



Faculty of Arts and Sciences – Department of Economics
ECONOMICS 211

Final Review Notes

No Appendix to Chapter 9 and No Game Theory in Chapter 14

TABLE OF CONTENTS

I- Chapter 1 – The Scope and Method of Economics5
1. Define economics.....5
2. State four reasons for studying economics.....5
3. Distinguish between the concepts of Opportunity Cost and Marginal Cost.....5
4. Define market efficiency in terms of profit opportunities.....5
5. Make clear the difference between microeconomic and macroeconomic concerns.....5
6. Distinguish between positive economics and normative economics.....5
7. Explain the value of the ceteris paribus assumption within the context of economic modeling.....6
8. Fallacy of Composition.....6
9. State and explain the four criteria used to assess the outcomes of economic policy.....6
10. Construct and interpret both graphs and linear equations.....6
11. Lexicon.....6
12. Graphics Lexicon (Appendix):.....7
II- Chapter 2 – The Economic Problem: Scarcity and Choice.....8
1. Identify the three basic economic questions.....8
2. Absolute Advantage and Comparative Advantage. Relate Comparative Advantage to the theory that individuals can gain from specialization and exchange.....8
3. Production Possibility Frontier, PPF negative slope, and why the slope depicts the concept of opportunity cost.....9
4. Explain why increasing Opportunity Costs occur and how this is shown in the PPF.....10
5. Identify ways in which economic growth may occur.....12
6. Economic Systems and the Role of Government.....12
7. Lexicon.....12
III- Chapter 3 – Demand, Supply, and Market Equilibrium.....14
1. Define and apply quantity demanded and quantity supplied, and state the law of demand and the law of supply.....14
2. Draw and interpret demand and supply graphs.....15
3. Identify the determinants of demand and supply and indicate how each must change for demand and supply to increase or decrease.....15
4. Derive market demand and market supply curves from individual demand and supply schedules.....16
5. Differentiate between a shift of a demand curve or supply curve and a movement along a curve, and depict these cases correctly on a graph.....16



6.	Provide explanations for the slope of a typical demand curve.	17
7.	Distinguish the relationship that exists between two goods that are substitutes and the relationship that exists between two goods that are complements.	17
8.	Distinguish between a good that is normal and a good that is inferior.	18
9.	Determine equilibrium price and quantity, and detail the process by which the market moves from one equilibrium situation to another when demand or supply shifts.	18
10.	Define excess demand (shortage) and excess supply (surplus) and predict their effects on the existing price level.	19
11.	Lexicon	19
IV-	Chapter 4 – Demand and Supply Applications	21
1.	Explain and demonstrate how the market uses the price-rationing mechanism to allocate resources and distribute output. 21	
2.	List non-price and price rationing policies, identify the rationale behind these, and analyze their effects.	21
3.	Explain, using words and/or diagrams, how an oil import fee would affect the domestic production and total consumption of oil. 23	
4.	Define Consumer Surplus and Producer Surplus and explain how these concepts relate to market efficiency.	23
5.	Lexicon	24
V-	Chapter 5 – Elasticity	26
1.	Define the concept of elasticity.	26
2.	Define price elasticity of demand. Interpret the terms elastic, inelastic, and unitary elasticity in the context of price elasticity of demand. Use the “percentage change” formula to measure price elasticity of demand.	26
3.	Use the midpoint formula to measure price elasticity of demand.	27
4.	Point Elasticity	28
5.	Graphic Representation:	29
6.	Predict the effect on total revenue of a price change, given the elasticity of demand. Apply the total revenue test.	30
7.	List the three determinants of price elasticity of demand and explain their effects.	30
8.	Distinguish between and calculate cross-price elasticity of demand and income elasticity of demand.	31
9.	Calculate and interpret elasticity values for the price elasticity of supply.	31
10.	IN SUMMARY:	31
11.	Lexicon	31
VI-	Chapter 6 - The Market System – Choices Made by Households and Firms	33
1.	Firm and Household Decisions	33
2.	Draw and explain the meaning of a budget constraint diagram, given price and income data. Indicate the constraints on a household’s consumption choices and relate these to the concept of the opportunity set.	33
3.	Movements of the Budget Constraint	34
4.	Distinguish between total utility and marginal utility. State the law of diminishing marginal utility.	36
5.	State the utility-maximizing rule both in words and mathematically, and analyze how the consumer would respond to disequilibrium situations.	36
6.	Explain why the concept of utility is useful in demand analysis.	36
7.	The Diamond Paradox:	36
8.	Distinguish between the income effect and the substitution effect and explain their role in the theory of household behavior. 37	
9.	Analyze the shape of the labor-supply curve using the income and substitution effects.	38
10.	Explain why indifference curves are negatively sloped and cannot intersect.	38
11.	Derive a demand curve using indifference curve analysis.	38



12.	Lexicon	39
VII-	Chapter 7 - The Production Process: The Behavior of Profit-Maximizing Firms.....	41
1.	Define economic cost and economic profit, distinguish economic profit from accounting profit, and discuss the meaning of positive, zero, and negative economic profit.	41
2.	Distinguish the short run from the long run.	43
3.	Explain how the production function relates inputs to outputs.	43
4.	State the law of diminishing returns and explain why this phenomenon occurs only in the short run. Explain the relationships between marginal, total, and average product and, given a production function graph, interpret the behavior of marginal and average product.	43
5.	Explain and, given a numerical example with prices, select the least-cost production technology for a firm.....	44
6.	Use the Isoquant-Isocost diagram to identify the optimal capital-labor mix for a given production level.	44
7.	Lexicon	47
VIII-	Chapter 8 – Short-Run Costs and Output Decisions.	48
1.	Define, distinguish, and explain the relationships among total cost, total fixed cost, and total variable cost; and among average total cost, average fixed cost, and average variable cost. Interpret cost diagrams.	48
2.	Define and graph marginal cost. Explain the shape of the marginal cost curve, using your knowledge of marginal product. Relate marginal cost to total variable cost and total cost.	48
3.	State the assumptions underlying the perfect competition model and relate these to the firm’s role as a “price taker.”	49
4.	A summary of cost concepts:	49
5.	Define marginal revenue and explain why it is constant in perfect competition.....	50
6.	State how firms determine the profit-maximizing level of output and explain why profit is maximized at that production level.	50
7.	Explain why the marginal cost curve above the AVC curve is the firm’s short-run supply curve.....	50
8.	Lexicon	51
IX-	Chapter 9 – Long Run Costs and Output Decisions	52
1.	Short-Run Condition and Long-Run Direction:.....	52
2.	Graphs!	52
3.	Long-Run Costs: Economies and Diseconomies of Scale.....	53
4.	Long-Run Adjustments to Short-Run Conditions	55
5.	Short Run Condition to Long Run Decision	56
6.	Lexicon	56
X-	Chapter 10 – Input Demand: The Labor and Land Markets	58
1.	Explain why Input Demand is a “Derived” Demand.	58
2.	Explain why inputs are simultaneously complements and substitutes.....	58
3.	Define and calculate marginal revenue product (MRP). Find the profit-maximizing hiring level for an input, given MRP and input price information. Explain why the MRP curve is identical to the input demand curve.	58
4.	Identify the factors that affect the position of an input demand curve and explain how each factor shifts the curve.	58
5.	In a world with more than one variable resource, derive and explain the factors influencing the demand curve for each input.	59
6.	Explain what is meant by the term Pure Rent and explain why it arises.	59
7.	In a world with more than one variable resource, state and interpret the conditions necessary for profit maximization.	59
8.	LEXICON	60
XI-	Chapter 13 - Monopoly and Antitrust Policy.....	61



1.	List the “perfectly competitive” assumptions that are not met by a monopolist and relate these to the features found in such a “single-seller” market.	61
2.	Define marginal revenue and explain why the monopolist’s marginal revenue decreases as output increases.	61
3.	Draw and interpret a diagram representing both the price and output choices of a profit-maximizing monopolist.	62
4.	Compare a monopolist’s performance relative to that of a perfectly competitive firm in terms of price, output, and the effect on income distribution.	63
5.	Name five types of barriers to entry. Distinguish a natural monopoly from other monopolies.	64
6.	Identify the welfare loss caused by the presence of a monopoly.	64
7.	Explain what is meant by price discrimination and discuss its effects.	65
8.	Identify the two major policy positions adopted by the government with respect to promoting/restricting competition within an industry exhibiting monopoly characteristics. Name the two government organizations charged with combating antitrust violations.	65
9.	Lexicon:	66
XII-	Chapter 14 – Oligopoly.....	68
1.	Identify the features that characterize an oligopolistic firm and industry.	68
2.	Outline the Five Forces Model and relate it to an oligopoly.	68
3.	Identify and discuss the behavioral implications of the collusion model, the Cournot model, and the price-leadership model.	69
4.	Describe ways in which an oligopolistic industry may be inefficient.	70
5.	Explain what the Herfindahl-Hirschman Index is, how it is calculated, and how it is used in antitrust matters.....	71
6.	Lexicon	71
XIII-	Chapter 15 – Monopolistic Competition	72
1.	Identify the features that characterize a monopolistically competitive firm and industry.	72
2.	Define product differentiation and explain why it occurs.....	72
3.	Explain the arguments for and against advertising.	73
4.	Interpret the graph of a profit-maximizing, monopolistically competitive firm, indicating the profit-maximizing output level and price. Explain why the monopolistically competitive firm will make only normal profits in long-run equilibrium.	74
5.	Identify and analyze the factors in monopolistic competition that cause inefficiency and resource misallocation.	74
6.	Lexicon	75



I- **Chapter 1 – The Scope and Method of Economics**

1. **Define economics.**

Economics is the study of how individuals and societies choose to use the scarce resources that nature and previous generations have provided. In a sense, economics is the “scientific study of rational choice.”

2. **State four reasons for studying economics.**

A study of economics helps one to learn a way of thinking, to understand society, to understand global affairs, and to be an informed citizen. Essential to the economic way of thinking is the concept of “opportunity cost”—choices involve forgoing some options. The best alternative that we forgo when we make a choice or a decision is the opportunity cost of that decision.

3. **Distinguish between the concepts of Opportunity Cost and Marginal Cost.**

“Marginal” is a frequently used term in economics that is important to understand right away. “Marginal” means “additional” or “extra.” “Marginal cost,” then, means “additional cost.” Suppose you buy a nonreturnable, nontransferable ticket to the zoo for \$10. This is not an additional cost. You’ve paid whether or not you visit the zoo.

If wants exceed the resources to satisfy those wants, choices must be made and some alternatives must be forgone. If you choose to visit the zoo this Saturday, the opportunity cost is the value of the activity you would have undertaken instead—that is, the next most-preferred activity. Perhaps it might be playing a round of golf or studying for a big economics test. The opportunity cost of the trip to the zoo is the value you attach to that one activity you would otherwise have chosen.

4. **Define market efficiency in terms of profit opportunities.**

The rapid elimination of profit opportunities is a signal that a market is operating efficiently. The stock market is a good example of this. If a firm’s stock is priced “too low,” increased bidding will drive the price higher, eliminating the excess profits. At a farmers’ market, Farmer Brown may charge \$1.20 for a dozen eggs, although the going rate is \$1.00. She might make excess profits for a while, but this will not persist in an efficient market. Sustained high profits indicate the presence of an inefficient market.

5. **Make clear the difference between microeconomic and macroeconomic concerns.**

THE SCOPE OF ECONOMICS:

- a) Microeconomics deals with the functioning of individual markets and industries and with the behavior of individual decision-making units: business firms and households.
- b) Macroeconomics looks at the economy as a whole. It deals with the economic behavior of aggregates-national output, national income, the overall price level, and the general rate of inflation.
- c) Economics is a broad and diverse discipline with many special fields of inquiry. These include economic history, international economics, and urban economics.

6. **Distinguish between positive economics and normative economics.**

THE METHOD OF ECONOMICS:

- a) Economics asks and attempts to answer two kinds of questions: positive and normative.
 - Positive economics attempts to understand behavior and the operation of economies without making judgments about whether the outcomes are good or bad. Positive economics is often divided into two parts. Descriptive economics involves the compilation of data that accurately describe economic facts and events. Economic theory attempts to generalize and explain what is observed. It involves statements of cause and effect-of action and reaction.
 - Normative economics looks at the results of economic behavior and asks whether they are good or bad and whether they can be improved.
- b) **Models:** An economic model is a formal statement of an economic theory. Models simplify and abstract from reality. Models and theories can be expressed in many ways. The most common ways are in words, in graphs, and in equations.



7. **Explain the value of the *ceteris paribus* assumption within the context of economic modeling.**

Economic Models are often useful to isolate the effects of one variable on another while holding "all else constant." This is the device of *ceteris paribus*. In testing the relationships between variables within a model, it is convenient to assume *ceteris paribus*: that all other variables have been held constant.

8. **Fallacy of Composition**

Because one event happens before another, the second event does not necessarily happen as a result of the first. To assume that "after" implies "because" is to commit the **fallacy of "Hoc, Ergo Propter Hoc"**

The erroneous belief that what is true for a part is necessarily true for the whole is the **Fallacy of Composition**.

An example of the fallacy of composition: One person at a football game who stands up to see a good play derives a benefit, therefore all will benefit similarly if the entire crowd stands up.

9. **State and explain the four criteria used to assess the outcomes of economic policy.**

Empirical Economics involves the collection and use of data to test economic theories. In principle, the best model is the one that yields the most accurate predictions. To make policy, one must be careful to specify criteria for making judgments. Four specific criteria are used most often in economics: Efficiency, Equity, Growth, and Stability.

10. **Construct and interpret both graphs and linear equations.**

Economic graphs depict the relationship between variables. A curve with a "rising" (positive) slope indicates that as one variable increases, so does the other. A curve with a "falling" (negative) slope indicates that as one variable increases in value, the other decreases in value. Slope is easily measured by the "rise over run" formula—the extent of vertical change divided by the extent of horizontal change.

In economics, graphs often feature financial variables like "price," "the interest rate," or "income." Usually the dependent variable is placed on the vertical axis and the independent variable on the horizontal axis. When graphing economic variables, it's a pretty safe bet that the *financial* variable will go on the vertical axis every time.

11. **Lexicon**

Ceteris Paribus	All else remaining equal. A device used to analyze the relationship between two variables while the values of other variables are held unchanged.
Descriptive Economics	The compilation of data that describe phenomena and facts.
Economic Growth	An increase in the total output of an economy.
Economic Theory	A statement or set of related statements about cause and effect, action and reaction.
Economics	The study of how individuals and societies choose how to use the scarce resources that nature and previous generations have provided.
Efficiency	In economics, "Allocative Efficiency". An efficient economy is one that produces what people want at the least possible cost.
Efficient Market	A market in which profit opportunities are eliminated almost instantaneously.
Empirical Economics	The collection and use of data to test economic theories.
Equity	Fairness
Fallacy of Composition	The erroneous belief that what is true for a part is necessarily true for the whole.
Industrial Revolution	The period in England during the late eighteenth and early nineteenth centuries in which new manufacturing technologies and improved transportation gave rise to the modern factory system and a massive movement of the population from the countryside to the cities.
Macroeconomics	The branch of economics that examines the economic behavior of aggregates, income, employment, output, and so on; all on a national scale.
Marginalism	The process of analyzing the additional or incremental costs or benefits arising from a choice or decision.
Microeconomics	The branch of economics that examines the functioning of individual industries and the behavior of individual decision-making units. That is firms and households.



Model	A formal statement of a theory. Usually a mathematical statement of a presumed relationship between two or more variables.
Normative Economics	An approach to economics that analyzes outcomes of economic behavior, evaluates them as good or bad, and may prescribe courses of action. Also called policy economics.
Ockham's razor	The principle that irrelevant detail should be cut away.
Opportunity Cost	The best alternative that we forgo, or give up, when we make a choice or a decision.
Positive Economics	An approach to economics that seeks to understand behavior and the operation of systems without making judgments. It describes what exists and how it works.
Post Hoc, Ergo Propter Hoc	Literally, "after this (in time), therefore because of this." A common error made in chinking about causation: If Event A happens before Event B, it is not necessarily true that A caused B.
Scarce	Limited
Stability	A condition in which national output is growing steadily, with low inflation and full employment of resources.
Sunk Costs	Costs that cannot be avoided because they have already been incurred.
Variable	A measure that can change from time to time or from observation to observation.

12. Graphics Lexicon (Appendix):

Cartesian Coordinate System	A common method of graphing two variables that makes use of two perpendicular lines against which the variables are plotted.
Graph	A two-dimensional representation of a set of numbers or data.
Negative Relationship	A relationship between two variables, X and Y, in which a decrease in X is associated with an increase in Y and an increase in X is associated with a decrease in Y.
Origin	On a Cartesian coordinate system, the point at which the horizontal and vertical axes intersect.
Positive Relationship	A relationship between two variables, X and Y, in which a decrease in X is associated with a decrease in Y and an increase in X is associated with an increase in Y.
Slope	A measurement that indicates whether the relationship between variables is positive or negative and how much of a response there is in Y (the variable on the vertical axis) when X (the variable on the horizontal axis) changes.
Time Series Graph	A graph illustrating how a variable changes over time.
X-Axis	On a Cartesian coordinate system, the horizontal line against which a variable is plotted.
X-Intercept	The point at which a graph intersects the X-Axis.
Y-Axis	On a Cartesian coordinate system, the vertical line against which a variable is plotted.
Y-Intercept	The point at which a graph intersects the Y-Axis.



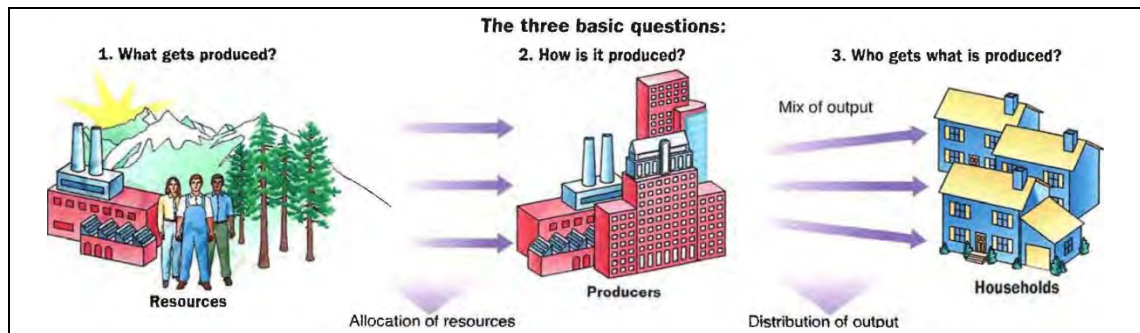
II- Chapter 2 – The Economic Problem: Scarcity and Choice

1. Identify the three basic economic questions.

Every society has some system or process for transforming into useful form what nature and previous generations have provided. Economics is the study of that process and its outcomes.

Producers are those who take resources and transform them into usable products, or outputs. Private firms, households, and governments all produce something.

All societies must answer three basic questions: What gets produced? How is it produced? Who gets what is produced? These three questions make up the Economic Problem.



In a complex society, the opportunity to cooperate and specialize offers great scope for increased production—but decisions must be made regarding the extent of cooperation, who specializes in what, and how goods are distributed. Even Robinson Crusoe and Friday on their hypothetical island must come up with answers to these questions. Wants are limitless, but resources are scarce. We are compelled to make choices. When a society consists of more than one person, questions of distribution, cooperation, and specialization arise.

Because resources are scarce relative to human wants in all societies, using resources to produce one good or service implies not using them to produce something else. This concept of Opportunity Cost is central to an understanding of economics. Constrained choice occurs, for example, when you go to the grocery store with only a \$20 bill in your pocket—you have to make choices based on this limitation. Unconstrained choice would be if you were allowed to take as many groceries home as you wanted, free of charge. Sadly, though, we know there's "no such thing as a free lunch."

Practical examples of the consequences and costs of choice include: present vs. future benefits (do you study hard now so that at exam time reviewing is easier, or do you take it easy now and sweat it before the exam?), and capital vs. consumer production (should we produce taxicabs or sports cars?). Using resources to produce capital that will in turn produce benefits in the future implies not using those resources to produce consumer goods in the present.

To calculate opportunity cost, use the "give up to get" approach. If you can determine what (next-best) choice was forgone to get your preferred selection, you have determined opportunity cost. This is most clearly seen as a movement along a production possibility frontier.

2. Absolute Advantage and Comparative Advantage. Relate Comparative Advantage to the theory that individuals can gain from specialization and exchange.

A producer has an absolute advantage in the production of Good A if, compared with another producer, he can produce Good A more efficiently. For example, a producer making 10 tables an hour has an absolute advantage over another who makes only 8 an hour.

A producer has a comparative advantage in the production of Good A if, compared with another producer, he can produce Good A at a lower opportunity cost. Here, we mean that a producer can produce Good A while giving up less in terms of production of Good B. If one producer can make 10 tables an hour AND 20 chairs an hour simultaneously, he has a comparative advantage in the production of tables over another producer who can make 10 tables an hour BUT ONLY 15 chairs an hour simultaneously.

Specialization and trade based on comparative advantage lets each participant achieve a higher consumption level than would otherwise be possible. Each participant can live outside the constraints of his own production opportunities.

Even if one individual or nation is absolutely more efficient at producing goods than another, all parties will gain if they specialize in producing goods in which they have a comparative advantage.



Comparative advantage hinges on the concept of opportunity cost. The producer (person, firm, or country) with the lowest opportunity cost holds the comparative advantage in that product. Don't be misled—it is irrelevant to comparative advantage whether or not the producer can produce more of the good. The issue revolves around the relative opportunity costs. The increased production could be traded. In terms of a production possibility diagram, trade will be advantageous if the diagrams have differing slopes because differing slopes indicate differing opportunity costs.

Think back to when you used to trade baseball or Pokémon cards in the schoolyard. Why did you trade? Did you and your trading partner necessarily benefit equally? Should that matter? Presumably, if you entered into a trade voluntarily, you did so because you thought it would be beneficial for you. Perhaps you traded a duplicate card for one you didn't have. Likewise, your partner approached the deal in the same way. Just because you got a good deal didn't necessarily mean that s/he got a bad deal—both traders could gain, although there's no requirement that the traders will gain equally.

3. Production Possibility Frontier, PPF negative slope, and why the slope depicts the concept of opportunity cost.

A Production Possibility Frontier (PPF) is a graph that shows all the combinations of goods and services that can be produced if all of society's resources are used efficiently. The PPF illustrates a number of important economic concepts: Scarcity, Unemployment, Inefficiency, Increasing Opportunity Cost, and Economic Growth.

A Production Possibility Frontier depicts the boundary between possible and impossible (unattainable) levels of production. Employing resources for one use prevents them from being employed for other uses—there is an opportunity cost involved in the choice. The production possibility frontier graphically portrays the opportunity cost of transferring resources from one activity to another in a two-good environment. If all resources are fully employed, as more of Good A is produced, fewer resources are available to produce Good B.

Along the production possibility frontier, trade-offs exist because the economy has only a limited quantity of resources to allocate between competing uses. The PPF slopes downward because “the more you get of one thing the less you get of the other.” The more you study economics, the less time you have for other activities. The opportunity cost of an extra hour of studying economics is the value of an hour of other activities.

a) Graphing Pointers:

Draw a graph with “study time per day” on the horizontal (X) axis and “time for all other activities per day” on the vertical (Y) axis. As you increase “study time” you must reduce “other time.” Graphically, the cost of one hour of study time (the lost time for other activities) is the (negative) change in Y divided by the (positive) change in X. The slope of the PPF is the geometric representation of the opportunity cost of transferring resources from one productive activity to another.

When drawing a production possibility frontier, remember that the frontier extends all the way from the vertical axis to the horizontal axis. It is a mistake to leave the frontier unconnected to the axes. If the frontier is not connected, it implies that an infinitely large quantity of either good could be produced, which is the exact opposite message that the diagram is intended to give.

The production possibility frontier shows all the combinations of two goods that can be produced when all resources are employed efficiently. Points inside the production possibility frontier (between the origin and the PPF) represent unemployment and/or inefficiency whereas points outside are currently unattainable.

b) Growth:

An outward movement of the production possibility frontier represents growth. Growth occurs if more resources become available or if existing resources become more productive (e.g., through better education, more efficient techniques of production, or technological innovations).

c) Production Efficiency and Output Efficiency:

The vision of a great volume of production with all resources employed is attractive. For this reason, it's often difficult to understand that, in serving the needs of consumers, producing the right goods is more important than mere quantity. This distinction lies at the heart of most confusion about production and output efficiency. Consider a remote Inuit economy that is fully employed producing refrigerators. Would it be “better” (more efficient) for the Inuits to have some unemployment but be producing warm clothing? Turning out (unwanted) refrigerators is productively efficient, whereas making warm clothing is efficient (in terms of output). Ideally, you'd want to be on the production possibility frontier (output efficiency) and also producing the most desired mix of output.



d) **LEARNING TIPS:**

- Think of the production possibility frontier as a way to depict opportunity cost and constrained choice. In general, you want to be somewhere on the curve because otherwise you're losing production, which is inefficient. Production on the curve means that resources are being used to the maximum (no unemployment). However, the inefficiency of a mismatch between an "efficient" production mix and society's needs is easily explained—just because we're producing "on the line" doesn't mean we're meeting society's needs as effectively as possible. Employing all our resources to produce taxicabs, for example, is unlikely to be desirable!
- Suppose that, at one point on the production possibility frontier, we can produce 16 cars and 5 pickups, and at another point, we can produce 12 cars and 7 pickups. Note that the opportunity cost is calculated by looking at the change in production levels—2 extra trucks cost 4 cars.
- Reducing unemployment does not shift the production possibility frontier. Remember the underlying assumptions! The production possibility frontier is drawn given a set of resources (whether or not those resources are being used). Unemployment represents a situation where the resources are not fully utilized. If unemployment is reduced, the economy moves closer to the production possibility frontier.

