systemic crises that followed included the equity crash of October 1987, the Japanese asset price collapse of the 1990s the Asian financial crisis of 1997 the Russian government default of 1998 (which brought down the Long-Term Capital Management hedge fund) and the 2007-8 sub-prime mortgages crisis. The symptoms have generally included collapses in asset prices, increases in risk premiums, and general reductions in liquidity.

Migration

Elementary considerations lead to a presumption that international migration results in a net gain in economic welfare. Wage differences between developed and developing countries have been found to be mainly due to productivity differences which may be assumed to arise mostly from differences in the availability of physical, social and human capital. And economic theory indicates that the move of a skilled worker from a place where the returns to skill are relatively low to a place where they are relatively high should produce a net gain (but that it would tend to depress the wages of skilled workers in the recipient country).

There have been many econometric studies intended to quantify those gains. A Copenhagen Consensus study suggests that if the share of foreign workers grew to 3% of the labor force in the rich countries there would be global benefits of \$675 billion a year by 2025. However, a survey of the evidence led a House of Lords committee to conclude that any benefits of immigration to the United Kingdom are relatively small Evidence from the United States also suggests that the economic benefits to the receiving country are relatively small and that the presence of immigrants in its labor market results in only a small reduction in local wages.

Globalization

The term globalization has acquired a variety of meanings, but in economic terms it refers to the move that is taking place in the direction of complete mobility of capital and labor and their products, so that the world's economies are on the way to becoming totally integrated. The driving forces of the process are reductions in politically imposed barriers and in the costs of transport and communication (although, even if those barriers and costs were eliminated, the process would be limited by inter-country differences in social capital).

It is a process which has ancient origins which has gathered pace in the last fifty years, but which is very far from complete. In its concluding stages, interest rates, wage rates and corporate and income tax rates would become the same everywhere, driven to equality by competition, as investors, wage earners and corporate and personal taxpayers threatened to migrate in search of better terms. In fact, there are few signs of international convergence of interest rates, wage rates or tax rates. Although the world is more integrated in some respects, it is possible to argue that on the whole it is now less integrated than it was before the first world war., and that many middle-east countries are less globalised than they were 25 years ago

Of the moves toward integration that have occurred, the strongest has been in financial markets, in which globalization is estimated to have tripled since the mid-1970s Recent research has shown that it has improved risk-sharing, but only in developed countries, and that in the developing countries it has increased macroeconomic volatility. It is estimated to have resulted in net welfare gains worldwide, but with losers as well as gainers.

Increased globalization has also made it easier for recessions to spread from country to country. A reduction in economic activity in one country can lead to a reduction in activity in its trading partners as a result of its consequent reduction in demand for their exports, which is one of the mechanisms by which the business cycle is transmitted from country to country. Empirical research confirms that the greater the trade linkages between countries the more coordinated are their business cycles

Globalization can also have a significant influence upon the conduct of macroeconomic policy. The Mundell–Fleming model and its extensions are often used to analyze the role of capital mobility (and it was also used by Paul Krugman to give a simple account of the Asian financial crisis Part of the increase in income inequality that has taken place within countries is attributable - in some cases - to globalization. A recent IMF report demonstrates that the increase

in inequality in the developing countries in the period 1981 to 2004 was due entirely to technological change, with globalization making a partially offsetting negative contribution, and that in the developed countries globalization and technological change were equally responsible.

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