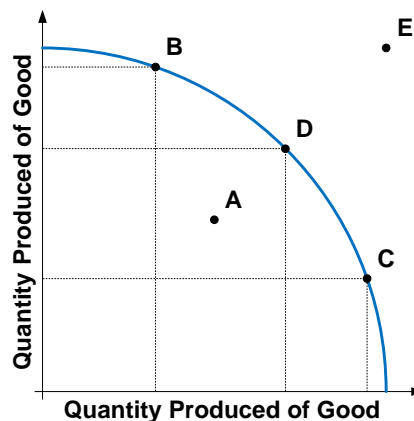
4. **Explain why increasing Opportunity Costs occur and how this is shown in the PPF.**

Increasing opportunity costs are present when the production possibility frontier bulges outwards from the origin. Increasing costs occur if resources are not equally well suited to the production of Good A and Good B.

The geometry of the production possibility frontier flows from its economics. A bowed-out production possibility frontier indicates that the opportunity cost (marginal rate of transformation) is increasing as resources become more heavily allocated to the production of one good. That bowed-out shape occurs because of the imperfect adaptability of resources to different uses.

A farmer wishing to produce dairy products, for example, will select the best-suited resources first, and production will increase sharply. Further increases will be less easy to achieve and more expensive in terms of lost production of other goods, as resources more suited to other endeavors are pressed into dairy service. If all resources were identical in their productive abilities, the opportunity cost of reallocation would be constant, and the production possibility frontier would be a straight line (a constant slope).

a) **More on the PPF**



A PPF shows all possible combinations of two goods that can be produced simultaneously during a given period of time, *ceteris paribus*. Commonly, it takes the form of the curve above. For an economy to increase the quantity of one good produced, production of the other good must be sacrificed. Here, Good X production must be sacrificed in order to produce more of Good Y. PPFs represent how much of the latter must be sacrificed for a given increase in production of the former.

For example, assume that the supply of the economy's factors of production does not change over time, in order to produce more of X, producing Y needs to be sacrificed. If production is efficient, the economy can choose between combinations (i.e. points) on the PPF: B if good Y is of interest, C if more of X is needed, D if an equal mix of X and Y is required.



In the PPF, all points *on* the curve are points of maximum productive efficiency (i.e., no more output can be achieved from the given inputs); all points inside the frontier (such as A) can be produced but productively *inefficient*; all points outside the curve (such as E) cannot be produced with the given, existing resources.

b) **Opportunity cost and the PPF**



Increasing X from A to B carries little opportunity cost, but from C to D the cost is great

If there is no increase in productive resources, increasing production of a first good entails decreasing production of a second, because resources must be transferred to the first and away from the second. Points along the curve describe the trade-off between the goods. The sacrifice in the production of the second good is called the *opportunity cost* (because increasing production of the first good entails losing the opportunity to produce some amount of the second). Opportunity cost is measured in the number of units of the second good forgone for one or more units of the first good.

In the context of a PPF, opportunity cost is directly related to the shape of the curve. If the shape of the PPF curve is straight-line, the opportunity cost is constant as production of different goods is changing. But, opportunity cost usually will vary depending on the start and end point. In the diagram above, producing 10 more packets of X, at a low level of X production, costs the opportunity of 5 Y (as with a movement from A to B). At point C, the economy is already close to its maximum potential X output. To produce 10 more X, 18.5 Y must be sacrificed (as with a movement from C to D). The ratio of opportunity costs is determined by the *marginal rate of transformation*.

c) **Marginal Rate of Transformation**



The slope of the production–possibility frontier (PPF) at any given point is called the marginal rate of transformation (MRT). The slope defines the rate at which production of one good can be redirected (by re-allocation of production resources) into production of the other. It is also called the **marginal** opportunity cost of a commodity, that is, it is the opportunity cost of X in terms of Y **at the margin**. It measures how much of



good Y is given up for one more unit of good X or vice versa. The shape of a PPF is commonly drawn as concave from the origin to represent increasing opportunity cost with increased output of a good. Thus, MRT increases in absolute size as one moves from the top left of the PPF to the bottom right of the PPF.

The marginal rate of transformation can be expressed in terms of either commodity. The marginal opportunity cost of X in terms of Y is simply the reciprocal of the marginal opportunity cost of Y in terms of X. If, for example, the (absolute) slope at point B in the diagram is equal to 2, then, in order to produce one more unit of X, the production of 2 units of Y must be sacrificed. If at A, the marginal opportunity cost of X in terms of Y is equal to 0.25, then, the sacrifice of one unit of Y could produce four units of X, and the opportunity cost of Y in terms of X is 4.

5. Identify ways in which economic growth may occur.

Economic growth occurs when society produces more, either by acquiring more resources or by learning to produce more with existing resources. Improved productivity may come from additional capital or from the discovery and application of new, more efficient techniques of production.

Investment and Capital: “Investment” and “capital” are two terms with very specific meanings in economics. Beware! Investing doesn’t just mean buying something. To an economist, investing means only the creation of capital. What, then, is capital? Capital refers to tangible or intangible resources usable in the production of other goods and services. A hammer is capital; a share of GM stock is not. A carpenter’s skill is capital; a dollar bill is not. Buying a hammer or training to be a carpenter is capital investment; buying GM stock is not!

If this capital/noncapital distinction gives you problems, ask yourself if the purchase of the item in question increases the economy’s ability to produce. If it does, then it’s an investment in capital.

6. Economic Systems and the Role of Government

A market is an institution through which buyers and sellers interact and engage in exchange. Some markets involve simple face-to-face exchange; others involve a complex series of transactions, often over great distances or through electronic means.

The two “pure” types of economic systems are the command economy and the laissez-faire economy:

- a) A command (planned) economy has a central government agency that sets production targets, income, and prices, and finds answers for the three basic questions.
- b) In a laissez-faire (market) economy, the three basic questions are answered through the operation of individual buyers and sellers following their own self-interest in markets. In an unregulated (free enterprise) market, profit-seeking producers respond to the preferences of consumers, while the distribution of output, income, and wealth is dictated by competitive forces.

More or less government intervention is felt to be necessary to correct laissez-faire “mistakes” such as an excessive inequality in the distribution of income, and periodic spells of unemployment or inflation. Individual enterprise, independent choice, and relatively free markets exist in centrally planned economics; there is significant government involvement in market economies such as that of the United States.

One of the great debates in economics revolves around the tension between the advantages of free, unregulated markets and the desire for government involvement in the economy. Free markets produce what people want, and competition forces firms to adopt efficient production techniques. The need for government intervention arises because free markets are characterized by inefficiencies and an unequal distribution of income, and experience regular periods of inflation and unemployment.

7. Lexicon

Absolute Advantage	A producer has an absolute advantage over another in the production of a good or service if he or she can produce that product using fewer resources.
Capital	Things that are produced and then used in the production of other goods and services.
Command Economy	An economy in which a central government either directly or indirectly sets output targets, incomes, or prices.



Comparative Advantage (and Theory of)	A producer has a comparative advantage over another in the production of a good or service if he or she can produce that product at a lower opportunity cost. The Theory of Comparative Advantage: David Ricardo, a major nineteenth century British economist, formalized the point precisely. Ricardo's theorized that specialization and free trade will benefit all trading parties, even those that may be "absolutely" more efficient producers.
Consumer Goods	Goods produced for present consumption.
Consumer Sovereignty	The idea that consumers ultimately dictate what will be produced (or not produced) by choosing what to purchase (and what not to purchase).
Economic Growth	An increase in the total output of an economy. It occurs when a society acquires new resources or when it learns to produce more using existing resources.
Factors of Production (or Factors)	The inputs into the process of production. Another term for resources.
Free Enterprise	The freedom of individuals to start and operate private businesses in search of profits.
Inputs (or Resources)	Anything provided by nature or previous generations that can be used directly or indirectly to satisfy human wants.
Investment	The process of using resources to produce new capital.
Laissez-Faire Economy	Literally from the French: "allow [them] to do". An economy in which individual people and firms pursue their own self-interest without any central direction or regulation.
Marginal Rate of Transformation (MRT)	The slope of the Production Possibility Frontier (PPF).
Market	The institution through which buyers and sellers interact and engage in exchange.
Opportunity Costs	The best alternative that we give up, or forgo, when we make a choice or decision.
Outputs	Goods and services of value to households.
Production	The process that transforms scarce resources into useful goods and services.
Production Possibility Frontier (PPF)	A graph that shows all the combinations of goods and services that can be produced if all of society's resources are used efficiently.



III- Chapter 3 – Demand, Supply, and Market Equilibrium

1. **Define and apply quantity demanded and quantity supplied, and state the law of demand and the law of supply.**

In societies with many people, production must satisfy wide-ranging tastes and preferences, and producers must therefore specialize.

a) **Firms and Households: The Basic Decision-Making Units**

- A firm exists when a person or a group of people decides to produce a product or products by transforming resources, or inputs, into outputs – the products that are sold in the market.
- Firms are the primary producing units in a market economy. We assume that firms make decisions to try to maximize profits.
- Households are the primary consuming units in an economy. All households' incomes are subject to constraints.

b) **Input Markets and Output Markets – The Circular Flow**

Households and firms interact in two basic kinds of markets: product or output markets and input or factor markets. Goods and services intended for use by households are exchanged in output markets. In output markets, competing firms supply and competing households demand. In input markets, competing firms demand and competing households supply.

Ultimately, firms choose the quantities and character of outputs produced, the types and quantities of inputs demanded, and the technologies used in production. Households choose the types and quantities of products demanded and the types and quantities of inputs supplied.

c) **Demand in Product/Output Markets**

The quantity demanded of an individual product by an individual household depends on:

- Price;
- Income;
- Wealth;
- Prices of other products;
- Tastes and preferences; and
- Expectations about the future.

Quantity demanded is the amount of a product that an individual household would buy in a given period if it could buy all that it wanted at the current price.

d) **Supply in Product/Output Markets**

Quantity supplied by a firm depends on:

- The price of the good or service;
- The cost of producing the product, which includes the prices of required inputs and the technologies that can be used to produce the product; and
- The prices of related products.

Quantity supplied is the amount of a product that a firm would be willing and able to offer for sale at a particular price during a given time period.

e) **Law of Demand**

The *law of demand* states that there is a negative relationship between the price and the quantity demanded of a product. When the price of McDonald's fries increases, we buy less.

f) **Law of Supply**

The *law of supply* states that there is a positive relationship between the price and the quantity supplied of a product. When McDonald's raises its hourly wage, it attracts more job applicants.



2. **Draw and interpret demand and supply graphs.**

- a) A demand schedule is a table showing how much of a given product households would be willing and able to buy at different prices in a given time period; a demand curve shows this relationship graphically. Demand curves slope downward.

All demand curves eventually intersect the price axis because there is always a price above which a household cannot or will not pay. Also, all demand curves eventually intersect the quantity axis because demand for most goods is limited, if only by time, even at a zero price.

- b) A supply schedule is a table listing how much of a product a firm will supply at alternative prices in a given time period; a supply curve, shows this relationship graphically. Supply curves slope upward.

Note: Demand and supply graphs always have price on the vertical axis and quantity (demanded or supplied, as appropriate) on the horizontal axis. It is a bad (though common) mistake to reverse the variables. A demand curve slopes down to the right; a supply curve slopes up to the right. In diagrams where there are several curves, clear, consistent labeling is critical.

3. **Identify the determinants of demand and supply and indicate how each must change for demand and supply to increase or decrease.**

a) **Demand and Quantity Demanded:**

The willingness and ability of a household to buy units of a good during a given time period (quantity demanded) are likely to depend principally on the price of the good itself. Other factors—including the household's income and wealth, the prices of other products, tastes and preferences, and expectations about price, income, and wealth—will influence demand.

When analyzing the impact of change in a determinant on demand and supply curves, a golden rule to remember is that each curve shifts no more than once for any such change. The market price is changed by shifts in the demand and supply curves, but the demand and supply curves are not changed by shifts in the market price.

Again: a change in price does not cause the demand curve or the supply curve to shift position!

Simply put, **Quantity Demanded** is a unique number showing the quantity that a consumer would purchase of a particular product at a particular market price (Q_p, P) – It's a point on the demand curve. The **Demand** is the total set of individual points of quantity demanded at each different price: $\{(Q_{p1}, P_1) ; (Q_{p2}, P_2) ; \dots \dots \dots ; (Q_{pn}, P_n)\}$ – This is the demand curve.

b) **Factors that can cause a change (shift) in demand are:**

- Income
- Wealth
- Prices of related products
- Tastes or preferences of the household
- Expectations

Increases in income and wealth, improved preferences, or expectations of a higher price, income, or wealth will increase demand for normal goods. An increase in the price of a substitute product or a decrease in the price of a complementary product will also increase demand, i.e., the entire demand curve shifts to the right.

c) **Learning Tip - Demand:**

When shifting the demand curve, you might naturally associate “rise” and “fall” with a vertical shift. This causes no problems in the case of demand, and you'd expect to be correct in using the same approach in the case of supply—but you'd be wrong! A vertical shift up in supply is a decrease in supply. When shifting the demand or supply curve, think in terms of the curve sliding left for a decrease (demand less or supply less) and right for an increase (demand more or supply more), not up and down.

Do “thought experiments.” Pick a good that you buy frequently (preferably a name brand), such as Exxon gasoline. How would you react if Exxon hiked the price of its gas? If your income fell? If the price of engine oil (a complement) increased? If the price of Chevron gas (a substitute) decreased?



d) **Supply and Quantity Supplied:**

The decision to supply is affected by the ability to earn profits (the difference between revenues and costs). The willingness and ability of a firm to offer units of a good for sale during a given time period (quantity supplied) are likely to depend mainly on the price of the good itself. If other factors important to producers change, then the supply curve diagram will change. The supply curve shifts position—a change in supply.

e) **Factors that can cause a change in supply are:**

- Changes in costs of production (input prices)
- New costs and market opportunities
- Changes in prices of related products

Improvements in technology, decreases in the costs of inputs and other costs of production, or increases in the price of complementary products, will increase supply. Decreases in the price of substitute products will also increase supply, i.e., the entire supply curve will shift to the right.

The Prices of Related Products: Firms often react to changes in the prices of related products. For example, if land can be used for either corn or soybean production, an increase in soybean prices may cause individual farmers to shift acreage out of corn production into soybeans (and vice-versa). Thus, an increase in soybean prices actually affects the amount of corn supplied. Similarly, if beef prices rise, producers may respond by raising more cattle. However, leather comes from cowhide. Thus, an increase in beef prices may actually increase the supply of leather.

f) **Learning Tip – Supply**

When considering if a given factor will cause supply to increase or decrease, ask “Will this change increase or decrease profits?” Producers will want to supply more if their profits are rising—so, if the answer to the question is “increase profits,” you should predict an increase (rightward shift) in supply.

g) **Learning Tip – Overall**

Keep these lists of factors that can change demand or supply in a place very close to your heart! Write them on an index card and review them frequently.

When you are told to imagine that income or some other variable has changed, imagine an enormous change—this will help you work out the effects. If a can of Pepsi has risen in price—suppose that it has tripled in price—it’s easier to see what will happen to the quantity of Pepsi demanded or supplied and to the demand for Coke.

4. **Derive market demand and market supply curves from individual demand and supply schedules.**

Market demand is the sum of all the quantities of a good or service demanded per period by all the households buying in the market for that good or service. The *market demand curve* is a summing of all the individual demand curves. At a given price level, the quantity demanded by each household is determined and the total quantity demanded is calculated.

The *market supply curve* is a horizontal summing of all the supply curves for the product.

5. **Differentiate between a shift of a demand curve or supply curve and a movement along a curve, and depict these cases correctly on a graph.**

It is very important to distinguish between movements along demand and supply curves and shifts of demand and supply curves. The demand curve shows the relationship between price and quantity demanded. The supply curve shows the relationship between price and quantity supplied. A change in price is a movement along the curve. Changes in tastes, income, wealth, expectations, or prices of other goods and services cause demand curves to shift; changes in costs, input prices, technology, or prices of related goods and services cause supply curves to shift. This is called a change in demand or a change in supply to distinguish it from a movement along the demand curve or the supply curve, which represent a change in quantity demanded or quantity supplied and can be caused only by a change in the price of the commodity.

a) **Graphing Pointer: Changes in Quantity Demanded (Supplied) vs. Changes in Demand (Supply)**

Most students experience confusion regarding the distinction between a “change in quantity demanded” and a “change in demand.” The distinction is rather artificial; the factors that affect demand include the price of the product. However, we regard the price-quantity demanded relationship as the most important and draw



the demand curve with these two variables on the axes, assuming that all other factors are fixed at a “given” level. This is the *ceteris paribus* assumption.

Look at a demand curve; price and quantity demanded can have a range of values whereas all other factors (income, other prices, etc.) are fixed at a particular level. If price changes, we move along the curve; if another factor changes, our *ceteris paribus* assumption is broken, and we must redraw the price-quantity demanded relationship.

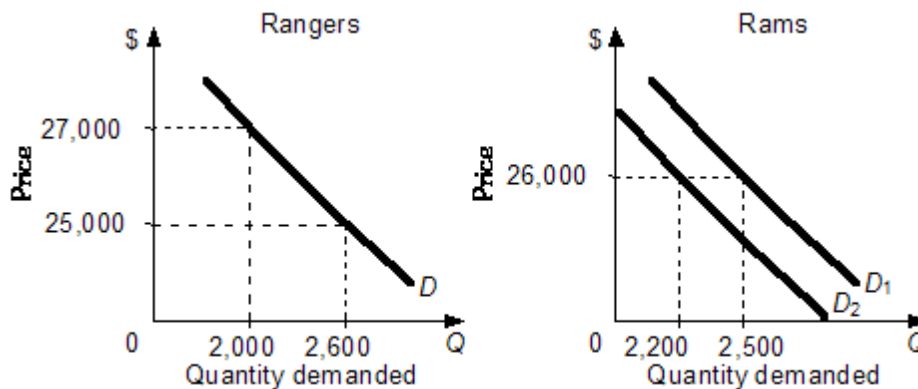
The only thing that can cause a “change in the quantity demanded” of Pepsi is a change in the price of Pepsi—a movement from one point on the demand curve to another point on the same demand curve.

If any other factor on the list changes, we will have to redraw the entire diagram—a “change in demand”—because the “all else being equal” assumption has been broken.

Similarly, a “change in the quantity supplied” of chicken can only be caused by a change in the price of chicken. A change in any other factor causes a “change in supply.”

b) Example:

Here is an example that points up the difference between a “change in quantity demanded” and a “change in demand.” In the following diagram, we have a demand curve for Ford Rangers on the left and a demand curve for Dodge Rams on the right.



Initially, the price of the Ranger is \$27,000, and 2,000 are demanded per week. The Ram sells for \$26,000 and has 2,500 demanders at that price. (Note: It’s irrelevant whether the Ram’s price is above, below or equal to that of the Ranger—at any realistic price, each truck will have some enthusiasts.)

Suppose that the price of Rangers decreases to \$25,000. More truck buyers will order Rangers—an increase in quantity demanded, as there is a movement along the demand curve. Some of those new Ford customers would have bought the Dodge Ram, but now will not. At the same price (\$26,000) as before, demand for Rams has decreased, perhaps to 2,200. The entire demand curve for Rams has shifted.

6. Provide explanations for the slope of a typical demand curve.

Demand curves slope down—as price rises, quantity demanded falls. We know this intuitively, but economists have explored this important “social law” more analytically. The higher the price of a good, lowfat milk, for instance, the higher the opportunity cost of buying it (i.e., the more of other goods we will give up, and the less willing we are to buy lowfat milk).

Utility is a conceptual measure of satisfaction. Successive units of a good bestow satisfaction, but typically at a decreasing rate—the second cup of coffee may be less enjoyable than the first. Accordingly, the price we are willing to pay will decrease.

7. Distinguish the relationship that exists between two goods that are substitutes and the relationship that exists between two goods that are complements.

If a rise in the price of good X causes demand for good Y to increase, the goods are substitutes. If a rise in the price of X causes demand for Y to fall, the goods are complements.

Substitutes are used in place of each other, complements are used together. Here are a few examples:

- **Substitutes:** Coke and Pepsi, Exxon gasoline and BP gasoline, phone calls and e-mail.



- **Complements:** peanut butter and jelly, CDs and CD players, cars and gasoline, cameras and film, left and right shoes.

8. **Distinguish between a good that is normal and a good that is inferior.**

When an increase in income causes demand for a good to rise, that good is a normal good. When an increase in income causes demand for a good to fall, that good is an inferior good.

Here are some examples:

- **Normal goods:** movie tickets, steak, restaurant meals, imported beers.
- **Inferior goods:** second-hand clothes, store-brand (versus name-brand) foods, generic medicines, rice, beans, bus rides.

9. **Determine equilibrium price and quantity, and detail the process by which the market moves from one equilibrium situation to another when demand or supply shifts.**

In the market for a particular good or service, quantity demanded may be greater than, less than, or equal to quantity supplied. *Equilibrium* occurs when quantity demanded equals quantity supplied. There is no tendency for the price to change because, at that price, there is a perfect match between the quantity of the good demanded and the quantity supplied.

a) **Equilibrium.**

The simple, less analytical, way to think about this concept is as “the point where the lines cross.” It will help your understanding if you remember that equilibrium is the “balance” situation in which there is no tendency for change—unless some outside factor intervenes.

b) **Changes in Equilibrium Price and Quantity.**

Demand and supply may change position simultaneously. If the magnitudes of the shifts are unknown, then the effect either on equilibrium price or on equilibrium quantity *must* be uncertain. It’s easy to forget this important fact. If demand and supply change position simultaneously, break down the situation into two separate graphs, one for the “demand shift” and the other for the “supply shift.” In each case, decide the direction of change in price and quantity, and then add them together

c) **Example: Demand Decreases and Supply Increases**

	Price Change	Quantity Change
Demand-side effect	Decrease	Decrease
Supply-side effect	Decrease	Increase
Total effect	Decrease	Uncertain

In this case, where demand decreases and supply increases, we predict a certain decrease in price and an uncertain change in equilibrium quantity.

d) **Practice Example:**

Following a severe drought, Australian wool production slumped to record low levels. Wool prices surged to a 15-year peak. What do you think is the effect of the price surge of wool on the market for cotton, a substitute fiber?

- As garment producers switch from wool to cotton, they cause the demand for cotton to increase, resulting in a boost in the price of cotton.

e) **Practice Example:**

During the first few months of 2008, corn prices rose throughout the world. Was this caused by cutbacks in supply or increases in demand? Background: Over the two previous years, major corn-growing regions had experienced poor weather conditions, the Chinese economy was experiencing increased affluence, and there had been a push by environmentally conscious governments to produce more ethanol (an oil substitute that uses corn). Given these facts, how would you analyze the changes in the corn market?

- There were changes in both supply and demand. The poor growing conditions reduced supply while increasing affluence expanded the demand for corn (a normal good). At the same time, the demand for corn used to produce ethanol increased, which reduced the amount available for food production.



f) **Practice Example:**

In the summer of 2008, gas prices were hovering around \$4.00 per gallon and President Bush appealed to Saudi Arabia to increase the supply of oil in order to reduce pressure on gas prices at the pumps. His point was that restricted supply had forced up prices. The Saudi response, in summary, was “There is no shortage of oil. World oil prices are responding as they should to the increase in demand.” However, the Law of Demand states that rising prices should reduce the amount of a good demanded. First, is there some inconsistency here in the Law of Demand?

Following this, can you analyze who was correct about the oil market in 2008, President Bush or the Saudi Oil Ministry?

- There’s no contradiction of the Law of Demand. In fact, as prices rose in the United States, oil consumption fell, as we should expect.
- On the second point, both parties are correct. An increase in supply would have slowed or, perhaps, reversed the rise in oil prices, as President Bush argued. However, the main cause of rising oil prices was the worldwide increase in demand. The Saudis were correct—the market was seeking to “compete away” excess demand by raising prices. If a market is in equilibrium there is no shortage.

10. **Define excess demand (shortage) and excess supply (surplus) and predict their effects on the existing price level.**

If the quantity demanded of a good is greater than the quantity supplied, there is *excess demand* (shortage). We would expect the price of the good to rise. If quantity supplied is greater than the quantity demanded of a good, there is an *excess supply* (surplus), and we would expect the price of the good to fall. In general, a shortage of supply means prices are below equilibrium, and a surplus means prices are above equilibrium.

11. **Lexicon**

Capital Market	The input/ factor market in which households supply their savings, for interest or for claims to future profits, to firms that demand funds to buy capital goods.
Complements (or Complementary Goods)	Goods that “go together”; a decrease in the price of one results in an increase in demand for the other and vice versa.
Demand Curve	A graph illustrating how much of a given product a household would be willing to buy at different prices.
Demand Schedule	A table showing how much of a given product a household would be willing to buy at different prices.
Entrepreneur	A person who organizes, manages, and assumes the risks of a firm taking a new idea or a new product and turning it in to a successful business.
Equilibrium	The condition that exists when quantity supplied and quantity demanded are equal. At equilibrium, there is no tendency for price to change.
Excess Demand or Shortage	The condition that exists when quantity demanded exceeds quantity supplied at the current price.
Excess Supply or Surplus	The condition that exists when quantity supplied exceeds quantity demanded at the current price.
Factors of Production	The inputs into the production process – land, labor, and capital – are the three key factors of production.
Firm	An organization that transforms resources (inputs) into products (outputs). Firms are the primary producing units in a market economy.
Households	The consuming units in an economy.
Income	The sum of all a household's wages, salaries, profits, interest payments, rents, and other forms of earnings in a given period of time. It is a flow measure.
Inferior Goods	Goods for which demand tends to fall when income rises.
Input or Factor Markets	The markets in which the resources used to produce goods and services are exchanged.
Labor Market	The input/ factor market in which households supply work for wages to firms that demand labor.



Land Market	The input/factor market in which households supply land or other real property in exchange for rent.
Law of Demand	The negative relationship between price and quantity demanded: As price rises, quantity demanded decreases; as price falls, quantity demanded increases.
Law of Supply	The positive relationship between price and quantity of a good supplied: An increase in market price will lead to an increase in quantity supplied, and a decrease in market price will lead to a decrease in quantity supplied.
Market Demand	The sum of all the quantities of a good or service demanded per period by all the households buying in the market for that good or service.
Market Supply	The sum of all that is supplied each period by all producers of a single product.
Movement along a Demand Curve	The change in quantity demanded brought about by a change in price.
Movement along a Supply Curve	The change in quantity supplied brought about by a change in price.
Normal Goods	Goods for which demand goes up when income is higher and for which demand goes down when income is lower.
Perfect Substitute	Identical products.
Product or Output Markets	The markets in which goods and services are exchanged.
Profit	The difference between revenues and costs.
Quantity Demanded	The amount (number of units) of a product that a household would buy in a given period if it could buy all it wanted at the current market price.
Quantity Supplied	The amount of a particular product that a firm would be willing and able to offer for sale at a particular price during a given time period.
Shift of a Demand Curve	The change that takes place in a demand curve corresponding to a new relationship between quantity demanded of a good and price of that good. The shift is brought about by a change in the original conditions.
Shift of a Supply Curve	The change that takes place in a supply curve corresponding to a new relationship between quantity supplied of a good and the price of that good. The shift is brought about by a change in the original conditions.
Substitutes	Goods that can serve as replacements for one another; when the price of one increases, demand for the other increases.
Supply Curve	A graph illustrating how much of a product a firm will sell at different prices.
Supply Schedule	A table showing how much of a product firms will sell at alternative prices.
Wealth or Net Worth	The total value of what a household owns minus what it owes. It is a stock measure.



IV- Chapter 4 – Demand and Supply Applications

1. Explain and demonstrate how the market uses the price-rationing mechanism to allocate resources and distribute output.

In a market economy, the market system (or price system) serves two functions. It determines the allocation of resources among producers and the final mix of outputs. It also distributes goods and services on the basis of willingness and ability to pay. In this sense, it serves as a *price rationing* device.

Price rationing distinguishes those who are “willing and able” to buy from those who are only able but no longer willing, i.e., it allocates according to the willingness and ability of consumers to pay—those who are willing and able to pay as the price increases will continue to get the good. Demand is constrained by income and wealth but, within those limits, individual preferences will prevail. If demand increases, price rises, signaling producers that profit may be made. More of the good is produced, with resources being switched from other lines of production.

Note, too, that the profit motive is highly durable. Limitations (such as price ceilings or rationing) placed on the operation of the market can lead to black markets so that demand can continue to be serviced.

2. List non-price and price rationing policies, identify the rationale behind these, and analyze their effects.

a) Non-Price Rationing:

Governments as well as private firms sometimes decide not to use the market system to ration an item for which there is excess demand. Examples of non-price rationing systems include queuing, favored customers, and ration coupons. The most common rationale for such policies is “fairness.”

Attempts to bypass the market and use alternative non-price rationing devices are more difficult and costly than it would seem at first glance. Schemes that open up opportunities for favored customers, black markets, and side payments often end up less “fair” than the free market.

Rationing by price may be considered “unfair”—poor people might be priced out of the market for some essentials—so other non-price rationing methods, including queuing, ration coupons, favored customers, and lotteries, are applied. Such schemes usually involve hidden costs (queuing costs time, for example) that may make them inefficient. Note that different types of rationing benefit different groups of people.

At many colleges, basketball tickets are distributed on a first-come, first-served basis—meaning that students must queue, perhaps for days, to get tickets to the big game. Not-so-hidden costs include the inconvenience, loss of study time, and possible negative health effects. As an example of a lottery, colleges may allocate dorm rooms, not by price or need, but by random number selection.

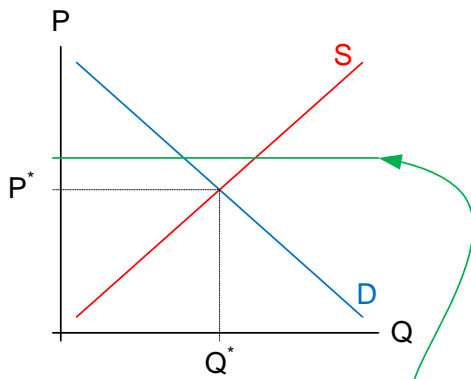
b) Price Ceilings and Floors:

A price ceiling sets a maximum price; a price floor sets a minimum price. The minimum wage is a price floor. An effective price ceiling creates a shortage; an effective price floor creates a surplus.

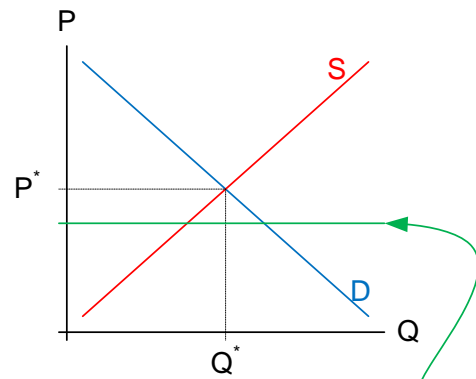
Remember that a price ceiling stops the price going higher (just like a ceiling in a room), whereas a price floor is a lower limit. To have an effect on equilibrium price, a ceiling must be set *below* the equilibrium price and a floor must be set *above* the equilibrium price.

For instance, adjustable rate mortgages have “caps” on how high the interest rate can move in response to market conditions—this is a price ceiling.

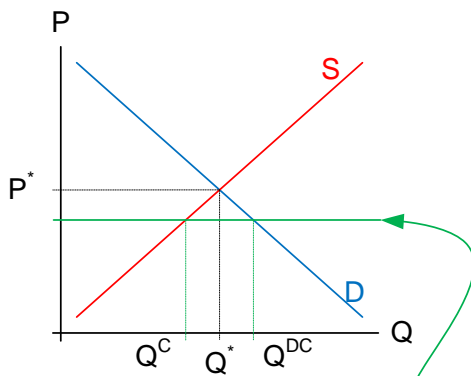
A price ceiling below equilibrium hampers supply and creates a shortage (excess demand). On the other hand, a price floor above equilibrium would hamper demand and create a surplus (excess supply).



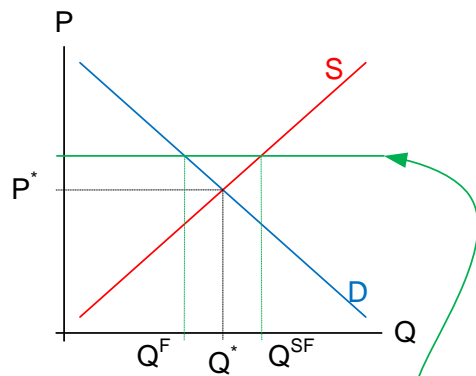
Ineffective Price Ceiling.
Equilibrium price being below the price ceiling, it will not affect a free market.



Ineffective Price Floor.
Equilibrium price being above the price floor, it will not affect a free market.



Effective Price Ceiling.
Suppliers are only willing to provide Q^C in this market. There will be an excess demand (shortage) equal to $Q^{DC} - Q^C$.



Effective Price Floor.
Consumers are only willing to buy Q^F in this market. There will be an excess supply (surplus) equal to $Q^{SF} - Q^F$.

c) PRACTICE EXAMPLE:

In 2009, the minimum wage was increased to \$7.25 per hour. Who gains and who loses from an increase in the minimum wage? How do teenagers fit into your answer?

- There is a transfer of income from employers to minimum-wage employees with jobs. There is a reduction in the quantity of labor demanded—fewer workers are hired. Workers who cannot find jobs (or who lose jobs) as a result of the wage floor are losers. The level of unemployment increases amongst the poor and unskilled—those least able to afford a reduction in job opportunities. Teenagers are amongst the least experienced workers, and evidence suggests that they suffer as a result of the minimum wage. Indeed, to redress the balance, an “opportunity wage” (a sub-minimum wage) was proposed for teenagers in the 1990s.

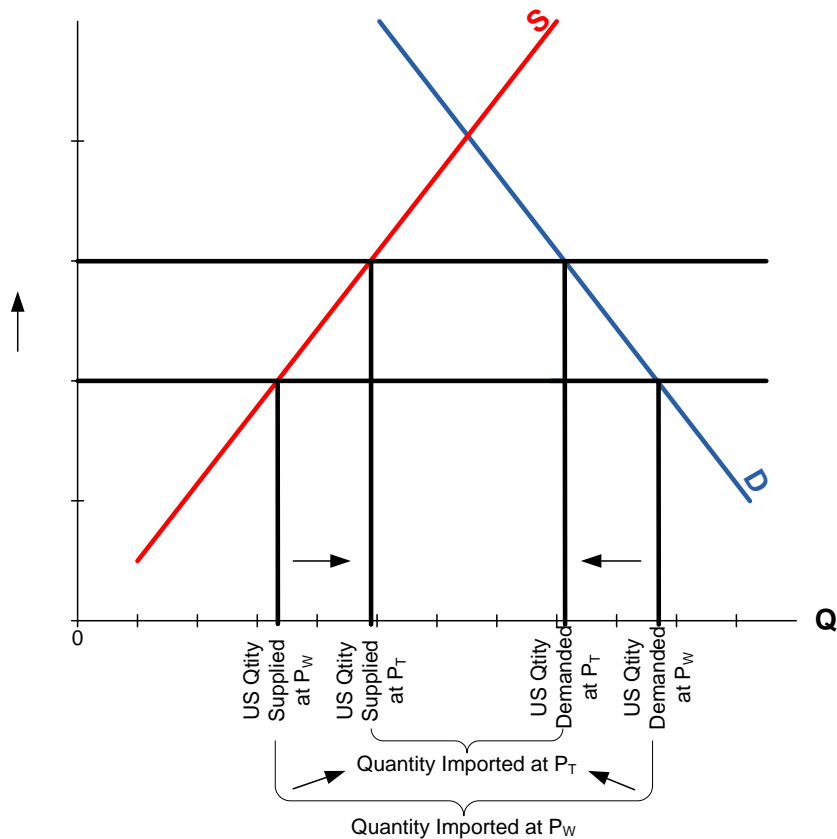


3. **Explain, using words and/or diagrams, how an oil import fee would affect the domestic production and total consumption of oil.**

The basic logic of supply and demand is a powerful tool for analysis. For example, supply and demand analysis shows that an oil import tax will reduce quantity of oil demanded, increase domestic production, and generate revenues for the government. A new tax on imported oil will raise the domestic price of oil, cutting quantity demanded and encouraging domestic production. The size of these changes depends on the slopes of the demand and supply curves or, more accurately, the responsiveness of demand and supply. Although the imposition of this tax would raise government revenues, reduce dependence on foreign oil, and stimulate domestic production of oil, inefficient domestic producers may be sheltered from lower priced foreign competition.

Within the market, some buyers will have a demand that is relatively unresponsive to price changes, whereas others will be more able to trim demand if price rises. A price hike would discriminate more against the poor who may have little choice in their fuel consumption than against those who are better off and who can afford to pay more for fuel.

Effect of Tax on Imported Oil on US Market for Crude Oil



4. **Define Consumer Surplus and Producer Surplus and explain how these concepts relate to market efficiency.**

Supply and demand curves can also be used to illustrate the idea of market efficiency, an important aspect of normative economics.

Consumer surplus is the difference between the maximum amount a person is willing to pay for a good and the current market price. Producer surplus is the difference between the current market price and the full cost of production for the firm. At free market equilibrium with competitive markets, the sum of consumer surplus and producer surplus is maximized. The total loss of producer and consumer surplus from underproduction or overproduction is referred to as a deadweight loss.



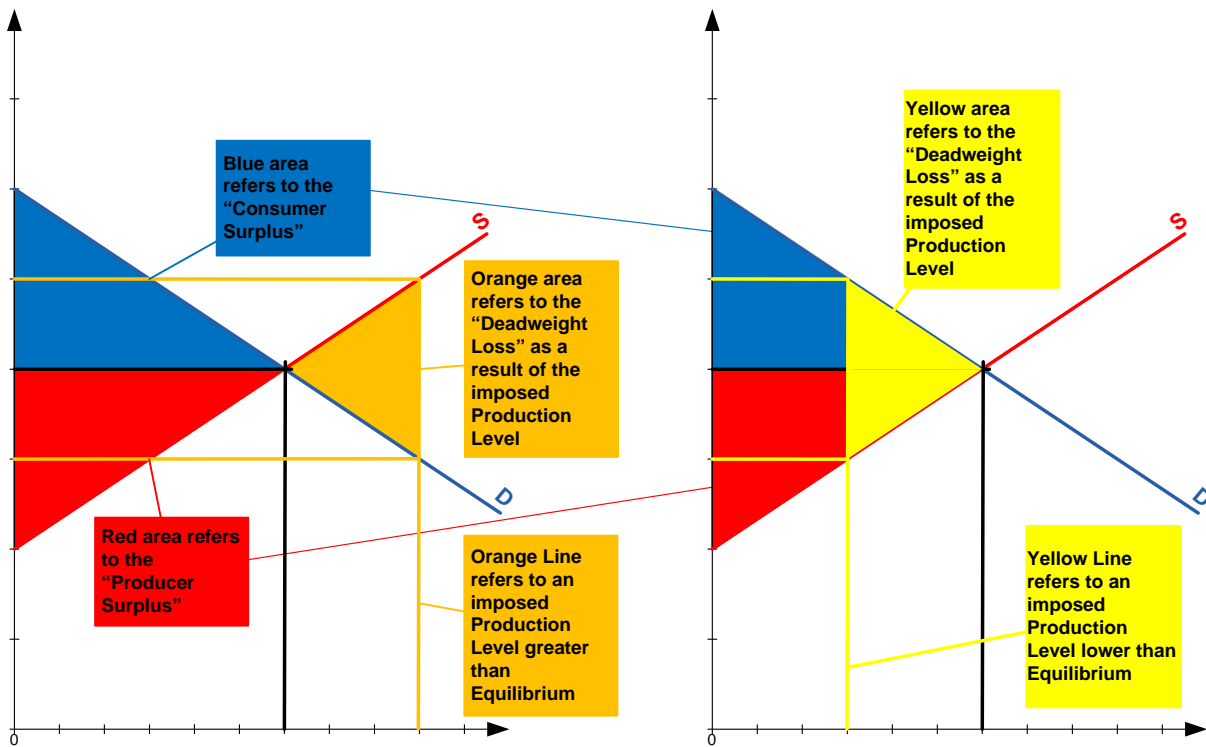
For the final unit of a good purchased, the price should equal the value derived by the purchaser. Previous units should be valued more highly, but the same price charged. Consumer surplus is the difference between the value the purchaser places on purchases of a product and the price paid. Graphically, the consumer surplus is the area bounded by the demand curve, the vertical axis, and the product price. Changes in the size of the area reflect changes in consumer well-being.

Put simply, consumer surplus is “the difference between the price you do pay and the price you would pay.” If you win an eBay auction at a lower price than you would have paid, the difference is your consumer surplus.

Producer surplus is a similar concept but from the point of view of the seller. The difference between the market price and the lowest price a seller would accept is the producer surplus. If you auction a CD on eBay and would take \$5 for it but you end up selling it for \$12, your producer surplus is \$7.

Graphically, consumer surplus is the triangular area between the demand curve and the market price; producer surplus is the triangular area between the supply curve and the market price.

By driving buyers and sellers to the intersection of demand and supply, market forces maximize the total surplus derived by participants. Any action that moves production away from the equilibrium level will reduce society’s surplus and will result in a deadweight loss to society.



5. **Lexicon**

Black Market	A market in which illegal trading takes place at market-determined prices.
Consumer Surplus	The difference between the maximum amount a person is willing to pay for a good and its current market price.
Deadweight Loss	The total loss of producer and consumer surplus from underproduction or overproduction.
Favored Customers	Those who receive special treatment from dealers during situations of excess demand.
Minimum Wage	A price floor set for the price of labor.
Price Ceiling	A maximum price that sellers may charge for a good; usually set by government.
Price Floor	A minimum price below which exchange is not permitted.



Price Rationing	The process by which the market system allocates goods and services to consumers when quantity demanded exceeds quantity supplied.
Producer Surplus	The difference between the current market price and the full cost of production for the firm.
Queuing	Waiting in line as a means of distributing goods and services: a non-price rationing mechanism.
Ration Coupons	Tickets or coupons that entitle individuals to purchase a certain amount of a given product per month.



V- Chapter 5 – Elasticity

1. Define the concept of elasticity.

Elasticity is a general measure of responsiveness that can be used to quantify many different relationships. If one variable A changes in response to changes in another variable R, the elasticity of A with respect to R is equal to the percentage change in A divided by the percentage change in R.

The slope of a demand curve is an inadequate measure of responsiveness because its value depends on the units of measurement used. For this reason, elasticities are calculated using percentages.

We know that quantity demanded decreases as price increases—that's the law of demand. Price elasticity of demand allows us to measure how much quantity demanded changes (how responsive we are) when price changes. We know that, as income increases, the demand for a good will increase or decrease (depending on whether it's normal or inferior). Income elasticity of demand allows us to measure how much demand will change and in which direction. We know that a change in the price of one good will increase or decrease the demand for a related good (depending on whether they are substitutes or complements). Cross-price elasticity of demand quantifies the relationship.

Boiled down, elasticity quantifies the response of one variable to a change on another variable. The concept is not limited to demand; it is a general concept.

The best way to understand “elasticity” is to equate the term with “responsiveness.” Select a good for which demand is fairly insensitive to price changes (prescription drugs, gasoline, college tuition) and one for which demand is quite sensitive (a particular brand of gasoline or soft drink).

2. Define price elasticity of demand. Interpret the terms elastic, inelastic, and unitary elasticity in the context of price elasticity of demand. Use the “percentage change” formula to measure price elasticity of demand.

Price Elasticity of Demand is the most frequently used measurement and sets a pattern for all the formulas—it is the “percentage change in quantity demanded divided by the percentage change in price.” Price elasticity of demand is the ratio of the percentage change in quantity demanded of a good to the percentage change in price of that good.

Demand responsiveness may be classified as:

- **Perfectly elastic:** The absolute price elasticity measure is infinity. Perfectly elastic demand describes a relationship in which a small increase in the price of a product causes the quantity demanded for that product to drop to zero.
- **Elastic:** The absolute price elasticity measure is > 1 . Elastic demand is demand in which the percentage change in quantity demanded is larger in absolute value than the percentage change in price.
- **Unitarily elastic:** The absolute price elasticity measure is 1. Unitary elasticity of demand describes a relationship in which the percentage change in the quantity of a product demanded is the same as the percentage change in price.
- **Inelastic:** The absolute price elasticity measure is < 1 . Inelastic demand is demand whose quantity demanded responds somewhat, but not a great deal, to changes in price.
- **Perfectly inelastic:** The absolute price elasticity measure is 0. Perfectly inelastic demand is demand whose quantity demanded does not respond at all to changes in price.

Recall that elasticity measures responsiveness. The more responsive a buyer is to a price change, the more elastic is demand and (in absolute terms) the larger is the price elasticity of demand. Elasticity changes continuously all the way along a straight-line curve, so using the slope of a demand or supply curve as a measure of elasticity is a bad idea.

Here is a simple memory aid for elasticity graphs. The demand curve is vertical (|) for perfectly (I)nelastic demand, but horizontal (—) for perfectly (E)lastic demand. Exactly the same relationship is true when we consider supply.

a) Calculating Price Elasticity of Demand

Because we need to know percentage changes to calculate elasticity, let us begin our example by calculating the percentage change in quantity demanded.

To convert this change into a percentage change, we must decide on a base against which to calculate the percentage. It is often convenient to use the initial value of quantity demanded (Q_1) as the base.

To calculate percentage change in quantity demanded using the initial value as the base, the following formula is used:



$$\% \text{ Change in Quantity Demanded} = \frac{\text{Change in Quantity Demanded}}{Q_1} \times 100\%$$

$$\% \text{ Change in Quantity Demanded} = \frac{(Q_2 - Q_1)}{Q_1} \times 100\%$$

We can calculate the percentage change in price in a similar way. Once again, let us use the initial value of P – that is, P_1 – as the base for calculating the percentage.

$$\% \text{ Change in Price} = \frac{\text{Change in Price}}{P_1} \times 100\%$$

$$\% \text{ Change in Price} = \frac{(P_2 - P_1)}{P_1} \times 100\%$$

Price Elasticity of Demand becomes:

$$\text{Price Elasticity of Demand} = \frac{\frac{\text{Change in Quantity Demanded}}{Q_1} \times 100\%}{\frac{\text{Change in Price}}{P_1} \times 100\%}$$

$$\text{Price Elasticity of Demand} = \frac{(Q_2 - Q_1) / Q_1}{(P_2 - P_1) / P_1}$$

3. Use the midpoint formula to measure price elasticity of demand.

Elasticity requires a comparison of the percentage change in quantity to the percentage change in price. In the midpoint formula, the “price” value is calculated by taking the average of both prices $(P_2 + P_1)/2$. Similarly, the “quantity” value is calculated by taking the average of both quantities $(Q_2 + Q_1)/2$. The “change in price” is determined by the difference between the final price (P_2) and the initial price (P_1), or $(P_2 - P_1)$. Similarly, the “change in quantity” is determined by the difference between the final quantity (Q_2) and the initial quantity (Q_1), or $(Q_2 - Q_1)$.

The midpoint formula, for all its complexity, is an essential part of elasticity. Even if you’re averse to formulas in general, you should practice this one. Be aware, though, that if all you need is to find whether demand is “elastic” or “inelastic”, the total revenue test (in the following section) will be sufficient.

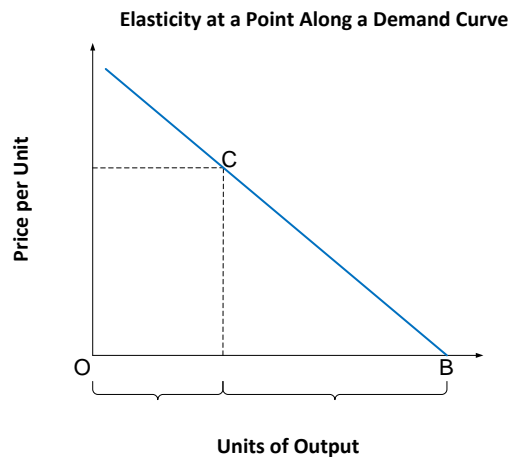
By canceling the 2’s in the textbook formula, the midpoint elasticity formula can be simplified to:

$$\frac{(Q_2 - Q_1) / (Q_2 + Q_1)}{(P_2 - P_1) / (P_2 + P_1)}$$

Make sure you have the “quantity” terms in the numerator and the “price” terms in the denominator—we’re measuring how much *quantity* (top) responds to a change in the *dollar* amount (bottom).



4. Point Elasticity



Point elasticity is very important to understand why elasticity changes along the demand curve. As was said before, Elasticity measures responsiveness. Imagine we would like to measure the “readiness” of a consumer to move along the demand curve given minute changes in price. We then speak of “Point Elasticity”. Now consider the straight-line demand curve in the figure above. We can write an expression for elasticity at point C as follows:

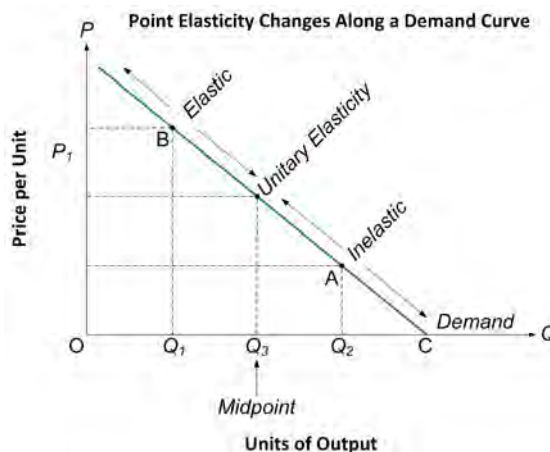
$$\text{Elasticity} = \frac{\% \Delta Q}{\% \Delta P} = \frac{\frac{\Delta Q}{Q} * 100}{\frac{\Delta P}{P} * 100} = \frac{\frac{\Delta Q}{Q_1}}{\frac{\Delta P}{P_1}} = \frac{\Delta Q}{\Delta P} * \frac{P_1}{Q_1}$$

$\Delta Q/\Delta P$ is the reciprocal of the slope of the curve. Slope in the diagram is constant along the curve, and it is negative. To calculate the reciprocal of the slope to plug into the previous elasticity equation, we take Q_1B , or M_1 , and divide by minus the length of line segment CQ_1 . Because the length of CQ_1 is equal to P_1 , we can write: $\Delta Q/\Delta P = M_1/P_1$. Also, $Q_1 = M_2$. By substituting, we get:

$$\text{Elasticity} = (M_1/P_1) * (P_1/Q_1) = M_1/M_2$$

Thus, Elasticity at point C is simply the ratio of line segment M_1 to line segment M_2 . It is easy to see that if we had chosen a point to the left of Q_1 , M_1 would have been larger and M_2 would have been smaller, indicating a higher elasticity. If we had chosen a point to the right of Q_1 , M_1 would have been smaller and M_2 would have been larger, indicating a lower elasticity.

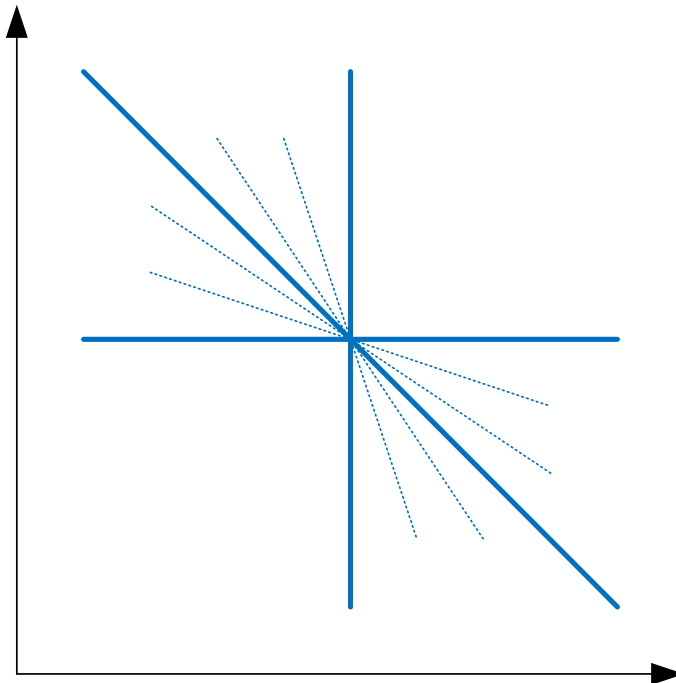
In the next picture, you can see that elasticity is unitary (equal to -1) at the midpoint of the demand curve, Q_3 . At points to the right, such as Q_2 , segment Q_2C is smaller than segment OQ_2 . This means that the absolute size of the ratio is less than 1 and that demand is inelastic at point A. At points to the left, such as Q_1 , segment Q_1C is larger than segment OQ_1 . This means that the absolute size of the ratio is greater than 1 and that demand is elastic at point B.



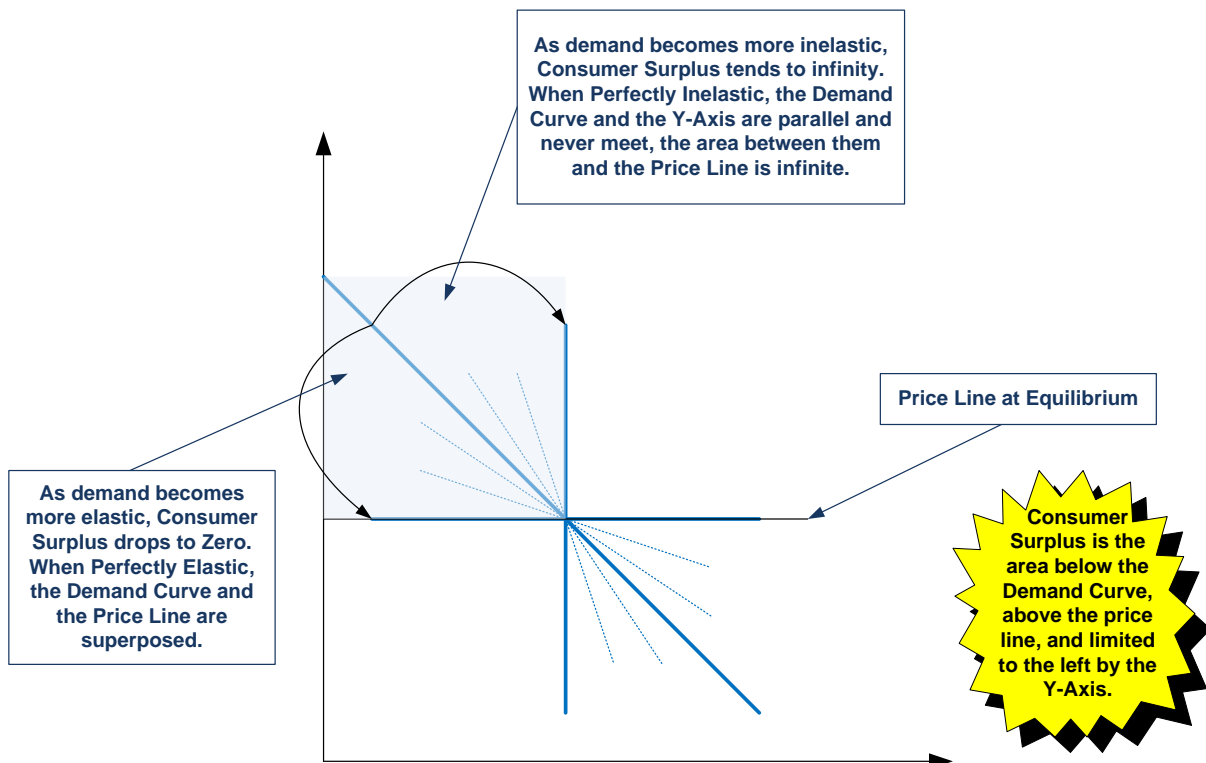


5. Graphic Representation:

a) Graphic Representation of Price Elasticity of Demand



b) Consumer Surplus and the Price Elasticity of Demand





6. **Predict the effect on total revenue of a price change, given the elasticity of demand. Apply the total revenue test.**

Total revenue is “price × quantity.” The relationship between elasticity and total revenue as price increases may be classified as:

- Elastic if total revenue decreases. If demand is elastic, a price increase will reduce the quantity demanded by a larger percentage than the percentage increase in price and total revenue ($P * Q$) will fall.
- Unitarily elastic if total revenue remains constant
- Inelastic if total revenue increases

If demand is elastic, a price cut will cause quantity demanded to increase by a greater percentage than the percentage decrease in price and total revenue will rise.

If demand is inelastic, a price cut will cause quantity demanded to increase by a smaller percentage than the percentage decrease in price and total revenue will fall.

Given with a good with an elastic demand (Pepsi), a small increase in the price of will trigger a relatively large decrease in the quantity demanded as consumers switch over to Coke and other close substitutes. Total spending on Pepsi will decrease.

Given a good with an inelastic demand (gasoline), even a large price hike will result in only a small decrease in the quantity demanded, because consumers have few close substitutes for the product. Total spending on gas will increase.

The total revenue test shows whether demand is elastic or inelastic when price changes. The following table summarizes the results of the test.

Price	Quantity Demanded	Elasticity	Total Revenue
Increase	Decrease	Perfectly Elastic	Falling to Zero
Increase	Decrease	Elastic	Falling
Increase	Decrease	Unitary Elastic	Constant
Increase	Decrease	Inelastic	Rising
Increase	No Change	Perfectly Inelastic	Rising

If you don't know (or don't want to calculate) exact elasticity values, checking how total revenue is changing is an effective way to discover if the good has an elastic demand or not.

7. **List the three determinants of price elasticity of demand and explain their effects.**

The elasticity of demand depends on:

- The availability of substitutes;
- The importance of the item in individual budgets; and
- The time-frame in question.

The responsiveness of demand to changes in price is affected by the availability of substitutes, the fraction of total spending that a good absorbs, and the time factor. The elasticity of demand will *increase* if more substitutes become available, if the good commands a greater portion of the household's budget, or if the response time is longer rather than shorter.

a) **Substitutes:**

Exxon gas has an elastic demand because there are many substitutes (BP, Texaco, etc.); gasoline, in general, has few substitutes—elasticity will be lower. Pepsi has many substitutes, electricity has few.



b) Fraction of total spending:

Suppose Bazooka Joe bubblegum (or salt, or pepper) doubled in price. It's such a small portion of expenditures for most people that the price increase would pass almost unnoticed and quantity demanded would respond only slightly—inelastic demand. In contrast, a doubling in the price of a good that is important in one's budget (gasoline, perhaps) will provoke a greater response.

c) Time:

The longer the consumer has to "shop around" following a price increase, the more responsive he or she can be. In the late 1970s, for instance, gas prices rose rapidly. Initially, drivers planned trips more carefully, then came carpooling. Eventually, as cars aged, newer, more fuel-efficient models were bought. Progressively, fuel consumption was reduced. As gas prices subsided, drivers moved on to SUVs and Hummers and forgot the lessons that they'd learned. With the recent upsurge in oil prices, some of those old strategies have been rediscovered.

In each example, remember to apply the total revenue test. If gasoline increases in price, your gas bill will increase (inelastic demand). If Pepsi increases in price, your spending on Pepsi will decrease (elastic demand).

8. Distinguish between and calculate cross-price elasticity of demand and income elasticity of demand.

a) Income elasticity of demand:

Income elasticity of demand measures the responsiveness of the quantity demanded with respect to changes in income. It measures how much demand for Good A shifts when income level changes — and shows whether goods are inferior (negative elasticity) or normal (positive elasticity).

b) Cross-price elasticity of demand:

Cross-price elasticity of demand measures the response of the quantity of one good demanded to a change in the price of another good. It measures how the demand for Good A shifts when the price of Good B changes — and shows whether goods are substitutes (positive elasticity) or complements (negative elasticity).

The main point is the sign (positive or negative) of the relationship rather than the magnitude. However, the larger (in absolute terms) the elasticity value, the more related are the two goods. For instance, a small decrease in the price of Pepsi may trigger a sizable decrease in the demand for Coke (close substitutes) but a smaller decrease in the demand for Yoo-Hoo Chocolate Drink.

→ Remember: put the "number" term (quantity) in the numerator and the "dollar" term (price or income) in the denominator.

9. Calculate and interpret elasticity values for the price elasticity of supply.

Elasticity of supply measures the response of the quantity of a good supplied to a change in the price of that good. The elasticity of labor supply measures the response of the quantity of labor supplied to a change in the price of labor. The labor supply curve can be backward bending (if price elasticity of supply is negative).

10. IN SUMMARY:

Remember, elasticity measures the responsiveness of a particular measure of quantity to a change in a particular measure of price. ALL ELASTICITIES MEASURE THE SAME: $\% \Delta Q / \% \Delta P$. Income elasticity of demand measures the responsiveness of the quantity demanded with respect to changes in income. Cross-price elasticity of demand measures the response of the quantity of one good demanded to a change in the price of another good. Elasticity of supply measures the response of the quantity of a good supplied to a change in the price of that good. The elasticity of labor supply measures the response of the quantity of labor supplied to a change in the price of labor.

In all these cases, the large $\% \Delta Q$ as compared to $\% \Delta P$ the more responsive is the quantity being measured to the change in the price being tracked. So, for elasticity of supply, if $E > 1$ we have an elastic supply and when $E < 1$ it is inelastic. What changes here is that where price elasticity of demand is usually negative (hence we measure its absolute value), price elasticity of supply is usually positive.

11. Lexicon

Cross-Price Elasticity of Demand	A measure of the response of the quantity of one good demanded to a change in the price of another good.
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Elastic Demand	A demand relationship in which the percentage change in quantity demanded is larger than the percentage change in price in absolute value (a demand elasticity with an absolute value greater than 1).
Elasticity	A general concept used to quantify the response in one variable when another variable changes.
Elasticity of Labor Supply	A measure of the response of labor supplied to a change in the price of labor.
Elasticity of Supply	A measure of the response of quantity of a good supplied to a change in price of that good. Likely to be positive in output markets.
Income Elasticity of Demand	A measure of the responsiveness of demand to changes in income.
Inelastic Demand	Demand that responds somewhat, but not a great deal, to changes in price. Inelastic demand always has a numerical value between zero and -1.
Midpoint Formula	A more precise way of calculating percentages using the value halfway between P_1 and P_2 for the base in calculating the percentage change in price and the value halfway between Q_1 and Q_2 as the base for calculating the percentage change in quantity demanded.
Perfectly Elastic Demand	Demand in which quantity drops to zero at the slightest increase in price.
Perfectly Inelastic Demand	Demand in which quantity demanded does not respond at all to a change in price.
Price Elasticity of Demand	The ratio of the percentage of change in quantity demanded to the percentage of change in price; measures the responsiveness of quantity demanded to changes in price.
Unitary Elasticity	A demand relationship in which the percentage change in quantity of a product demanded is the same as the percentage change in price in absolute value (a demand elasticity of -1).

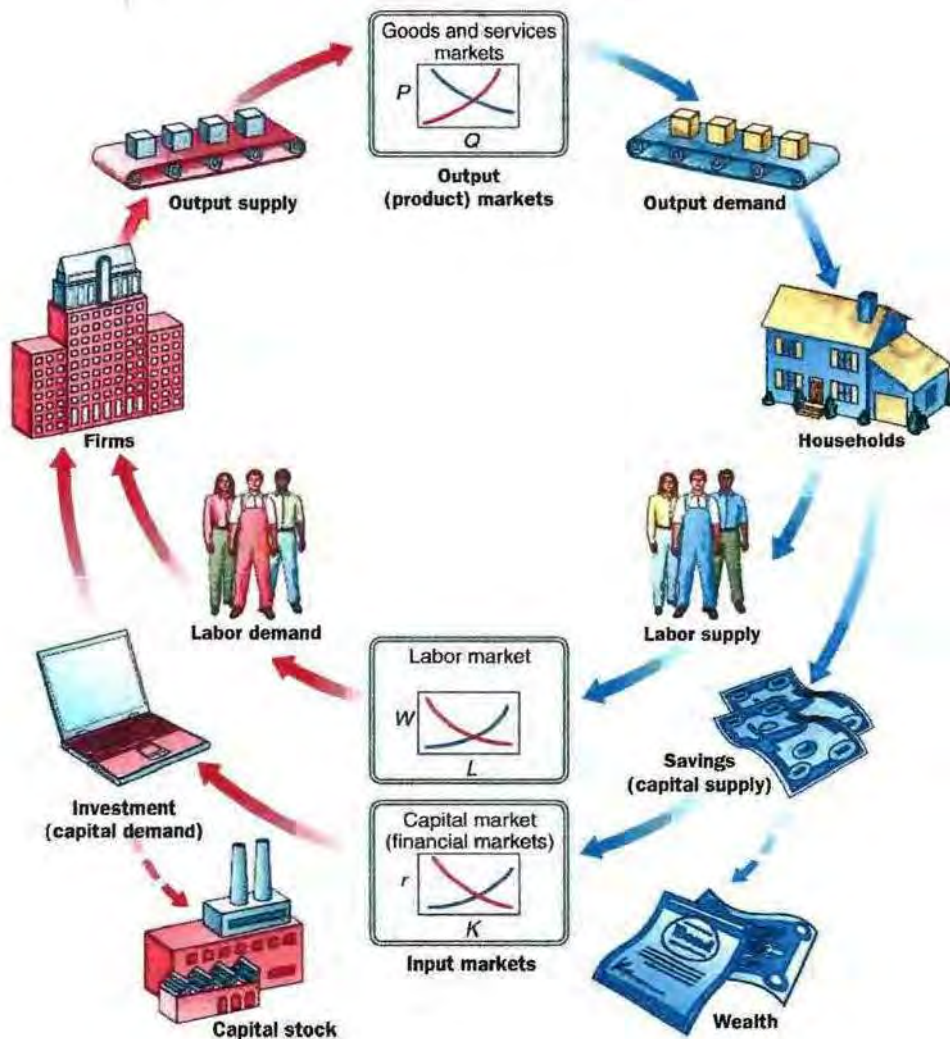


VI- Chapter 6 - The Market System – Choices Made by Households and Firms

1. Firm and Household Decisions

The graph below presents a diagram of a simple competitive economy.

Households demand in output markets and supply labor and capital in input markets. For simplicity, government and international sectors were not included in this circular flow diagram.



2. Draw and explain the meaning of a budget constraint diagram, given price and income data. Indicate the constraints on a household's consumption choices and relate these to the concept of the opportunity set.

The analysis of household choice assumes that there is perfect competition in all (input and output) markets, that price is governed by demand and supply, and that households are "informed"—that they have perfect knowledge about the price, availability, and quality of goods; about wage rates; and (later) about interest rates.

Every household must make three basic decisions:

- How much of each product, or output, to demand;
- How much labor to supply; and
- How much to spend today and how much to save for the future.

In simplified form, the *budget constraint diagram* illustrates the limited set of opportunities available to you. Income, wealth, and prices define household budget constraint. The budget constraint separates those combinations of goods and services that are available from those that are not.



It is best to think of the household choice problem as one of allocating income over a large number of goods and services. A change in the price of one good may change the entire allocation. Demand for some goods may rise, while demand for others may fall.

As long as a household faces a limited income, the real cost of any single good or service is the value of the next preferred other goods and services that could have been purchased with the same amount of money.

In a two-good situation, this constraint looks rather like a production possibility frontier—think of it as a “consumption” possibility frontier, if you will. The real cost of buying more of one good is the value of the other good that must be forgone. Points on and inside the constraint are combinations of goods that can be bought; they comprise the *opportunity (choice) set*. Points outside cannot be bought. The budget constraint will shift to the right if income or wealth increases, or if prices fall there is an increase in possible consumption levels. The slope is determined by the relative prices of the two goods. If the price of one good falls, the budget constraint *swivels* and the slope of the constraint changes.

Within the constraints of prices, income, and wealth, household decisions ultimately depend on preferences, likes, dislikes, and tastes.

Formally, the budget constraint for two goods (X and Y) can be written as: $P_xX + P_yY = I$; where P_x is the price of Good X, P_y is the price of Good Y, and I is household income.

The equation can be written as $Y = I/P_y - P_xX/P_y$. This is a downward sloping line with the slope equal to P_x/P_y . It intersects the Y-axis at I/P_y and the X-axis at I/P_x :

When it intersects the Y-axis, X = 0.

$$Y = I/P_y - P_xX/P_y$$

$$Y = I/P_y - 0$$

$$Y = I/P_y$$

When it intersects the X-axis, Y = 0.

$$0 = I/P_y - P_xX/P_y$$

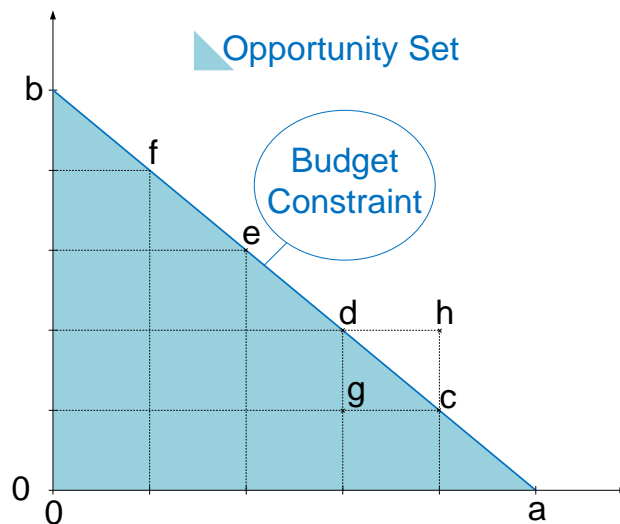
$$P_xX/P_y = I/P_y$$

$$P_xX = I$$

$$X = I/P_x$$

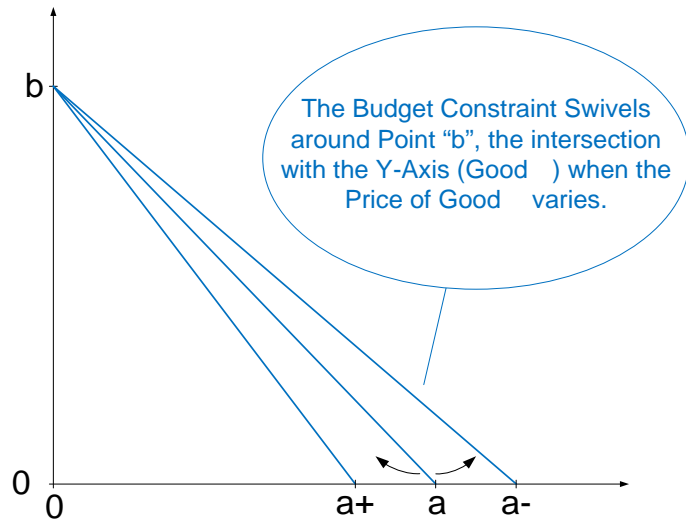
3. Movements of the Budget Constraint

The Budget Constraint separates those combinations of goods and services that are available given a limited income (a, b, c, d, e, f, g), from those that are not (h). The available combinations make up the Opportunity Set.

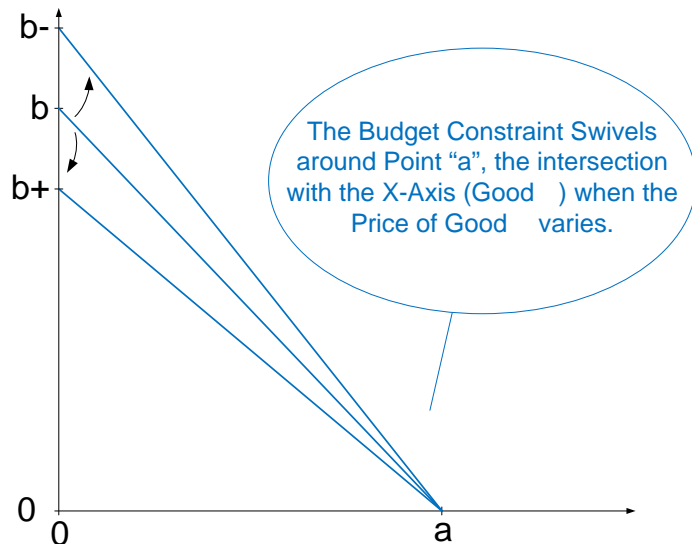




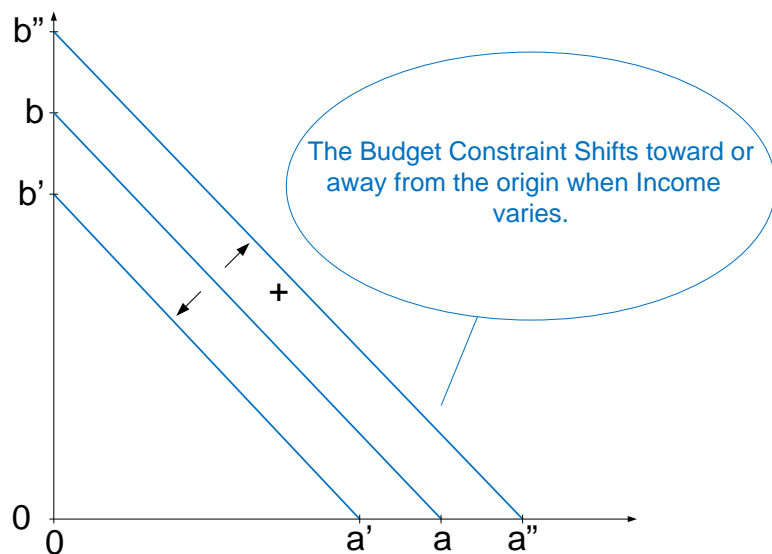
A Budget Constraint between Good A (X-Axis) and Good B (Y-Axis) will depend on the price of Good A. If Good A's price changes, the Budget Constraint line will swivel around the intersection point with the Y-Axis. The Budget Constraint line will swivel away from the origin (when P_A decreases) or toward the origin (when P_A increases).



A Budget Constraint between Good A (X-Axis) and Good B (Y-Axis) will depend on the price of Good B. If Good B's price changes, the Budget Constraint line will swivel around the intersection point with the X-Axis. The Budget Constraint line will swivel away from the origin (when P_B decreases) or toward the origin (when P_B increases).



A Budget Constraint between Good A and Good B will depend on the level of income (I). If Good A is priced at P_A and Good B is priced at P_B , then the equation for the Budget Constraint is $P_A \times Q_A + P_B \times Q_B = I$. If I changes, the Budget Constraint line will shift away from the origin (when I increases) or toward the origin (when I decreases).





4. **Distinguish between total utility and marginal utility. State the law of diminishing marginal utility.**

Whether one item is preferable to another depends on how much utility, or satisfaction, it yields relative to its alternatives.

- a) **Utility** (satisfaction) is derived from goods and services, including leisure.
- b) The **Marginal Utility** you derive from a good (potato chips, for example) is the additional satisfaction you get from each additional portion.
- c) The **Total Utility** is the sum of these additional contributions to your level of satisfaction.
- d) The **Law of Diminishing Marginal Utility** says that the more of any good we consume in a given period of time, the less satisfaction, or utility, we get out of each additional (or marginal) unit of that good. In other words, extra units of a good yield less and less extra satisfaction. Although the first few potato chips may provide quite significant increases in utility, subsequent chips are likely to provide progressively less additional utility (as your hunger decreases and your guilt increases).

5. **State the utility-maximizing rule both in words and mathematically, and analyze how the consumer would respond to disequilibrium situations.**

Households allocate income among goods and services to maximize utility. This implies choosing activities that yield the highest marginal utility per dollar. In a two-good world, households will choose to equate the marginal utility per dollar spent on X with the marginal utility per dollar spent on Y. This is the **Utility-Maximizing Rule**.

Assuming that households try to maximize their utility, they should select those goods that give the largest marginal utility per dollar. Utility will be maximized when the per-dollar marginal utility of the last unit of each good bought is equal. Formally, it is stated: $MU_X/P_X = MU_Y/P_Y$. This is further evidenced when we explore indifference curves later in this chapter.

An imbalance in the utility-maximizing condition – for example, $MU_X/P_X > MU_Y/P_Y$ – means that you could shuffle your income around. Buying more of the good giving the greater marginal utility per dollar (X) and less of the other (Y) will get a better deal. Buying more of X reduces its marginal utility and buying less of Y increases its marginal utility. Therefore, the imbalance is removed.

6. **Explain why the concept of utility is useful in demand analysis.**

In making their choices, most people spread their incomes over many different kinds of goods. One reason people prefer variety is that consuming more and more of any one good reduces the marginal, or extra, satisfaction they get from further consumption of the same good. Formally, marginal utility (MU) is the additional satisfaction gained by the consumption of one more unit of a good or service.

It is important to distinguish marginal utility from total utility. Total utility is the total amount of satisfaction obtained from consumption of a good or service. Marginal utility comes only from the last unit consumed; total utility comes from all units consumed.

Suppose you live next to a store that sells homemade ice cream that you are crazy about. Even though you get a great deal of pleasure from eating ice cream, you do not spend your entire income on it. The first cone of the day tastes heavenly. The second is merely delicious. The third is still very good, but it is clear that the glow is fading. Why? The answer is because the more of any one good we consume in a given period, the less satisfaction, or utility, we get from each additional, or marginal, unit. In 1890, Alfred Marshall called this "familiar and fundamental tendency of human nature" the **Law of Diminishing Marginal Utility**.

Utility analysis therefore explains the downward slope of the demand curve. Because marginal satisfaction falls with each additional unit bought, price must fall to "encourage" additional purchases of a good.

It is quite easy to see this "diminishing marginal utility" explanation in operation when one finds examples of "Buy the first, and get the second for half price."

7. **The Diamond Paradox:**

The utility-maximizing rule helps us understand an old puzzle dating from the time of Plato and familiar to economists beginning with Adam Smith. Adam Smith wrote about it in 1776:

"The things which have the greatest value in use have frequently little or no value in exchange; and on the contrary, those which have the greatest value in exchange have frequently little or no value in use. Nothing is more useful than water: but it will purchase scarce anything; scarce anything can be had in exchange for it. A diamond, on the contrary, has scarce any value in use; but a very great quantity of other goods may frequently be had in exchange for it."



Although diamonds have arguably more than "scarce any value in use" today (for example, they are used to cut glass), Smith's diamond/water paradox is still instructive, at least where water is concerned. The low price of water owes much to the fact that it is in plentiful supply. Even at a price of zero, we do not consume an infinite amount of water. We consume up to the point where marginal utility drops to zero. The marginal value of water is zero. Each of us enjoys an enormous consumer surplus when we consume nearly free water. At a price of zero, consumer surplus is the entire area under the demand curve. We tend to take water for granted, but imagine what would happen to its price if there were not enough for everyone. It would command a high price indeed...

The scarcity of diamonds works in exactly the opposite way. We cannot consume an infinite amount; many can't even afford a tiny little one... But, independent of its scarcity and dollar value, the marginal value of diamonds is quite important from the self-esteem it helps its wearer feel, the projection of personal disposable wealth, and the beauty we may see in it. The marginal utility from the last dollar spent on diamonds will always be high, even beyond our budget constraint (Income and Wealth).

8. Distinguish between the income effect and the substitution effect and explain their role in the theory of household behavior.

The income effect and the substitution effect provide a second explanation for the downward slope of the demand curve. Most goods are *normal goods*. As the price of a normal good (lowfat milk, for instance) rises, you become poorer because your food dollar can't stretch as far as it did before (*income effect*), and you seek substitutes such as regular milk (*substitution effect*). Both effects result in a decrease in the quantity demanded of lowfat milk as its price increases.

Although the demand curve for *inferior goods* (Spam, perhaps), still slopes down, the income effect is reversed. As before, a rise in price of the good (Spam) makes you seek substitutes, such as other meats (substitution effect). But you're poorer because of the higher price—your food dollar can't stretch as far. In the case of an inferior good, however, the income effect results in more of the good being bought. Because you're poorer after a price rise, you may no longer be able to afford that steak you were going to buy—Spam is the best you can manage. In general, the substitution effect (price higher—buy less) is stronger than the income effect (price higher—buy more), so on balance quantity demanded falls when price rises.

The fact that demand curves have a negative slope can then be explained in two ways:

- Marginal utility for all goods diminishes.
- For most normal goods, both the income and the substitution effects of a price decline lead to more consumption of the good.

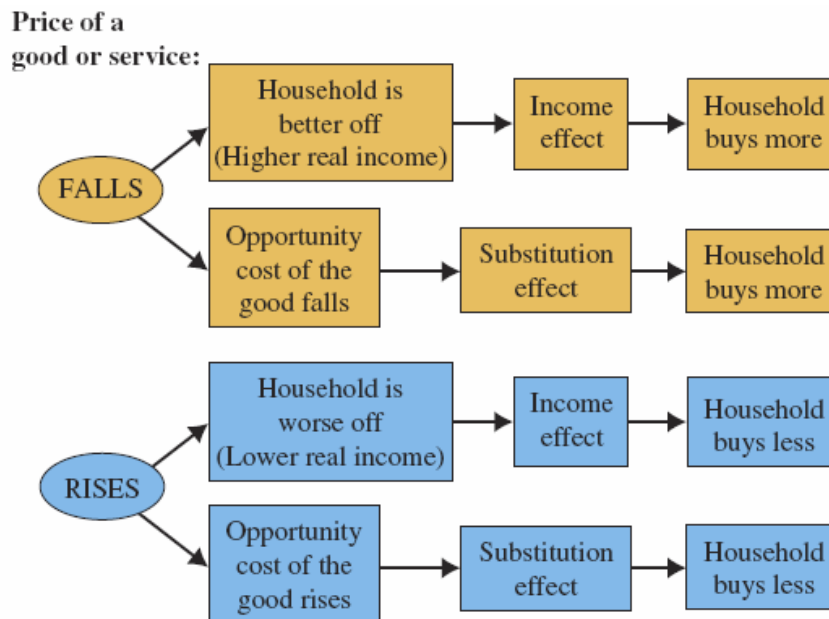
	Substitution effect	Income effect	Overall
The effect of a fall in price			
Normal good	Increases quantity demanded	Increases quantity demanded	Increases quantity demanded; downward sloping demand curve
Inferior good	Increases quantity demanded	Decreases quantity demanded	Increases quantity demanded; downward sloping demand curve
The effect of an increase in price			
Normal good	Decreases quantity demanded	Decreases quantity demanded	Decreases quantity demanded; downward sloping demand curve
Inferior good	Decreases quantity demanded	Increases quantity demanded	Decreases quantity demanded; downward sloping demand curve

Another example of the role of the income and substitution effects on household behavior is savings and interest rates. In addition to deciding how to allocate its present income among goods and services, a household may also decide to save or borrow. When a household decides to save part of its current income, it is using current income to finance future spending. When a household borrows, it finances current purchases with future income. An increase in interest rates has a positive effect on saving if the substitution effect dominates the income effect and a negative



effect if the income effect dominates the substitution effect. Most empirical evidence shows that the substitution effect dominates here.

INCOME EFFECT AND SUBSTITUTION EFFECT GRAPHICALLY



- The fall in price is akin to a rise in income (the \$ stretches to buy more goods), and vice-versa.
- The rise in price makes one seek a substitute, and vice-versa.
- For normal goods, the income and substitution effects work in the same direction.
- Higher prices lead to a lower quantity demanded, and lower prices lead to a higher quantity demanded.

9. Analyze the shape of the labor-supply curve using the income and substitution effects.

In the labor market, a trade-off exists between the value of the goods and services that can be bought in the market or produced at home and the value that one places on leisure.

The opportunity cost of paid work is leisure and unpaid work. The wage rate is the price, or opportunity cost, of the benefits of unpaid work or leisure.

The income and substitution effects of a change in the wage rate work in opposite directions. Higher wages mean that:

- Leisure is more expensive (likely response: people work more – substitution effect); and
- More income is earned in a given number of hours, so some time may be spent on leisure (likely response: people work less – income effect)

10. Explain why indifference curves are negatively sloped and cannot intersect.

An indifference curve is a set of points, each point representing a combination of goods X and Y, all of which yield the same total utility. A particular consumer's set of indifference curves is called a preference map. If there is less of one good, the individual must be compensated by having more of the other good—a negative relationship. Indifference curves cannot intersect because this would imply that the same bundle of goods could give more than one level of satisfaction. The slope of the indifference curve is MU_X/MU_Y .

11. Derive a demand curve using indifference curve analysis.

The slope of an indifference curve is the ratio of the marginal utility of X to the marginal utility of Y, and it is negative. It is called the **Marginal Rate of Substitution (MRS)**. It is the rate at which an individual is willing to surrender units of one good for units of the other good. Put differently, it's the ratio of the marginal utility of one good to the marginal utility of the other. Formally, this ratio is stated: $MRS = MU_X/MU_Y$.

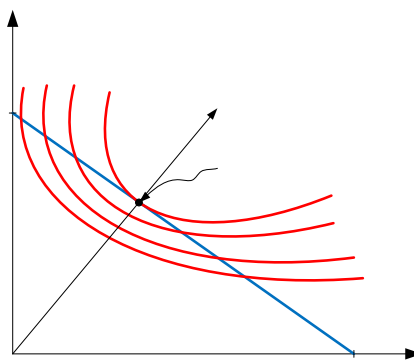


The budget constraint diagram is combined with indifference curves to depict the utility-maximizing mix of purchases. Four assumptions are made, the main one being that the marginal rate of substitution is diminishing. An indifference curve maps all the combinations of goods that provide a particular level of utility. Indifference curves bend inwards because we assume that the rate of marginal substitution is diminishing. Higher (further right) indifference curves indicate higher levels of utility.

Indifference curves are convex – when Marginal Utility of good Y drops to zero, MRS tend to infinity which cannot be the case with a concave curve.

As long as indifference curves are convex to the origin, utility maximization will take place at that point at which the indifference curve is just tangent to – that is, just touches – the budget constraint. As we move outward from the origin, we have higher utility. The indifference curve furthest from the origin, with points in the opportunity set is just tangent to the Budget Constraint. In equilibrium, the slopes of both curves are equal. The MRS is equal to the price ratio, so that $MU_x/MU_y = P_x/P_y$.

The utility-maximizing rule can also be written as $MU_x/P_x = MU_y/P_y$ for all pairs of goods.



The analysis makes two important points.

- First, we can get optimum quantity for the other at different price levels. We get price and quantity demanded curves. This is the demand curve at income I .
- Second, by decreasing the price of one good, the Budget Constraint swivels outward reaching higher utilities and more quantities for each good. The quantity demanded of the good with the price decrease has therefore risen – another explanation of the downward-sloping demand curve.

12. Lexicon

Budget Constraint	The limits imposed on household choices by income, wealth, and product prices.
Diamond/Water Paradox	A paradox stating that (1) the things with the greatest value in use frequently have little or no value in exchange and (2) the things with the greatest value in exchange frequently have little or no value in use.
Financial Capital Market	The complex set of institutions in which suppliers of capital (households that save) and the demand for capital (firms wanting to invest) interact.
Homogeneous Products	Undifferentiated outputs; products that are identical to or indistinguishable from one another.
Indifference Curve	A set of points, each point representing a combination of goods X and Y. all of which yield the same total utility.
Labor Supply Curve	A curve that shows the quantity of labor supplied at different wage rates. Its shape depends on how households react to changes in the wage rate.
Law of Diminishing Marginal Utility	The more of any one good consumed in a given period, the less satisfaction (utility) generated by consuming each additional (marginal) unit of the same good.
Marginal Rate of Substitution	MU_x/MU_y – The ratio at which a household is willing to substitute good Y for good X.
Marginal Utility (MU)	The additional satisfaction gained by the consumption or use of one more unit of a good or service.



Opportunity Set (or Choice Set)	The set of options that is defined and limited by a budget constraint.
Perfect Competition	An industry structure in which there are many firms, each being small relative to the industry and producing virtually identical products, and in which no firm is large enough to have any control over prices.
Perfect Knowledge	The assumption that households possess a knowledge of the qualities and prices of everything available in the market and that firms have all available information concerning wage rates, capital costs, and output prices.
Preference Map	A consumer's set of Indifference Curves
Real Income	The set of opportunities to purchase real goods and services available to a household as determined by prices and money income.
Total Utility	The total amount of satisfaction obtained from consumption of a good or service.
Utility	The satisfaction a product yields.
Utility-Maximizing Rule	Equating the ratio of the marginal utility of a good to its price for all goods. $MU_x/P_x = MU_y/P_y$ for all goods.



VII- Chapter 7 - The Production Process: The Behavior of Profit-Maximizing Firms

1. Define economic cost and economic profit, distinguish economic profit from accounting profit, and discuss the meaning of positive, zero, and negative economic profit.

a) Firms and their choices:

Firms vary in size and internal organization, but they all take inputs and transform them into outputs through a process called production.

In perfect competition, no single firm has any control over prices. This follows from two assumptions:

- Perfectly competitive industries are composed of many firms; each small relative to the size of the industry, and
- Each firm in a perfectly competitive industry produces homogeneous products.

The demand curve facing a competitive firm is perfectly elastic. If a single firm raises its price above the market price, it will sell nothing. Because it can sell all it produces at the market price, a firm has no incentive to reduce price.

Profit-maximizing firms in all industries must make three choices:

- How much output to supply;
- How to produce that output; and
- How much of each input to demand

To make decisions, firms need to know three things:

- The market price of their output;
- The production techniques that are available; and
- The prices of inputs

b) Normal and Economic Profits

Profit equals total revenue minus total cost. Total cost (economic cost) includes:

- Out-of-pocket costs; and
- The opportunity cost of each factor of production, including a normal rate of return on capital.

Profit equals total revenue minus total (economic) cost. Note that economists distinguish between explicit (out-of-pocket or accounting) costs and implicit (economic) costs. Economic cost includes both the explicit costs and the implicit costs of all the factors of production (including a normal rate of return for the owners of the firm). In this sense, cost includes a profit component.

A normal rate of return is a reward sufficient to compensate the owners for the risk and effort they have undertaken. When total revenue just covers total cost, owners are receiving an adequate reward. A normal rate of return on capital is included in total cost because tying up resources in a firm's capital stock has an opportunity cost. If you start a business or buy a share of stock in a corporation, you do so because you expect to make a normal rate of return. Investors will not invest their money in a business unless they expect to make a normal rate of return.

A producer who is "breaking even" in an economic sense (total revenue equals total economic cost) will be quite well satisfied. Obviously, he would prefer even more profits, but the normal rate of return is adequate to cover opportunity costs and to ensure continued production.

Positive economic profits (or excess profits) are a higher-than-normal reward. New firms are attracted to an industry by positive economic profits. In the long run, given negative economic profits (i.e., losses), firms will leave the industry.

Comparing Implicit and Explicit Costs

An understanding of implicit and explicit costs is important to determine the actual costs of an endeavor or to determine actual profits.



When comparing implicit vs. explicit cost, explicit costs or direct costs are payments for the purchase of productive resources. Such costs are clear and require tangible cash outflow or outlay of money that has a direct impact on profits. Examples include wages, rents, raw materials, and utility bills. Implicit costs, also known as “normal profit”, imputed cost, implied cost, or notional cost, denotes the opportunity cost, or the lost opportunities when using the available resources for the particular purpose. Such costs remain intangible, with no direct cash outlay or outflow. Examples include the value of an entrepreneur’s labor, possible interest, or best alternative returns for the capital invested in business.

All entrepreneurs embarking on a business forego wages they could have received if they took up employment. The possible wage becomes a major implicit cost of the entrepreneur’s business. The amount invested in the business is direct cost, but the potential return from this amount invested, in an alternative, stream is implicit cost.

An employee traveling on vacation incurs explicit costs such as cost of flight tickets, cost of hotel room, and the like. The wages the employee would have got if he or she did not take the vacation is the implicit cost of the vacation.

Description	Accounting Profit Analysis	Economic Profit Analysis	Remarks
Total Return	Quantity Sold * Unit Price	Quantity Sold * Unit Price	
Less Variable Costs	Quantity Sold * Average Variable Cost	Quantity Sold * Average Variable Cost	Explicit or Direct Costs
Less Fixed Costs	Fixed Costs	Fixed Costs	
Equals	Accounting Profit	Normal Profit	
Less Normal Rate of Return		Opportunity cost, or the lost opportunities when using the available resources for the particular purpose.	Implicit Costs
Equals		Economic Profit	A producer who is “breaking even” in an economic sense will be satisfied. New firms are attracted by positive economic profits (or excess profits). In the long run, given negative economic profits (i.e., losses), firms will leave the industry.

Accounting Profit versus Economic Profit

The major application of the difference between implicit costs vs. explicit costs lies in the determination of economic profit as opposed to accounting profit.

Bookkeeping or accounting considers only the explicit or direct costs when determining the profit and loss of a business, and this forms the basis for tax calculations. The economic costs of production, however, includes both explicit and implicit costs. While the company might show profit in accounting books, economic profit occurs only when the company’s revenue exceeds both explicit and implicit costs.

Explicit costs are easy to find and account. Implicit costs remain hidden, are hard to find, and very often remain overlooked. Companies that do so, and factor implicit costs into their decisions, generally retain the resources



they have and attract additional resources such as land, labor, and capital. Companies who ignore implicit costs and consider only direct costs find that despite their accounting books showing a profit, they tend to lose resources and face constraints

c) **Practice Example:**

Suppose you have a bank job earning \$50,000 a year, which you quit to open a small Internet business. Business is brisk and you bring in \$200,000 in revenues with accounting expenses of \$170,000. Are you earning a profit? Your accountant would say yes—\$30,000. An economist would say no—you lost \$20,000. Your significant other would perhaps side with the economist and advise you to go back to the bank!

2. **Distinguish the short run from the long run.**

Two assumptions define the **short run**:

- A fixed scale or fixed factor of production; and
- No entry to or exit from the industry

In the **long run**, firms can choose any scale of operations they want and firms can enter and leave the industry.

The long run is a time period long enough for the firm to alter any and all of its factors of production. The short run is the time period less than that — the period in which each firm has a fixed scale of production with at least one resource fixed in quantity. In the long run, new firms can enter or leave the market. In the short run, they can't.

Perhaps the best way to remember the difference between the short run and the long run is to understand the long run first. In the long run, the firm has enough time to alter all of its factors of production. Simply put, the short run is anything less.

In the long run, firms can enter or leave an industry. In the short run, a firm that wants to leave an industry can reduce production to zero, but can't leave. (Because it still has some fixed resources, it still has bills to pay. In effect, the closed-down firm is still in existence.) In the short run, a firm that wants to enter an industry hasn't enough time to assemble all of its factors of production—maybe the machines and workers are ready but the factory hasn't been built.

Remember: The short run and long run are conceptual time periods—not a specific number of days or weeks. It will be quicker to reach the long run in some industries than in others—think of all the years of training it takes to enter the market as a dentist!

3. **Explain how the production function relates inputs to outputs.**

The relationship between inputs and outputs (the production technology) expressed numerically or mathematically is called a production function or total product function.

4. **State the law of diminishing returns and explain why this phenomenon occurs only in the short run. Explain the relationships between marginal, total, and average product and, given a production function graph, interpret the behavior of marginal and average product.**

- a) The **marginal product** of a variable input is the additional output that an added unit of that input will produce if all other inputs are held constant. According to the **law of diminishing returns**, when additional units of a variable input are added to fixed inputs, after a certain point, the marginal product of the variable input will decline. This is a short-run concept—in the long run there are no fixed inputs.

When marginal product is increasing, the slope of the production function is positive and increasing (rising at an increasing rate). When diminishing marginal returns set in, the slope of the production function is positive but decreasing.

It is tempting to assume that marginal productivity declines because the employer hires the “best” resources (workers, for example) first and that subsequent workers are inferior. This may be true in the real world—the boss chooses the most able applicant first—but is not required. Even if all workers are equally capable, diminishing returns will still set in just as, in Chapter 6, when we consume equal additional cans of Coke, diminishing marginal utility will occur.

A frequently used illustration of the validity of the law of diminishing returns is a flowerpot. Space, in this case, is a fixed resource. If the law of diminishing returns did not hold, we could add larger and larger quantities of resources such as light and fertilizer, better hybrids, and more effective insecticides and feed everyone in the world from the product of the one flowerpot. Clearly, the law of diminishing returns does hold.



- b) **Average product** is the average amount of product produced by each unit of a variable factor of production. If marginal product is above average product, the average product rises; if marginal product is below average product, the average product falls.

The average product (of labor, for example) is the total product divided by the number of units (of labor), and it is related to marginal product.

- c) **The Average-Marginal Rule:** The relationship between marginal and average values is ruled by the laws of arithmetic. If the extra (marginal) value is more than the average, the average rises; if the marginal value is less than the average, the average falls. This rule, you will discover, pops up throughout your microeconomics course. If your GPA is 3.0 and you get an “A” in this course, your average will rise. If you pick up a “D,” your average will fall. Indeed, assuming we added one unit of output:

$$\text{New AP} = \frac{(\text{Old AP} \times \text{Old Output Units}) + \text{MP}}{\text{New Output Units}}$$

$$\text{AP}_1 = \frac{(\text{AP}_0 \times U_0) + \text{MP}}{U_1}$$

$$\text{AP}_1 = \frac{(\text{AP}_0 \times (U_1 - 1)) + \text{MP}}{U_1}$$

$$\text{AP}_1 \times U_1 - \text{MP} = \text{AP}_0 \times U_1 - \text{AP}_0$$

- If $\text{MP} > \text{AP}_0$, then to maintain the equality, $(\text{AP}_1 \times U_1) > (\text{AP}_0 \times U_1)$. Simplify by eliminating the U_1 from either side of the comparison, and we have $\text{AP}_1 > \text{AP}_0$.
- Similarly, if $\text{MP} < \text{AP}_0$, then to maintain the equality, $(\text{AP}_1 \times U_1) < (\text{AP}_0 \times U_1)$. Simplify by eliminating the U_1 from either side of the comparison, and we have $\text{AP}_1 < \text{AP}_0$.
- And, if $\text{MP} = \text{AP}_0$, then to maintain the equality, $(\text{AP}_1 \times U_1) = (\text{AP}_0 \times U_1)$. Simplify by eliminating the U_1 from either side of the equation, and we have $\text{AP}_1 = \text{AP}_0$.

5. **Explain and, given a numerical example with prices, select the least-cost production technology for a firm.**

Capital and labor are at the same time complementary and substitutable inputs. Capital enhances the productivity of labor, but it can also be substituted for labor.

One of the key decisions that all firms must make is which technology to use. Profit-maximizing firms will choose the combination of inputs that minimizes costs and therefore maximizes profits.

For a given output level, the producer should attempt to employ the least-cost method of production. The least-cost (profit-maximizing) method of production depends on the available techniques of production and the prices of the factors of production. One gets the best “value for money” by hiring resources to equalize the marginal product per dollar of each resource.

The logic here is the same as we saw in Chapter 6 where consumers attempt to maximize utility by equating the marginal utility per dollar of each good purchased. Go back and review that discussion, if the similarity is unclear to you.

6. **Use the Isoquant-Isocost diagram to identify the optimal capital-labor mix for a given production level.**

The Appendix to Chapter 7 develops two new graphical tools—the **Isoquant** and the **Isocost** line — with which it becomes possible to work out the least costly (and profit-maximizing) combination of two inputs, given a particular output level.

An isoquant plots all the combinations of two inputs that will produce a given output level. In general, isoquants are downward sloping—the more labor we use, the less capital we need.

The isoquant’s slope is the **Marginal Rate of Technical Substitution (MRTS)**, the rate at which we can surrender workers and hire new machines while holding production constant. Higher levels of production are shown by isoquants that are further from the origin.

An isocost line plots all the combinations of labor and capital that can be hired for a given amount of money. In general, isocost lines are downward sloping—the more labor we hire, the less money there is left to hire capital. The

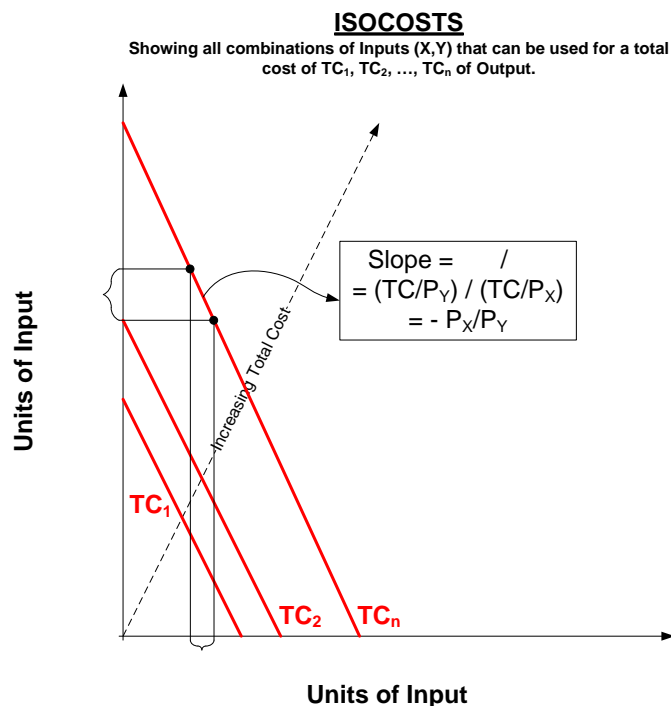
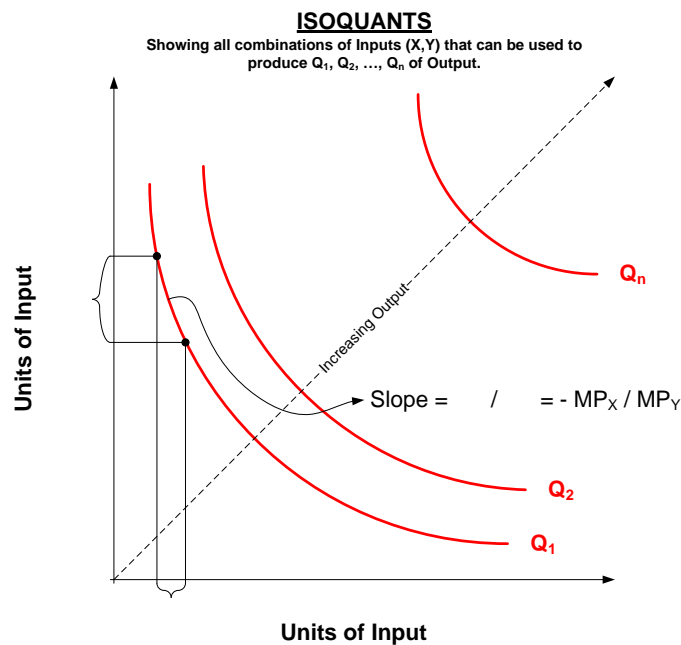


slope of the line is determined by the relative costs of labor and capital. A higher level of expenditure is shown by an isocost line that is further from the origin.

Given the trade-off between labor and capital and the relative prices of the two inputs, the producer's goal is to find the lowest possible cost for producing a chosen level of production. This must also represent the profit-maximizing input mix. Equilibrium occurs when the lowest possible isocost line is just tangential to the given isoquant. Formally, the equilibrium condition is stated: $MP_L / P_L = MP_K / P_K$.

You should see the relationship between the material in the Appendix of this chapter and in that of Chapter 6. For "isoquant," read "indifference curve." For "isocost line," read "budget line." And, of course, the marginal rate of technical substitution is the production-side version of the marginal rate of substitution. If you're a little confused by the Appendix to Chapter 7, go back now and review the Appendix to Chapter 6.

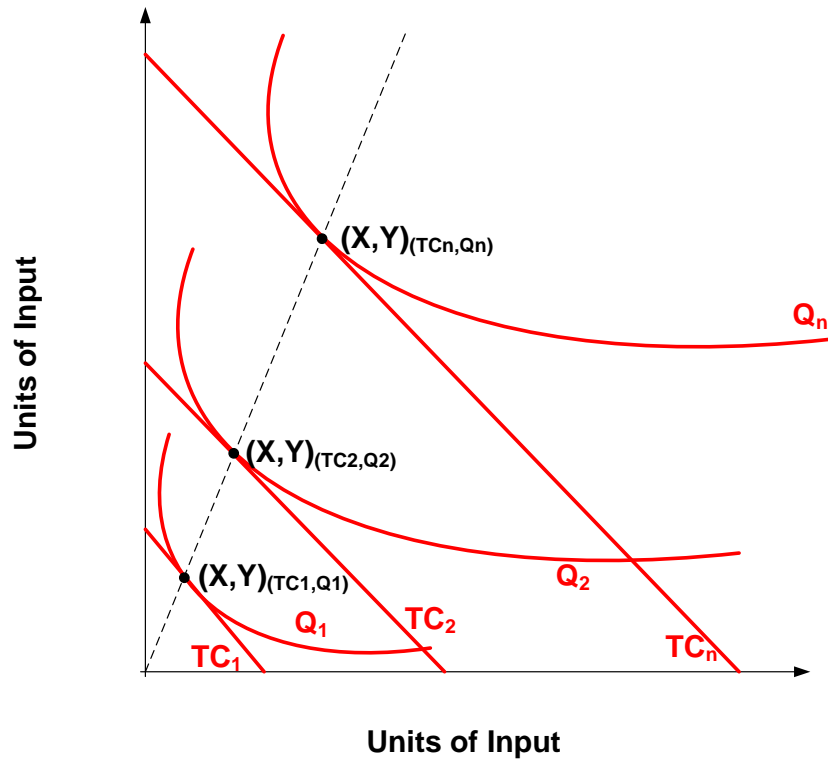
Graphically:





ISOCOST and ISOQUANTS

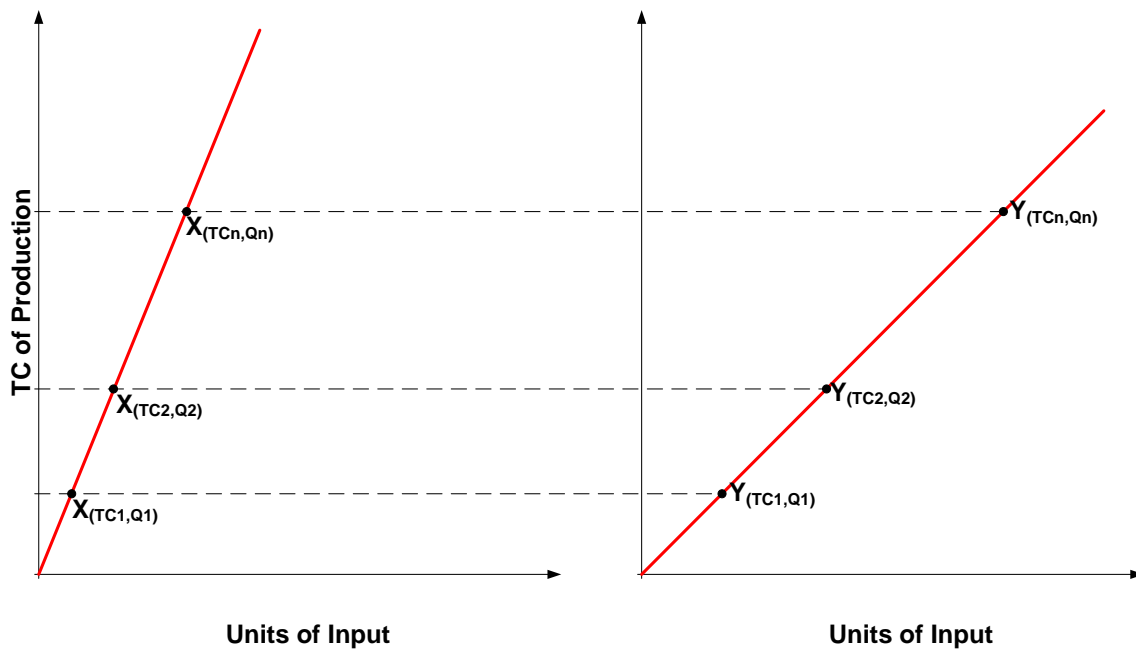
Showing the Minimum Cost of Producing at Each Level of Output.



→ **ONE IMPORTANT DISTINCTION:** By plotting the different equilibrium points, we get a "Cost" versus "Output Quantity" curve. This is NOT the Supply Curve which plots "Market Price" versus "Output Quantity".

COST CURVE

Showing the Minimum Cost of Producing at Each Level of Output.





7. Lexicon

Average product	The average amount produced by each unit of a variable factor of production.
Average Product of Labor	= Total Product / Total Units of Labor
Capital-Intensive Technology	Production Technology that relies heavily on capital instead of human labor.
Economic Profit	The difference between total revenue and total economic cost.
Firm	An organization that comes into being when a person or a group of people decides to produce a good or service to meet a perceived demand.
Isocost Line	A graph that shows all the combinations of capital and labor available for a given total cost.
Isoquant	A graph that shows all the combinations of capital and labor that can be used to produce a given amount of output
Labor-Intensive Technology	Production Technology that relies heavily on human labor instead of capital.
Law of Diminishing Returns	When additional units of a variable input are added to fixed inputs, after a certain point, the marginal product of the variable input declines.
Long Run	That period of time for which there are no fixed factors of production: Firms can increase or decrease the scale of operation, and new firms can enter and existing firms can exit the industry.
Marginal Product	The additional output that can be produced by adding one more unit of a specific input, ceteris paribus.
Marginal Rate of Technical Substitution	The rate at which a firm can substitute capital for labor and hold output constant.
Normal Rate of Return	A rate of return on capital that is just sufficient to keep owners and investors satisfied. For relatively risk-free firms, it should be nearly the same as the interest rate on risk-free government bonds.
Optimal Method of Production	The production method that minimizes cost.
Production	The process by which inputs are combined, transformed, and turned into outputs.
Production function or Total Product Function	A numerical or mathematical expression of a relationship between inputs and outputs. It shows units of total product as a function of units of inputs.
Production Technology	The quantitative relationship between inputs and outputs.
Profit	= Total Revenue - Total Cost
Short Run	The period of time for which two conditions hold: The firm is operating under a fixed scale (fixed factor) of production and firms can neither enter nor exit an industry.
Slope of Isocost line	= $\Delta K / \Delta L = - (TC / P_K) / (TC / P_L) = - P_L / P_K$
Slope of Isoquant	= $\Delta K / \Delta L = -MP_K / MP_L$
Total Economic Cost	The total of (1) out-of-pocket costs and (2) opportunity cost of all factors of production.
Total Revenue	The amount received from the sale of the product (Q X P).



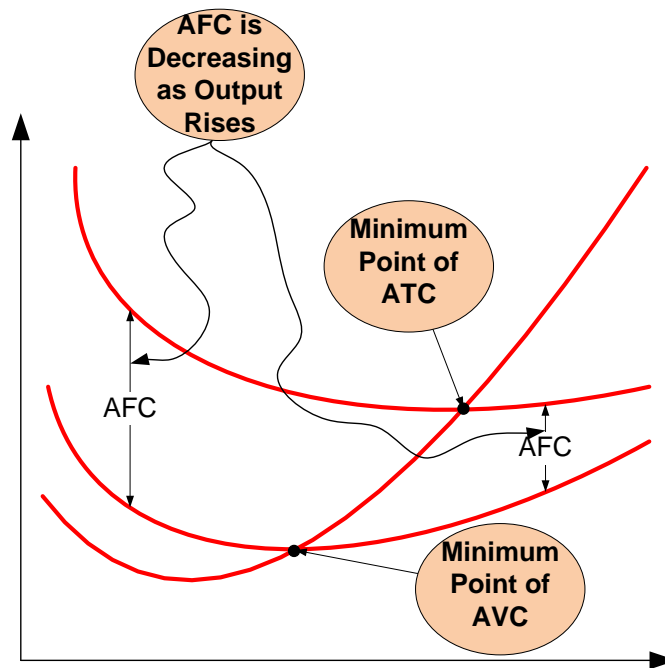
VIII- Chapter 8 – Short-Run Costs and Output Decisions.

1. **Define, distinguish, and explain the relationships among total cost, total fixed cost, and total variable cost; and among average total cost, average fixed cost, and average variable cost. Interpret cost diagrams.**
 - a) **To calculate production costs, firms must know two things:**
 - The quantity and combination of inputs they need to produce their product; and
 - The cost of those inputs.
 - b) In the short run, the costs of fixed resources are called fixed costs and those of variable resources are called variable costs. Added together they are total costs. In the short run, total fixed costs (TFC) are unavoidable and must be paid—even if the firm has ceased production. In the long run, however, all resources and all costs are variable. Total variable cost (TVC) is the cost associated with the cheapest combination of inputs at each level of production. Numerous combinations of inputs can be used to produce a given level of output. Total variable cost (TVC) is the sum of all costs that vary with output in the short run.
 - c) Average fixed cost ($AFC = TFC/q$) graphs as a downward-sloping line—as output increases the overheads are spread over more units. Average variable cost ($AVC = TVC/q$) is U-shaped and is influenced by the marginal cost curve because of the “average-marginal” rule. Average total cost (ATC) is TC/q or $AFC + AVC$.
 - d) As output level increases, the difference between average total cost and average variable cost decreases, because additional units of output spread fixed cost over a larger number of units and reduce its importance. $ATC = AVC + AFC$. As output rises, average fixed cost declines steadily because the same total is being spread over a larger and larger quantity of output. This phenomenon is called spreading overhead.
2. **Define and graph marginal cost. Explain the shape of the marginal cost curve, using your knowledge of marginal product. Relate marginal cost to total variable cost and total cost.**
 - a) Marginal cost (MC) is the increase in total cost (and total variable cost) of hiring resources that occurs when an extra unit of output is produced. It is the increase in total cost that results from the production of 1 more unit of output. If a firm is producing 1,000 units, the additional cost of increasing output to 1,001 units is marginal cost. Marginal cost measures the cost of the additional inputs required to produce each successive unit of output. Because fixed costs do not change when output changes, marginal costs reflect changes in variable costs.
 - b) In the short run, because the firm is constrained by fixed resources, eventually the law of diminishing returns will apply, marginal productivity will decrease, and marginal cost will increase. In the short run, a firm is limited by a fixed factor of production or a fixed scale of a plant. As a firm increases output, it will eventually find itself trapped by that scale. Because of the fixed scale, marginal cost eventually rises with output.
 - c) As in Chapter 7, the “average-marginal rule” applies to the relationship between the marginal (extra) value and the average value. Remember: marginal cost shows how total cost changes as output changes. Because total fixed cost doesn’t change, it has no effect at all on marginal cost. The marginal cost curve intersects both the average variable cost curve and average total cost curve at the lowest point of each.
 - d) The cost diagram represented by AVC, ATC, and MC is important in this and subsequent chapters and it’s crucial to learn how to draw it correctly. It’s not merely a collection of randomly positioned U-shaped curves. The marginal cost curve must cut through the other two curves at their minimum value. Always draw the ATC curve above the AVC curve—total cost must be larger than any single component of costs. The vertical gap between ATC and AVC represents the level of AFC.
 - e) The easiest way to draw the diagram correctly is to draw the MC curve first, then the ATC curve. Be sure that the ATC curve bottoms out just as it meets the MC curve (because of the “average-marginal rule”). Finally, draw in the AVC curve—it also bottoms out when it reaches the MC curve. Be careful that you draw the AVC curve so that it gets closer to the ATC curve as output increases—the difference between ATC and AVC (that is, AFC) decreases as AFC decreases.
 - f) Caution: Be careful of misinterpreting the formula for MC. It is true that $MC = \Delta TVC$, but only when $\Delta q = 1$. As is stated, more generally, $MC = \Delta TVC / \Delta q$.
 - g) Marginal cost is the slope of the Total Variable Cost Curve. The total variable cost curve always has a positive slope because total costs always rise with output. However, increasing marginal cost means that total costs ultimately rise at an increasing rate.
 - h) Average variable cost (AVC) is equal to total variable cost divided by the quantity of output. When marginal cost is above average variable cost, average variable cost is increasing. When marginal cost is below average



variable cost, average variable cost is declining. Marginal cost intersects average variable cost at AVC's minimum point.

- i) Average total cost (ATC) is equal to total cost divided by the quantity of output. It is also equal to the sum of average fixed cost and average variable cost. When marginal cost is below average total cost, average total cost is declining toward marginal cost. When marginal cost is above average total cost, average total cost is increasing. Marginal cost intersects average total cost at ATC's minimum point.
- j) From Chapter 7: As marginal product decreases (loss of productivity), marginal cost increases (the cost of making extra units rises).
- k) **THE INFAMOUS GRAPH:**



3. **State the assumptions underlying the perfect competition model and relate these to the firm's role as a "price taker."**

- a) A perfectly competitive firm faces a demand curve that is a horizontal line (in other words, perfectly elastic demand). Some basic assumptions for the perfectly competitive model are: many small firms producing a homogeneous (standardized) product with free entry into, and exit from, the market in the long run. These assumptions lead to two important implications. **Each firm faces a perfectly elastic (horizontal) demand curve, and each firm is a price taker.**
- b) Examples of Perfect Competition: The material in this chapter might put you off because of the lack of plausible examples of perfect competition—it may seem rather artificial. A farmers' market is a reasonable example of a perfectly competitive market—tomatoes are a quite homogeneous product. No single farmer sets his/her price independently and any seller who prices above the going rate will make no sales. Traditional examples come from the farming sector (wheat, apples, eggs), but financial markets offer close approximations.

4. **A summary of cost concepts:**

Term	Definition	Equation
Accounting Costs	Out-of-pocket costs or costs as an accountant would define them. Sometimes referred to as "Explicit Costs".	



Term	Definition	Equation
Economic Costs	Costs that include the full opportunity costs of all inputs. These include what are often called “Implicit Costs”.	
Total Fixed Costs (TFC)	Costs that do not depend on the quantity of output produced. These must be paid even if output is zero.	
Total Variable Costs (TVC)	Costs that vary with the level of output.	
Total Cost (TC)	The total economic cost of all the inputs used by a firm in production.	$TC = TFC + TVC$
Average Fixed Costs (AFC)	Fixed costs per unit of output.	$AFC = TFC / q$
Average Variable Costs (AVC)	Variable costs per unit of output.	$AVC = TVC / q$
Average Total Costs (ATC)	Total costs per unit of output.	$ATC = TC / q = AFC + AVC$
Marginal Costs (MC)	The increase in total cost that results from producing 1 additional unit of output.	$MC = \Delta TC / \Delta q$

5. Define marginal revenue and explain why it is constant in perfect competition.

The demand curve faced by the perfectly competitive firm is perfectly elastic (horizontal) and is identical to the marginal revenue curve. Total revenue is price × quantity sold, whereas marginal revenue is how much total revenue changes as each extra unit is sold. In perfect competition, marginal revenue equals price (because each extra unit sold increases total revenue by the amount of the price).

Mathematically, marginal revenue is change in total revenue (TR) divided by change in quantity. Boiled down, “change in total revenue” is “change in price × change in quantity.” However, in perfect competition, price remains constant as the firm’s output level changes. The only way that total revenue can change, then, is through a change in quantity. The marginal revenue formula becomes:

$$MR = (\text{Price} \times \text{change in quantity}) / \text{change in quantity}$$

Because the “change in quantity” terms cancel, we can see that MR equals price (and demand) and, therefore, is constant.

6. State how firms determine the profit-maximizing level of output and explain why profit is maximized at that production level.

To maximize profits, the firm should produce at the level of production where price (or marginal revenue) is equal to marginal cost. The profit-maximizing condition, then, is $MR = MC$.

To simplify your study, you can immediately adopt the “ $MR = MC$ ” profit-maximizing formula, instead of the “ $P = MC$ ” formula used in this chapter. Either formula is correct for perfect competition, but the “ $MR = MC$ ” formula applies in all the cases you will encounter (e.g., monopoly, monopolistic competition). Knowing how to find the profit-maximizing level of output is one of your most powerful tools in microeconomics.

When MR exceeds MC, output should be increased—the marginal unit brings in more revenue than it costs. When MR is less than MC, output should be decreased—the marginal unit costs more than it earns in revenue.

In general, the firm first locates the profit-maximizing level of production—quantity is decided first. In perfect competition, the firm is a price taker. In other market structures, you will discover, the price is specified following the selection of the level of production.

7. Explain why the marginal cost curve above the AVC curve is the firm’s short-run supply curve.

Marginal Cost is identified with the firm’s short-run supply curve. As price (and marginal revenue) increase, the firm will increase production. The determining factor is the behavior of marginal cost.

Note that for a portion of its length—the portion where MC lies below AVC—the marginal cost curve is not the firm’s short-run supply curve. In the case where the price is so low that the firm is unable to cover its variable costs, it will close down. The MC curve is therefore the short-run supply curve above the AVC curve.



8. Lexicon

Average Fixed Cost (AFC)	$AFC = TFC/q$ Total fixed cost divided by the number of units of output; a per-unit measure of fixed costs.
Average Total Cost (ATC)	$ATC = TC/q = AFC + AVC$ Total Cost divided by the number of units of output.
Average Variable Cost (AVC)	$AVC = TVC/q$ Total Variable Cost divided by the number of units of output.
Fixed Cost (FC)	Any cost that does not depend on the firm's level of output. These costs are incurred even if the firm is producing nothing. There are no fixed costs in the long run.
Homogeneous Product	Undifferentiated products; products that are identical to, or indistinguishable from one another.
Marginal Cost (MC)	The increase in total cost that results from producing 1 more unit of output. Marginal Costs reflect changes in variable costs.
Marginal Revenue (MR)	The additional revenue that a firm takes in when it increases output by one additional unit. In perfect competition, $P = MR$.
Perfect Competition	An industry structure in which there are many firms, each small relative to the industry, producing identical products and in which no firm is large enough to have any control over prices. In perfectly competitive industries, new competitors can freely enter and exit the market.
Profit-Maximizing Level of Output for all Firms	$MR = MC$
Profit-Maximizing Level of Output For Perfectly Competitive Firms	$P = MC = MR$
Spreading Overhead	The process of dividing total fixed costs by more units of output. Average fixed cost declines as quantity rises.
Total Cost (TC)	$TC = TFC + TVC$ Total Cost equals Total Fixed Costs plus Total Variable Costs.
Total Fixed Costs (TFC) or Overheads	Slope of TFC = MC The total of all costs that do not change with output even if output is zero.
Total Revenue (TR)	$TR = P \times q$ The total amount that a firm takes in from the sale of its product: the price per unit times the quantity of output the firm decides to produce.
Total Variable Cost (TVC)	The total of all costs that vary with output in the short run.
Total Variable Cost Curve	A graph that shows the relationship between total variable cost and the level of a firm's output.
Variable Cost (VC)	A cost that depends on the level of production chosen.



IX- Chapter 9 – Long Run Costs and Output Decisions

1. Short-Run Condition and Long-Run Direction:

a) In the short run, the firm must be

- The firm is earning positive economic profits;
- The firm is just breaking even – that is, earning a normal rate of return and thus zero profits; or
- The firm is suffering economic losses. If the firm can cover its operating expenses, it will continue to produce, otherwise, it will shut down.

b) In the long run, each of the cases above produces a different response:

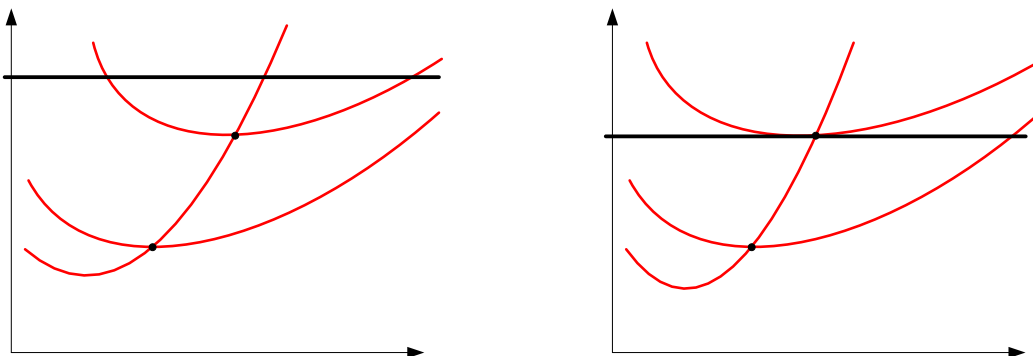
- The firm making an economic profit will try to expand; new firms, attracted by the extra profits, will enter the industry.
- The firm making a normal profit will maintain its production level; no incentive exists for firms to enter or leave the industry.
- The firm making a loss will leave the industry.

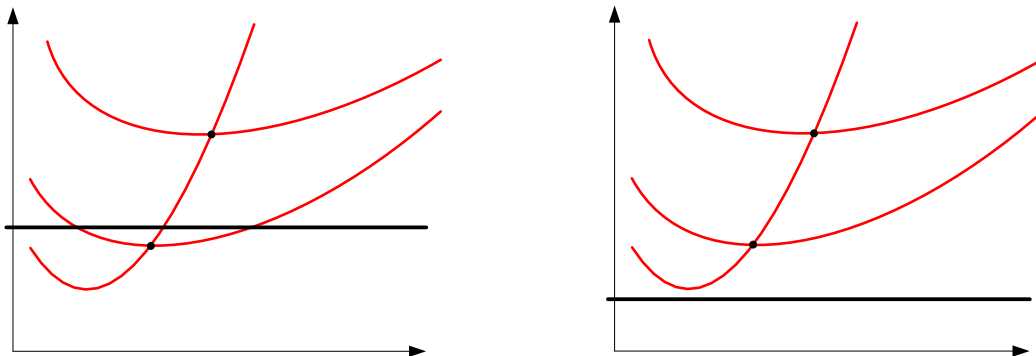
2. Graphs!

a) The diagrams in this chapter are especially detailed—drawing practice is essential! Redraw each of the four short-run cases:

- Making economic profits;
- Breaking even;
- Making a loss but producing; and
- Making a loss and closing down.

b) Here is an extended graphical example giving each of the possible short-run cases.





- c) A firm that is earning positive profits in the short run and expects to continue doing so has an incentive to expand in the long run. Profits also provide an incentive for new firms to enter the industry.
- d) In the short run, firms suffering losses are stuck in the industry. They can shut down operations ($q = 0$), but they must still bear fixed costs. In the long run, firms suffering losses can exit the industry.
- e) A firm's decision about whether to shut down in the short run depends solely on whether its total revenue from operating is sufficient to cover its total variable cost. If total revenue exceeds total variable cost, the excess can be used to pay some fixed costs and thus reduce losses.
- f) Anytime that price is below the minimum point on the average variable cost curve, total revenue will be less than total variable cost, and the firm will shut down. The minimum point on the average variable cost curve (which is also the point where marginal cost and average variable cost intersect) is called the shutdown point. At all prices above the shutdown point, the MC curve shows the profit-maximizing level of output. At all prices below it, optimal short-run output is zero.
- g) In the short run, the border between producing at a loss and shutting down occurs where average variable cost is at its minimum (and where marginal cost intersects it). If the price per unit isn't high enough to cover even these minimum average operating expenses, the firm should shut down. Any price above the minimum AVC value will lead to "profit-maximizing" behavior, producing where $P = MC$. Therefore, the Short-Run Supply Curve of a firm in a perfectly competitive industry is the portion of its marginal cost curve that lies above its average variable cost curve.
- h) **The industry supply curve is derived by aggregation. Two things can cause the industry supply curve to shift:**
 - In the short run, anything that causes marginal costs to change across the industry, such as an increase in the price of a particular input; and
 - In the long run, entry or exit of firms.

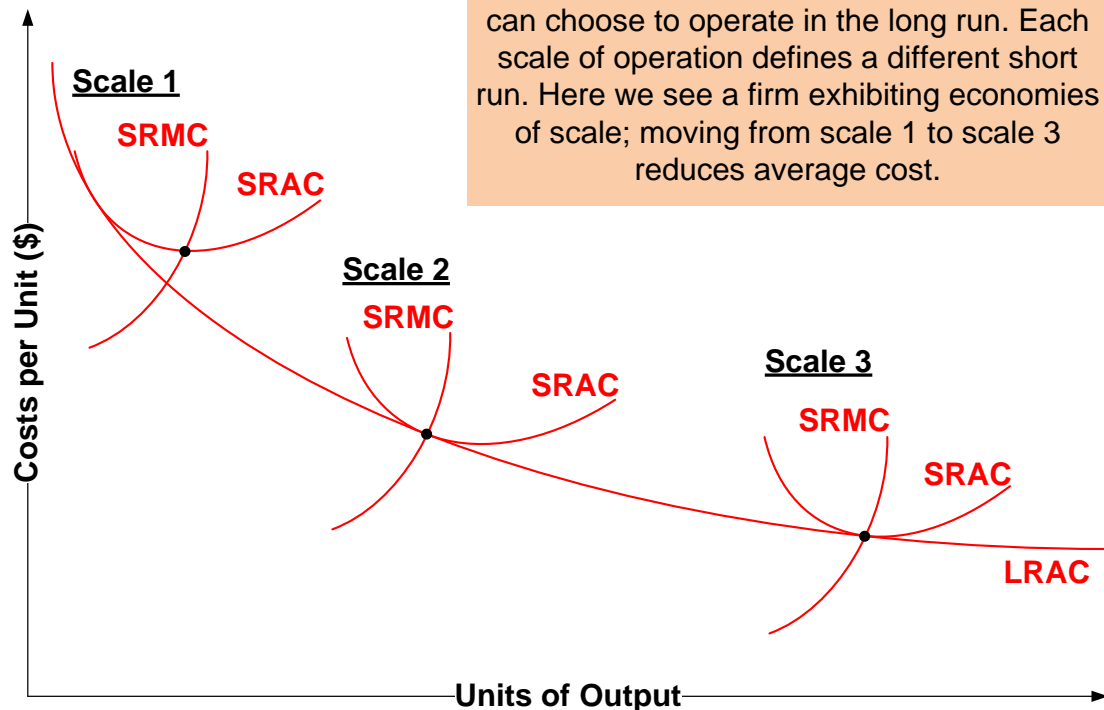
3. **Long-Run Costs: Economies and Diseconomies of Scale**

- a) In the short run, a firm had to determine an optimum output for a given $P^* = MR$ and the cost curves. In the long run, the firm must now determine its optimum method of production for a given output!
- b) In the long run there are no fixed resources—the firm can select any scale of production. The U-shape of the firm's long-run average cost curve can't be due to diminishing returns—the concept of diminishing returns is purely short run. The long-run average cost curve is U-shaped because of internal economies and diseconomies of scale. In the presence of economies of scale, average costs decrease as output rises; in the presence of diseconomies of scale, average costs increase as output rises.
- c) Internal economies of scale (increasing returns to scale) are revealed when the firm's long-run average costs fall as its production increases. If a firm doubles all inputs, output will more than double. Such cost-reducing improvements might be due to standardization or bulk buying. Internal diseconomies of scale (decreasing returns to scale) occur when the firm's long-run average costs increase as its production expands. Diseconomies are most frequently blamed on managerial inefficiency as a business becomes too large and unwieldy to operate effectively. Also, regulations (such as fire, health or safety regulations) may only apply to larger firms. Constant returns to scale are a third possibility.



A Firm Exhibiting Economies of Scale

The long-run average cost curve of a firm shows the different scales on which the firm can choose to operate in the long run. Each scale of operation defines a different short run. Here we see a firm exhibiting economies of scale; moving from scale 1 to scale 3 reduces average cost.



- d) A firm's Long-Run Average Cost Curve (LRAC) shows the costs associated with different scales on which it can choose to operate in the long run.

e) Decreasing Returns to Scale

When average cost increases with scale of production, a firm faces decreasing returns to scale, or diseconomies of scale. The most often cited example of a diseconomy of scale is bureaucratic inefficiency. As size increases beyond a certain point, operations tend to become more difficult to manage. Large size often entails increased bureaucracy. A large firm is also more likely than a small firm to find itself facing problems with organized labor. Unions can demand higher wages and more benefits, go on strike, force firms to incur legal expenses, and take other actions that increase production costs.

- f) Economies and Diseconomies of Scale: Learn the "other names" for internal economies and diseconomies of scale—increasing returns and decreasing returns, respectively. The material in this section explains both the downward- and the upward-sloping long-run average cost curve—why it is U-shaped. As with diminishing returns in the short run, economies and diseconomies fight for dominance as the firm increases output. Initially, economies of scale represent the stronger effect and push average costs down, but as output rises diseconomies begin to prevail and costs start to rise (as mentioned above, large companies tend to face more and more scrutiny from the market, employees, and the government; they also experience bureaucracy; etc...). The minimum efficient scale is the lowest level of operations at which long-run average costs are minimized. Essentially, it is the answer to the question, how large does a firm have to be to have the best per-unit cost position possible?

Economists have studied cost data extensively over the years to estimate the extent to which economies of scale exist. Evidence suggests that in most industries, firms do not have to be gigantic to realize cost savings from scale economies. In other words, the MES is moderate relative to market size. Perhaps the best example of efficient production on a small scale is the manufacturing sector in Taiwan. Taiwan has enjoyed very rapid growth based on manufacturing firms that employ fewer than 100 workers.

In conclusion, when we have diseconomies of scale (decreasing returns to scale), it pays to be small, and the MES is small relative to the size of the industry. Conversely, when we have economies of scale (increasing



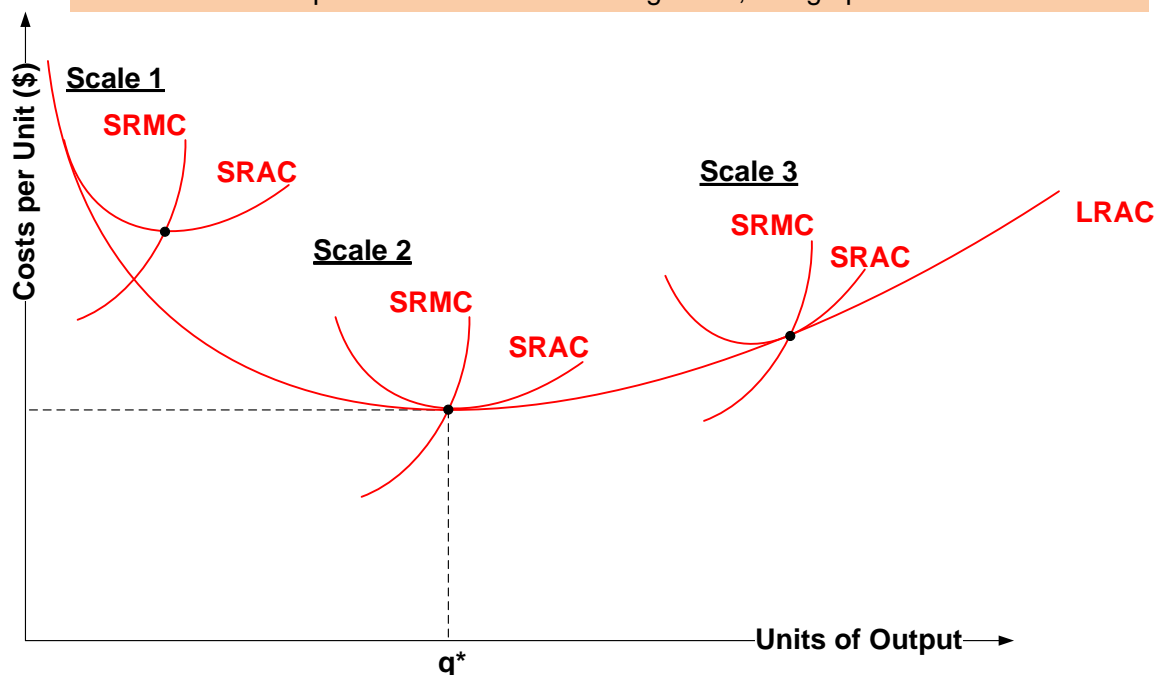
returns to scale), it pays to be big, and the MES is large relative to the industry. Finally, in constant returns to scale, we're somewhere in the middle and the MES is moderate relative to industry size...

g) U-Shaped Long-Run Average Costs

- i) As we have seen, the shape of a firm's long-run average cost curve depends on how costs react to changes in scale. Some firms do see economies of scale, and their long-run average cost curves slope downward. Most firms seem to have flat long-run average cost curves. Still others encounter diseconomies of scale, and their long-run average cost curves slope upward.
- ii) Many firms exhibit both economies of scale and diseconomies of scale. Average costs decrease with scale of plant up to a level q^* of output and increase with scale after that.
- iii) The U-shaped average cost curve looks very much like the short-run average cost curves we have examined in the last two chapters, but do not confuse the two. All short-run average cost curves are U-shaped because we assume a fixed scale of plant that constrains production and drives marginal cost upward as a result of diminishing returns. In the long run, we make no such assumption; instead, we assume that scale of plant can be changed and ask how costs change with scale.
- iv) It is important to note that economic efficiency requires taking advantage of economies of scale (if they exist) and avoiding diseconomies of scale. The optimal scale of plant is the scale of plant that minimizes average cost. In fact, as we will see next, competition forces firms to use the optimal scale.

A Firm Exhibiting Economies and Diseconomies of Scale

Economies of scale push this firm's average costs down to q^* . Beyond q^* the firm experiences diseconomies of scale; q^* is the level of production at lowest average cost, using optimal scale.



4. Long-Run Adjustments to Short-Run Conditions

- a) When short-run profits exist in an industry, firms enter and existing firms expand. These events shift the industry supply curve to the right. When this happens, price falls and ultimately profits are eliminated.
- b) When short-run losses are suffered in an industry, some firms exit and some firms reduce scale. These events shift the industry supply curve to the left, raising price and eliminating losses.
- c) In the short run, firms may enjoy economic profits or suffer economic losses. In either case, the industry is not in long-run equilibrium because firms will adjust their behavior. Given short-run economic profits, new firms will be attracted to the industry. If all economies of scale have not been fully realized, existing firms have an incentive to expand. The entry of new firms and the expansion of existing firms cause the industry's short-



run supply curve to shift to the right, reducing price and eroding profits. In the face of short-run economic losses, firms will quit the industry, causing the industry supply curve to shift left. This raises price and eventually eliminates losses for the surviving firms.

- d) In long-run equilibrium, firms maximize profits ($MR = LRMC$) and make zero economic profit ($P^* = LRAC$). However, profit maximizing occurs in the short run too, where $MR = SRMC$. If the firm is in long-run equilibrium, earning normal profit, then this condition also applies in the short run ($P^* = SRAC$). In perfect competition, where price always equals marginal revenue, the complete long-run equilibrium condition holds: $P^* = SRMC = SRAC = LRAC$.
- e) The firm maximizes profits where P^* (or MR) = $SRMC$. $MC = SRAC$ reveals that unit costs are minimized and that average productivity is maximized—inputs are being allocated efficiently. (Recall that the $SRMC$ and $SRAC$ curves intersect at the minimum point on the average cost curve.)
- f) Competition requires that only normal profits be made in long-run equilibrium, so $P^* = LRAC$. A similar logic holds in the short run, so $P^* = SRAC$. You may question this—can't economic profits occur in the short run? Yes, but to achieve long-run equilibrium, they must have been competed away in a perfectly competitive industry. Notice that in equilibrium the typical firm produces at the lowest possible cost per unit, both in the short run and in the long run. This result occurs because of free entry into and exit from the market, forcing each firm to the most cost-efficient output level.
- g) Why is this equilibrium? Because there's no incentive to change. No new firms want into the industry (forcing price down); no existing firms are dissatisfied with their normal profits and seeking to leave (forcing price up).
- h) Why might a firm not merely continue to expand its plant indefinitely? Answers will vary, depending on the industry chosen. Sometimes, big is not better and small is not beautiful. If we see an industry containing many successful firms with different scales of operation, this would imply that the long-run average cost curve is fairly flat—there's no advantage to being either big or small. If, on the other hand, most firms are of similar size, or if they have multiple plants, this is evidence that this industry does have some optimal scale of operation—tanning salons, pizzerias, or hot dog vendors might be examples of this case. The image of small family farms grimly enduring in the face of competition from huge agri-firms also suggests that there is an optimal scale of operation (in this case, large). Over the past 70 years, average farm size has tripled and the number of farms has shrunk by two-thirds.
- i) In efficient markets, investment capital flows toward profit opportunities.

5. Short Run Condition to Long Run Decision

Profits, Losses, and Perfectly Competitive Firm Decisions in the Long and Short Run			
Profit/Loss	Short Run Condition	Short Run Decision	Long Run Decision
Profits	$TR > TC$	$P = MC \rightarrow$ Operate	Expand \rightarrow New Firms Enter
Losses	$TR \geq TVC$	$P = MC \rightarrow$ Operate (Loss < Total Fixed Cost)	Contract \rightarrow Firms Exit
	$TR < TVC$	Shut Down (Loss = Total Fixed Cost)	Contract \rightarrow Firms Exit

6. Lexicon

Breaking Even	The situation in which a firm is earning exactly a normal rate of return
Constant Returns to Scale	An increase in a firm's scale of production has no effect on costs per unit produced.
Decreasing Returns to Scale or Diseconomies of Scale	An increase in a firm's scale of production leads to higher costs per unit produced.
Increasing Returns to Scale or Economies of Scale	An increase in a firm's scale of production leads to lower costs per unit produced.
Long-Run Average Cost Curve (LRAC)	The "envelope" of a series of Short-Run Cost Curves.



Long-Run Competitive Equilibrium	<p>The point at which $P^* = SRMC = SRAC = LRAC$ and profits are equal to zero.</p> <p>When there is promise of positive profits, investments are made and output expands. When firms end up suffering losses, firms contract and some go out of business. It can take quite awhile, however, for an industry to achieve Long-Run Competitive Equilibrium.</p> <p>In fact, because costs and tastes are in a constant state of flux, very few industries ever really get there. The economy is always changing. There are always some firms making profits and some firms suffering losses.</p> <p>This, then, is a story about tendencies: Investment – in the form of new firms and expanding old firms – will over time tend to favor those industries in which profits are being made; and over time, industries in which firms are suffering losses will gradually contract from disinvestment.</p>
Minimum Efficient Scale (MES)	The smallest size at which the Long-Run Average Cost Curve is at its minimum.
Optimal Scale of Plant	The scale of plant that minimizes average cost.
Short-Run Industry Supply Curve	The sum of the Marginal Cost Curves (above AVC) of all the firms in an industry.
Shutdown Point	The lowest point on the Average Variable Cost Curve. When price falls below the minimum point on AVC, total revenue is insufficient to cover variable costs and the firm will shut down and bear losses equal to fixed costs.



X- Chapter 10 – Input Demand: The Labor and Land Markets

1. **Explain why Input Demand is a “Derived” Demand.**
 - a) The same set of decisions that lies behind output supply curves also lies behind input demand curves. Only the perspective is different.
 - b) Demand for inputs depends on demand for the outputs that they produce; input demand is thus a “derived” demand. When the management of the Miami Heat signs LeBron James to a contract, it does so because of the “output” (points and excitement) that James can produce for the team. The demand for his labor services is a demand derived from the demand for the team’s output by its public. This specific conclusion is generally true for the demand for all types of input.
 - c) Productivity is a measure of the amount of output produced per unit of input.
 - d) In general, firms will demand workers as long as the value of what those workers produce exceeds what they must be paid. Households will supply labor as long as the wage exceeds the value of leisure or the value that they derive from nonpaid work.
 - e) This chapter’s main theme is that the value of an input depends on society’s valuation of the output produced by that input. Inputs will be hired as long as their contribution to the value of production exceeds their cost.
2. **Explain why inputs are simultaneously complements and substitutes.**
 - a) Inputs are at the same time complementary and substitutable. Although fans of the L.A. Lakers might disagree (for them, the only valid product is a “W” in the win column), the product of the Lakers is “entertainment”—the Lakers compete with movies, rock concerts, and so on for the public’s leisure dollars. The facilities in the Lakers’ stadium add to the entire entertainment package (inputs are complements), but they may be seen as substitutes for Kobe Bryant (a team without a Bryant can attract fans by offering other facilities instead). At the team level, one player can assist (complement) the play of another and can also substitute for that player.
 - b) In the short run, some factor of production is fixed. This means that all firms encounter diminishing returns in the short run. Stated somewhat differently, diminishing returns means that all firms encounter declining marginal product in the short run.
3. **Define and calculate marginal revenue product (MRP). Find the profit-maximizing hiring level for an input, given MRP and input price information. Explain why the MRP curve is identical to the input demand curve.**
 - a) The Marginal Revenue Product (MRP) of a variable input is the additional revenue a firm earns by employing one additional unit of the input, ceteris paribus. MRP is equal to the input’s Marginal Product times the Price of Output.
 - b) Marginal revenue product of labor is the addition to revenue that occurs when an additional worker is hired—it’s the dollar value of the extra merchandise he produces (i.e., $MP_L * P$). In the short run, as extra workers are hired, MRP falls because of diminishing marginal productivity. The MRP curve is typically downward sloping.
 - c) Demand for an input depends on that input’s Marginal Revenue Product. Profit-maximizing perfectly competitive firms will buy an input (for example, hire labor) up to the point where the input’s Marginal Revenue Product equals its Price. **For a firm employing only one variable factor of production, the MRP curve is the firm’s demand curve for that factor in the short run.**
4. **Identify the factors that affect the position of an input demand curve and explain how each factor shifts the curve.**
 - a) When a firm employs two variable factors of production, a change in factor price has both a factor substitution effect and an output effect.
 - b) A wage increase may lead a firm to substitute capital for labor and thus cause the quantity demanded of labor to decline. This is the Factor Substitution Effect of the wage increase.
 - c) A wage increase increases cost, and higher cost may lead to lower output and less demand for all inputs, including labor. This is the Output Effect of the wage increase. The effect is the opposite for a wage decrease.
 - d) A profit-maximizing employer will hire any worker who pays his/her way. As the wage changes, the hiring level will change too, based on the MRP (demand for labor) schedule. Each point on the demand schedule equates input price and MRP. The equilibrium hiring condition is: $W = MRP$. It is equivalent to the $P = MC$ profit-maximization rule in output markets. The input demand curve will shift if marginal productivity changes (through technological change) or if the price of the product changes (through a change in the demand for the output). Changes in the quantity and price of other (complementary or substitutable) inputs are other factors that can shift the position of the input demand curve. → **A shift in a firm’s demand curve for a factor**



of production can be influenced by the demand for the firm's product, the quantity of complementary and substitutable inputs, the prices of other inputs, and changes in technology. In general, an increase in input prices increases cost, and higher costs lower productivity. A price-increase for inputs will lead to lower output and less demand for all inputs.

5. **In a world with more than one variable resource, derive and explain the factors influencing the demand curve for each input.**

- a) The same profit-maximizing principles apply with two variable factors of production as with one variable factor of production. However, when more than one factor is involved, an increase in the price of an input has a factor substitution effect and an output effect. These effects explain why, as wage increases, the quantity demanded of labor decreases. As the wage rises, capital is substituted for the now relatively more expensive labor — the factor substitution effect. Also, higher wages may mean higher production costs, lower production and less use of all inputs, including labor—the output effect.
- b) Suppose the price of robot car-machines decreases and that there is job loss on the assembly line. In the labor market, which factor is stronger, the factor substitution effect or the output effect? The lowered price of robots will increase management's desire to substitute capital for labor. The labor demand curve will decrease — this represents the factor substitution effect. Because production costs have fallen (cheaper robots), the company will wish to expand production because with lower costs and the same selling price, the company will earn higher profits. Expanding production means that the demand for labor will increase — this is the output effect. If labor demand fell, on balance, the factor substitution effect would be stronger.

6. **Explain what is meant by the term *Pure Rent* and explain why it arises.**

- a) Because land is in strictly fixed supply, its price is demand-determined — that is, its price is determined exclusively by what households and firms are willing to pay for it. The return to any factor of production in fixed supply is called a *Pure Rent*. A firm will pay for and use land as long as the revenue earned from selling the product produced on that land is sufficient to cover the price of the land. The firm will use land up to the point at which $MRP_A = P_A$, where A is land (acres).
- b) The market for land differs from the market for labor in one important respect: land prices are demand determined, due to the fact that land is strictly fixed in supply. The return to any factor of production in fixed supply is called a pure rent. Any site has a variety of uses and should be allocated to the user who is willing to pay the most. (page 256)
- c) Pure rent emerges when any factor (not just land) is fixed in supply. Any payment greater than zero is a "bonus." Suppose that Marlene has a PC she's willing to lend out (lease, if you want) to her suitemates, Charlene, Arlene, and Darlene. Each has a term paper due tomorrow morning and is willing to pay for the use of the PC (which is the only one available at such short notice). Marlene would take \$6, but asks for bids. Charlene offers \$7, Arlene, \$8, and Darlene, \$10. Darlene would have the use of the PC, and Marlene would receive a pure rent of \$4.

7. **In a world with more than one variable resource, state and interpret the conditions necessary for profit maximization.**

- a) The logic of profit maximization ($P = MC$) leads to $Wage = MRP_L$. No profit-maximizing employer will hire a worker who doesn't pay his or her way. Firms weigh the value of outputs as reflected in output price against the value of inputs as reflected in marginal costs.

We are on the demand side. Recall the rule developed to describe the consumer's utility-maximizing mix of purchases: the final dollar spent on each good must provide the same utility. The same logic applies to profit maximization. Except that, for companies and unlike individuals, demand is derived and dependent on the return from selling the output. In other words, the "pleasure" or "utility" a company gets from an input is not merely dependent on the consumption of the input, but also on the return it gets from selling its output! When a firm has multiple inputs (L = Labor, A = Land, and K = Capital), the final dollar spent on each input must generate the same amount of additional production. We will explore this further below.

- b) MP and MRP both maximize return and choosing the input with the highest MRP is return maximizing. To ensure we have actual profits — the maximum return could still be generating a loss — we divide the MP or MRP by the cost of that input. The Cost minimizing AND profit maximizing equation is for the following to hold for ALL inputs at the same time: $MRP = \text{Cost of input}$ (This is the "technology" the company chooses in chapters 8 and 9).
- c) From the above, the profit-maximizing condition for the perfectly competitive firm is (P_x is the price of output X):



$$P_L = MRP_L = MP_L \times P_X$$

$$P_A = MRP_A = MP_A \times P_X$$

$$P_K = MRP_K = MP_K \times P_X$$

When all these conditions are met simultaneously, the firm will be using the optimal, or least costly, combination of inputs. When all the conditions hold at the same time, it is possible to rewrite them another way:

$$\mathbf{MRPL/PL = MRPK/PK = MRPA/PA = 1}$$

$$\mathbf{MPL/PL = MPK/PK = MPA/PA = 1/PX}$$

- d) Your intuition tells you much the same thing that these equations do: The marginal product of the last dollar spent on labor must be equal to the marginal product of the last dollar spent on capital, which must be equal to the marginal product of the last dollar spent on land, and so on. If this was not the case, the firm could produce more with less and reduce cost. Suppose, for example, that $MP_L/P_L > MP_K/P_K$; in this situation, the firm can produce more output by shifting dollars out of capital and into labor. Hiring more labor drives down the marginal product of labor, and using less capital increases the marginal product of capital. This means that the ratios come back to equality as the firm shifts out of capital and into labor.

8. LEXICON

Demand-Determined Price	The price of a good that is in fixed supply; it is determined exclusively by what households and firms are willing to pay for the good.
Derived Demand	The demand for resources (inputs) that is dependent on the demand for the outputs those resources can be used to produce.
Factor Substitution Effect	The tendency of firms to substitute away from a factor whose price has risen and toward a factor whose price has fallen.
Marginal Product of Labor (MP_L)	The additional output produced by 1 additional unit of labor.
Marginal Revenue Product (MRP)	The additional revenue a firm earns by employing 1 additional unit of input, ceteris paribus.
Output Effect of a Factor Price Increase (Decrease)	When a firm decreases (increases) its output in response to a factor price increase (decrease), this decreases (increases) its demand for all factors.
Pure Rent	The return to any factor of production that is in fixed supply.
Technological Change	The introduction of new methods of production or new products intended to increase the productivity of existing inputs or to raise marginal products.
Equations	<p>A firm will demand an input as long as its Marginal Revenue Product (MRP) exceeds its market price. MRP, which in perfect competition is equal to a factor's Marginal Product times the Price of Output, is the value of the factor's marginal product: $MRP_L = MP_L \times P_X$.</p> <p>The profit-maximizing equilibrium is to "balance the margins" according to the following rule: $MRP_L/P_L = MRP_K/P_K = MRP_A/P_A = 1$ (the marginal revenue product/dollar of the final unit of each input should be equal and have a value of one). Put differently, using the least costly method of production, we have: $MP_L/P_L = MP_K/P_K = MP_A/P_A = 1/P_X$.</p>
Productivity of an Input	The amount of output produced per unit of that input.



XI- Chapter 13 - Monopoly and Antitrust Policy

1. List the “perfectly competitive” assumptions that are not met by a monopolist and relate these to the features found in such a “single-seller” market.

- a) A number of assumptions underlie the logic of perfect competition. Among them:
 - i) A large number of firms and households are interacting in each market;
 - ii) Firms in a given market produce undifferentiated, or homogeneous, products; and
 - iii) New firms are free to enter industries and compete for profits.

The first two imply that firms have no control over input prices or output prices; the third implies that opportunities for positive profit are eliminated in the long run.

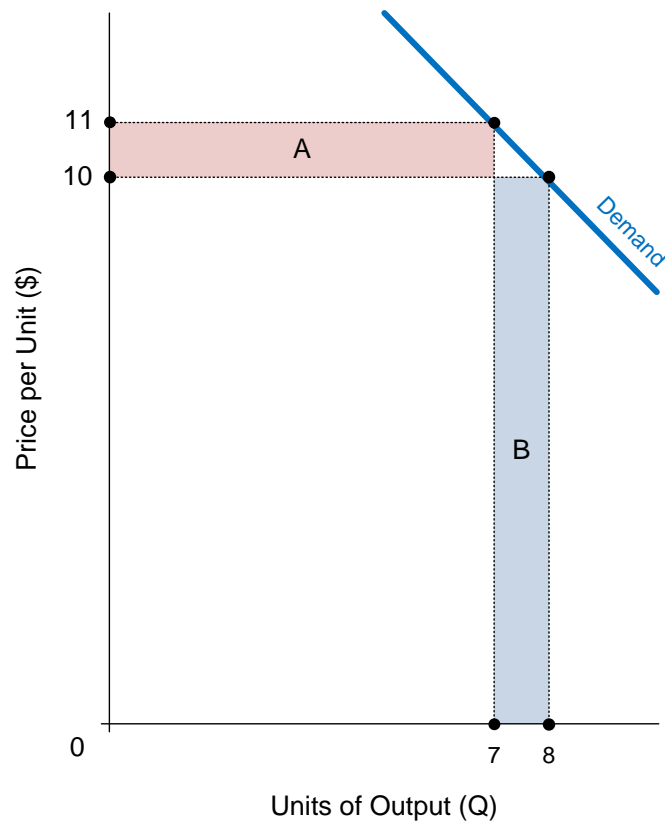
- b) A market in which individual firms have some control over price is imperfectly competitive. Such firms exercise market power. The three forms of imperfect competition are monopoly, oligopoly, and monopolistic competition.
- c) A pure monopoly is an industry with a single firm that produces a product for which there are no close substitutes and in which there are significant barriers to entry.
- d) Market power means that firms must make four decisions instead of three:
 - i) How much to produce;
 - ii) How to produce it;
 - iii) How much to demand in each input market; and
 - iv) What price to charge for their output?

- e) Travel to Europe and experience “Bed and Breakfast” in a private household offering cheap overnight accommodation to tourists. This feature of tourist travel is a reasonable approximation of a perfectly competitive market. There are many sellers and buyers; fairly homogeneous products; and ease of entry into the industry (all you need is a spare bedroom!). Private motels at the beach are a similar example in the United States. When these competitive elements are absent, imperfect competition (monopoly, oligopoly, or monopolistic competition) is present. Reduced competition bestows market power—the ability to adjust price while retaining customers. The perfectly competitive firm, in contrast, has no market power.

The college dorm for a first-semester freshman is close to being a monopoly because (s/he may be required to reside in a dorm. A *pure monopoly* occurs when there is a single firm in an industry producing a product with no close substitutes (in this case, campus accommodation), and where there are significant barriers to the entry of competitors. Clearly, the trick is to define what is included in the market. How close do substitutes have to be for monopoly not to exist? Are, for instance, Macintosh and PCs part of a single market for computers?

2. Define marginal revenue and explain why the monopolist’s marginal revenue decreases as output increases.

- a) Market power does not imply that a monopolist can charge any price it wants. Monopolies are constrained by market demand. They can sell only what people will buy and only at a price that people are willing to pay.
- b) In perfect competition, many firms supply homogeneous products. With only one firm in a monopoly market, however, there is no distinction between the firm and the industry; the firm is the industry. The market demand curve is thus the firm's demand curve, and the total quantity supplied in the market is what the monopoly firm decides to produce.
- c) For a monopolist, an increase in output involves not just producing more and selling it but also reducing the price of its output to sell it. Thus, marginal revenue, to a monopolist, is not equal to product price, as it is in competition. Instead, marginal revenue is lower than price because to raise output 1 unit and to be able to sell that 1 unit, the firm must lower the price it charges to all buyers.
- d) In imperfect competition, the addition to revenue from selling the extra unit is less than the price charged. When few items are affected by the price cut, the increase in sales increases total revenue, and marginal revenue is positive. However, as progressively more items suffer a lower price, the increase in revenue from the new sales is offset by the decrease in revenue from existing sales, and total revenue decreases—marginal revenue becomes negative.
- e) **LEARNING TIP:** In order to understand what is happening to revenue as price and quantity change, examine the following diagram.



When price is \$11 and \$10, respectively, total revenue is \$77 and \$80, respectively. Marginal Revenue is \$3. Now consider area A and area B. Verify that they are \$7 and \$10 respectively. Area A represents the revenue lost because of the price change whereas Area B represents the revenue gained. Comparing the two, let us calculate MR visually. As price falls and output expands, the one-unit revenue increase dwindles in importance beside the multiunit revenue decrease — imagine the difference in areas if, rather than 7 and 8 units, the diagram showed 1007 and 1008 units.

Recall the price elasticity and the total revenue test. Note that as price decreases, total revenue increases when demand is elastic (MR is positive), and that total revenue decreases when demand is inelastic (MR is negative).

LEARNING TIP: You have already derived the cost curves for a perfectly competitive firm and industry. The cost curves used in this and subsequent chapters are the same as those that you’ve seen before—nothing new to learn! The economic forces that shaped them in previous chapters (diminishing returns in the short run and economies of scale in the long run) are just as valid for an imperfectly competitive firm. When drawing the diagram, most people find it easier to draw the “cost diagram” first and then put in the demand and marginal revenue curves afterwards. The only differences occur in the revenue parts of the diagram. Demand for the firm is the same as the market demand — there is only one firm. For a straight-line demand curve, the marginal revenue curve is a straight line whose slope is twice as steep as that of the demand curve.

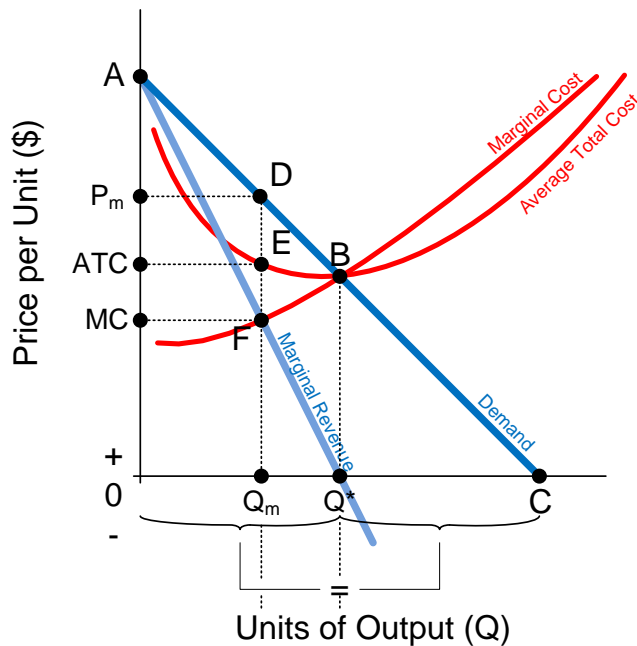
3. Draw and interpret a diagram representing both the price and output choices of a profit-maximizing monopolist.

- a) Monopolists (and other types of imperfectly competitive firms) must decide how much output to produce, how to produce it, and how much of each input to hire, just as a perfectly competitive firm must do. However, monopolists must also decide which price to set. This is determined by the “ $MR = MC$ ” rule. The “demand side,” then, limits the monopolist. The firm can’t charge any price, because they are limited by the demand for their product.
- b) A profit-maximizing monopolist will produce up to the point at which marginal revenue is equal to marginal cost ($MR = MC$). Monopolies have no identifiable supply curves. They simply choose a point on the market demand curve. That is, they choose a price and quantity to produce, which depend on both the marginal cost and the shape of the demand curve. Marginal revenue — the amount by which total revenue changes as output increases by one unit — is a key concept that you’ve seen before. Perfect competition is a special case, where $P = MR$. For any firm with a downward-sloping demand curve, price is greater than marginal revenue. The profit-maximizing output level can always be found by equating marginal revenue and marginal cost (MR



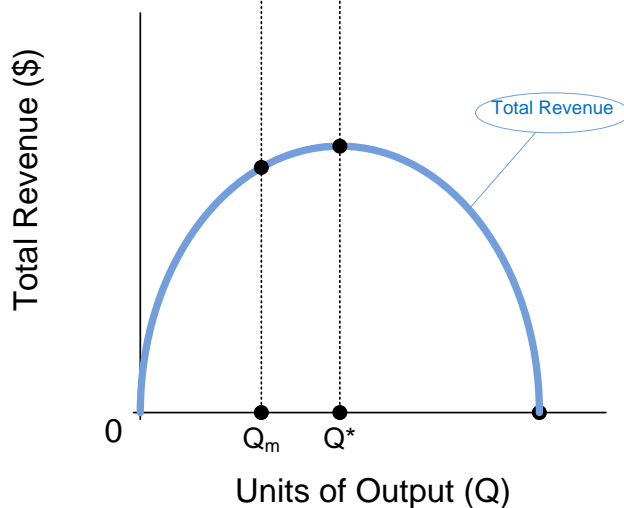
= MC). The monopolist, therefore, doesn't charge the highest price to get the most profit—s/he takes both cost and revenue (demand) information into account.

- c) In the short run, monopolists are limited by a fixed factor of production, just as competitive firms are. Monopolies that do not generate enough revenue to cover costs will go out of business in the long run.
- d) **Graphing Pointer:** Having found where $MR = MC$, it is tempting to move immediately to the vertical axis and identify that value as the price (MC in the graph below). This is a mistake! Always refer to the demand curve to determine the correct price. Draw a line up from the intersection of marginal revenue and marginal cost to the demand curve and then over to the vertical axis to get the correct price (P_m below).
- e) **From Chapter 5, remember that Q^* is at the midpoint of segment [OC] (Point Elasticity).**



Marginal Revenue and Total Revenue

A monopoly's marginal revenue curve bisects the quantity axis between the origin and the point where the demand curve hits the quantity axis. A monopoly's MR curve shows the change in total revenue that results as a firm moves along the segment of the demand curve that lies exactly above it.



Price and Output Choice for a Profit-Maximizing Monopolist

A profit-maximizing monopolist will raise output as long as marginal revenue exceeds marginal cost. Maximum profit is at an output of Q_m and a price of P_m . Above Q_m , marginal cost is greater than marginal revenue; increasing output beyond Q_m would reduce profit.

4. **Compare a monopolist's performance relative to that of a perfectly competitive firm in terms of price, output, and the effect on income distribution.**

- a) Compared with a competitively organized industry, a monopolist restricts output, charges higher prices, and earns positive profits. Because MR always lies below the demand curve for a monopoly, monopolists always charge a price higher than MC (the price that would be set by perfect competition).
- b) In terms of welfare and efficiency, monopoly compares poorly with perfect competition. Assuming similar costs, the monopolist will overprice and under produce. Monopoly is not efficient because output is not set



where $P = MC$, the firm does not use the lowest-cost production method, and the distribution of income is altered (through the appropriation of consumer surplus, which is like a private tax).

- c) If a competitive industry were to become a monopoly, price would increase and quantity would decrease. Consumers would lose through the higher prices and reduced level of production—in general, society loses when a monopoly replaces perfect competition. There is a deadweight loss, as discussed in Chapter 4. Additionally, as we will see, the monopolist might indulge actions to prevent competition, i.e., rent-seeking behavior.
- d) Remember the long-run perfectly competitive equilibrium result:

$$P = MC = LRAC \text{ (minimum)} = SRAC \text{ (minimum)}$$

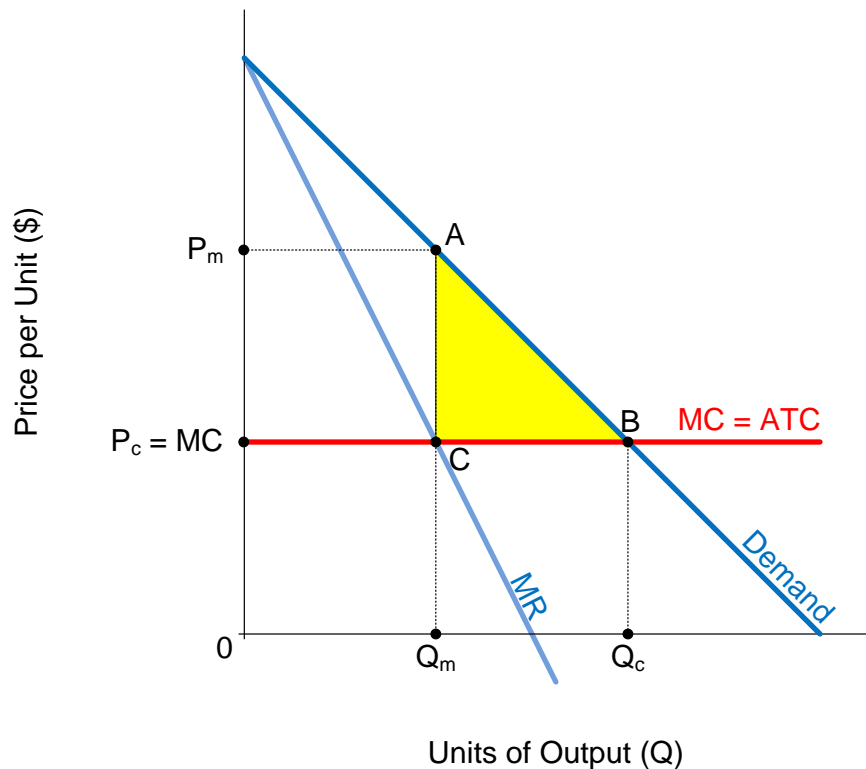
First, in monopoly, the firm will not minimize average costs. Second, the monopolist will not produce the output that society considers to be optimal (where $P = MC$).

5. Name five types of barriers to entry. Distinguish a natural monopoly from other monopolies.

- a) Barriers to entry prevent new entrants from competing away industry excess profits.
- b) Monopoly can only persist if barriers to entry are present. Barriers to entry are the reason that this situation can arise and endure. Different forms of barriers to entry are: economies of scale, legal barriers (patents, government rules), the exclusive ownership of a necessary input, and network effects.
- c) Government rules and economies of scale are typical reasons for the emergence of natural monopolies. Network effects can be felt every time you use e-mail or your cell phone — the more other users there are, the more recipients you can contact.
- d) Note the term “externalities” in the discussion of network effects. In the present context, when new users join a network, existing users receive a benefit.
- e) A natural monopoly occurs where average costs decrease as output levels rise because of long-lasting economies of scale. In such circumstances, a single-firm industry can be the most efficient way to organize production, better even than perfect competition. Here it would be undesirable to break up the monopoly, because economies of scale would be lost. Such an industry is usually regulated.

6. Identify the welfare loss caused by the presence of a monopoly.

- a) With the exception of a natural monopoly, we would expect a monopoly to produce less and charge more than a perfectly competitive industry. In fact, the monopoly reduces the welfare of their customers and undermines the efficiency of the marketplace.
- b) When firms price above marginal cost, the result is an inefficient mix of output. The decrease in consumer surplus is larger than the monopolist's profit, thus causing a net loss in social welfare.
- c) A slightly simplified version of the monopoly diagram appears in the figure below. It shows how we might make a rough estimate of the size of the loss to social welfare that arises from monopoly. For clarity, we will ignore the short-run cost curves and assume constant returns to scale in the long run. The figure is extremely important for this and subsequent chapters. First, review your knowledge of profit maximization ($MR = MC$), the meaning of demand (marginal benefit), consumer surplus, and the essential meaning of marginal cost — the opportunity cost of production. Confirm that, in order to maximize society's welfare gain, the firm should produce at the output level where $P = MR = MC$. Unfortunately, in the case of monopoly, it doesn't maximize society's welfare gain, but instead curtails output and raises prices. Conclusion: Society loses when it encounters a monopoly. The finding of a net social loss (and higher prices and restricted output) is a theoretical basis for antitrust policies and regulation.
- d) Under competitive conditions, firms would produce output up to Q_c . Price would ultimately settle at $P_c =$ to long-run average cost. Any price above P_c will mean positive profits, which would be eliminated by the entry of new competing firms in the long run.
- e) A monopoly firm in the same industry, however, would produce only Q_m and charge a price of P_m . The monopoly would make a profit equal to total revenue minus total cost: $Q_m \times P_m - Q_m \times P_c$ (area of the rectangle $P_m A C P_c$).



- f) A demand curve shows the amounts that people are willing to pay at each potential level of output. Thus, the demand curve can be used to approximate the benefits to the consumer of raising output above Q_m . MC reflects the marginal cost of the resources needed. The triangle ABC roughly measures the net social gain of moving from Q_m to Q_c (or the loss that results when monopoly decreases output from Q_m to Q_c).
- g) With economic profits present, there is an incentive to prevent a change in the status quo. Rent-seeking behavior refers to actions taken by firms to preserve economic profits. An industry might lobby heavily to prevent opening of markets, or might even attempt to “capture” government regulatory agencies — the consumer watchdog becomes the industry lapdog! Rent-seeking behavior consumes resources and adds to social cost, thus reducing social welfare even further.

7. **Explain what is meant by price discrimination and discuss its effects.**

- a) Charging different prices to different buyers is called price discrimination. The motivation for price discrimination is fairly obvious: If a firm can identify those who are willing to pay a higher price for a good, it can earn more profit from them by charging a higher price.
- b) A firm that charges the maximum amount that buyers are willing to pay for each unit is practicing perfect price discrimination. A perfectly price-discriminating monopolist will actually produce the efficient quantity of output.
- c) Essentially, the seller must identify those buyers who are willing to pay more for a good and those who will pay less. The seller is appropriating a portion of the consumer surplus. With perfect price discrimination, because each successive unit is sold at the price indicated by the demand curve, price and marginal revenue are equal. Accordingly, the output level selected by the monopolist will be equal to the efficient output level, as production will continue until price equals marginal cost.
- d) Examples of price discrimination are all around us. Airlines routinely charge travelers who stay over Saturday nights a much lower fare than those who do not. Business travelers generally travel during the week, often are unwilling to stay over Saturdays, and generally are willing to pay more for tickets.

8. **Identify the two major policy positions adopted by the government with respect to promoting/restricting competition within an industry exhibiting monopoly characteristics. Name the two government organizations charged with combating antitrust violations.**

- a) When imperfect competition fails to produce the efficient level of output, the government may choose to intervene to improve the allocation of society’s resources. There are two apparently conflicting government



stances — first, promotion of competition and restriction of market power through trust-busting legislation, and second, restriction of competition by regulation of industries. Antitrust is meant to promote competition; regulation intends to restrict competition. Both policies are intended to promote economic efficiency.

- b) Governments have thus assumed two roles with respect to imperfectly competitive industries:
- i) They promote competition and restrict market power, primarily through antitrust laws and other legislative acts; and
 - ii) They restrict competition by regulating industries.
- c) In the USA, antitrust legislation began in 1887 with the Sherman Act of 1890, which made monopoly and trade restraints illegal. In 1914, Congress passed the Clayton Act, which was designed to strengthen the Sherman Act and to clarify what specific forms of conduct were "unreasonable" restraints of trade. In the same year, the Federal Trade Commission was established and given broad power to investigate and regulate unfair methods of competition.

9. **Lexicon:**

Barrier to Entry	Factors that prevent new firms from entering and competing in imperfectly competitive industries.
Clayton Act	Passed by Congress in 1914 to strengthen the Sherman Act and clarify the rule of reason. The act outlawed specific monopolistic behaviors such as tying contracts, price discrimination, and unlimited mergers.
Federal Trade Commission (FTC)	A federal regulatory group created by Congress in 1914 to investigate the structure and behavior of firms engaging in interstate commerce, to determine what constitutes unlawful "unfair" behavior, and to issue cease-and-desist orders to those found in violation of antitrust law.
Government Failure	Occurs when the government becomes the tool of the rent seeker and the allocation of resources is made even less efficient by the intervention of government.
Major Antitrust Legislations	Various governments around the world have enacted legislation against monopolization or attempted monopolization. In the United States, the rules set out in terms of what firms can and cannot do in their markets are contained in two pieces of antitrust legislation: the Sherman Act passed in 1890 and the Clayton Act passed in 1914. The Federal Trade Commission was also created in 1914.
Market Power	An imperfectly competitive firm's ability to raise price without losing all of the quantity demanded for its product.
Natural Monopoly	An industry that realizes such large economies of scale in producing its product that single-firm production of that good or service is most efficient.
Network Externalities	The value of a product to a consumer increases with the number of that product being sold or used in the market.
Patent	A barrier to entry that grants exclusive use of the patented product or process to the inventor.
Price Discrimination	Charging different prices to different buyers.
Public Choice Theory	An economic theory that the public officials who set economic policies and regulate the players act in their own self-interest just as firms do.
Pure Monopoly	An industry with a single firm that produces a product for which there are no close substitutes and in which significant barriers to entry prevent other firms from entering the industry to compete for profits.
Rent-Seeking Behavior	Actions taken by households or firms to preserve positive profits.



Imperfectly Competitive Industry	An industry in which individual firms have some control over the price of their output.
Perfect Price Discrimination	Occurs when a firm charges the maximum amount that buyers are willing to pay for each unit.
Rule of Reason	The criterion introduced by the Supreme Court in 1911 to determine whether a particular action was illegal ("unreasonable") or legal ("reasonable") within the terms of the Sherman Act.



XII- Chapter 14 – Oligopoly

1. Identify the features that characterize an oligopolistic firm and industry.

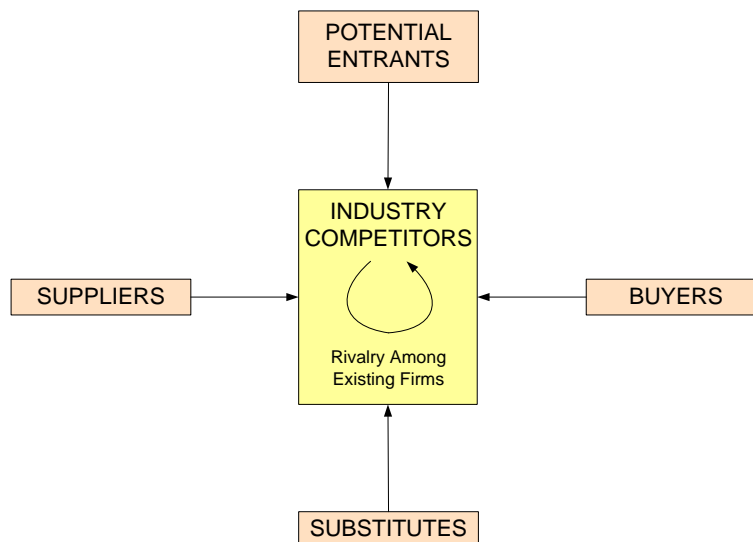
- a) **Industrial organization** economists classify their investigations into an industry under three broad categories:
- Market structure: How many firms are there? Are there economies of scale? How big are the four, or eight, largest firms?
 - Conduct: How do firms behave? How are prices set? Do firms advertise?
 - Performance: Is the industry efficient? Does it promote growth?
- b) An *oligopoly* is an industry dominated by a few firms that, by virtue of their individual sizes, are large enough to influence market price. The behavior of a single oligopolistic firm depends on the reactions it expects of all the other firms in the industry. Industrial strategies usually are very complicated and difficult to generalize about.

Oligopoly is thus the market structure with a “few” interdependent firms, each having market power and exerting strong barriers to entry. Products may be differentiated (cars) or standardized (oil). Firms may compete in terms of price or they may not. The behavior of one firm in an oligopolistic industry depends on the reactions of the others. Because the actions of each firm depend on the expected reactions of its rivals, this market structure is notoriously complex.

- c) As a rule of thumb, one fairly reliable way to identify an oligopolistic industry is to check which firms are advertising in national publications (like Time), or on prime-time television, or are sponsoring large international events (such as the Olympics or the World Cup). Such firms are likely to be oligopolists. Why? A perfectly competitive firm has no differentiated product to advertise, a monopolist (which might sometimes advertise) already controls the industry and, a monopolistically competitive firm is likely to be too small to be able to advertise nationally.

2. Outline the Five Forces Model and relate it to an oligopoly.

- a) The five forces model is a helpful way to organize economic knowledge about the structure of oligopolistic industries. By gathering data on an industry's structure in terms of the existing rivals, new entrants, substitutes, and buyer and supplier characteristics; we can better understand the sources of excess profits in an industry.



- b) Central to this model is the rivalry among the existing firms in the industry. In oligopoly, there are a few firms, each watchful of the actions of its rivals. The number of firms, their size distribution (as measured by the concentration ratio), and the degree of product differentiation are important factors. The easier it is for new firms to enter, or the greater the availability of substitutes, the less able firms will be to sustain profits. Profitability is also influenced by conditions in both input markets and output markets. In each case, the stronger the oligopolist's relative bargaining position, the greater the firm's opportunity to increase its profits.



- c) Contestable markets arise when the threat of entry by potential rivals is high. Often, this may be because the industry's capital stock is very mobile — the airline industry is the standard example. If profit opportunities emerge in one market — the route from Washington to New York, for instance — capital will flow there until the profits are competed away. Because there is easy entry into, and exit from, the industry, oligopolists in perfectly contestable markets behave like firms in a perfectly competitive industry, earning only normal profits in the long run.
- d) The Five Forces model can be applied to any type of industry. Use it to review your understanding of perfect competition and monopoly as well as your grasp of the features of oligopoly. Apply it again, with monopolistic competition, in Chapter 15.

3. **Identify and discuss the behavioral implications of the collusion model, the Cournot model, and the price-leadership model.**

- a) Models, such as the **Collusion Model**, the **Cournot Model**, and the **Price Leadership Model**, have been devised to display how firms might react to the interdependence that is characteristic of oligopolistic markets.
- b) **Collusion**, either explicitly (through the formation of a cartel) or implicitly, occurs when firms act in such a way that prices are fixed. Several conditions are necessary for collusion to work well: ideally, there should be only a few firms selling similar products to buyers with an inelastic demand, who do not have close substitutes available. If these conditions prevail in a cartel, the cartel operates in exactly the same fashion as a single-firm monopoly. Each firm, though, has strong incentives to “cheat” on the agreement. OPEC, the oil-producing cartel, is an example of collusion.

When firms collude, either explicitly or tacitly, they jointly maximize profits by charging an agreed-to price or by setting output limits and splitting profits. The result is the same as it would be if one firm monopolized the industry: The firm will produce up to the point at which $MR = MC$ and price will be set above marginal cost.

- c) **The Price Leadership Model** assumes one large firm and a cluster of smaller, competitive firms. The dominant firm maximizes profits subject to both market demand and the behavior of the other firms. The smaller firms produce as much as they wish at the price set by the leader, and then that firm services the remaining customers. The price-leadership model of oligopoly leads to a result similar but not identical to the collusion model. In this organization, the dominant firm in the industry sets a price and allows competing firms to supply all they want at that price. An oligopoly with a dominant price leader will produce a level of output between what would prevail under competition and what a monopolist would choose in the same industry. An oligopoly will also set a price between the monopoly price and the competitive price.
- d) Collusion and price leadership can be attractive strategies to avoid price competition and to maintain profits. Not surprisingly, real-world examples of collusion and price leadership continue to emerge. A few years ago, several Ivy League universities were accused of price-fixing—agreeing not to compete on offers of financial aid to qualified students. Does this practice produce a social benefit (students choose the college that best fits their intellectual needs (the colleges' argument) or does it suppress competition? In New York, milk and Italian bread have been examples of collusion, with a few powerful firms conspiring to keep prices high. Following the demise of the New York milk cartel, which had survived for 50 years, a gallon of milk tumbled in price by 30 percent.
- e) **Cournot's Model** is of a duopoly — the industry has only two firms selling identical products — and, although it is quite mechanistic, it can still offer insights into behavior in an oligopolistic market. Each firm maximizes profits and takes the output of the other as given. The more one rival produces, the less market is left for the other firm. Given market demand, each firm subtracts what it expects the rival firm to produce, and chooses its output to maximize its profits based on the market that is left. Eventually, the firms split the market and charge the same price. Expectations of future behavior don't enter into the Cournot model. The output level arrived at by the firms lies somewhere between the perfectly competitive outcome and that for a monopoly. With more than two firms, the result moves closer to the perfectly competitive result.

The Cournot model of oligopoly is based on three assumptions:

- i) That there are few firms in an industry;
- ii) That each firm takes the output of the other as a given; and
- iii) That firms maximize profits.

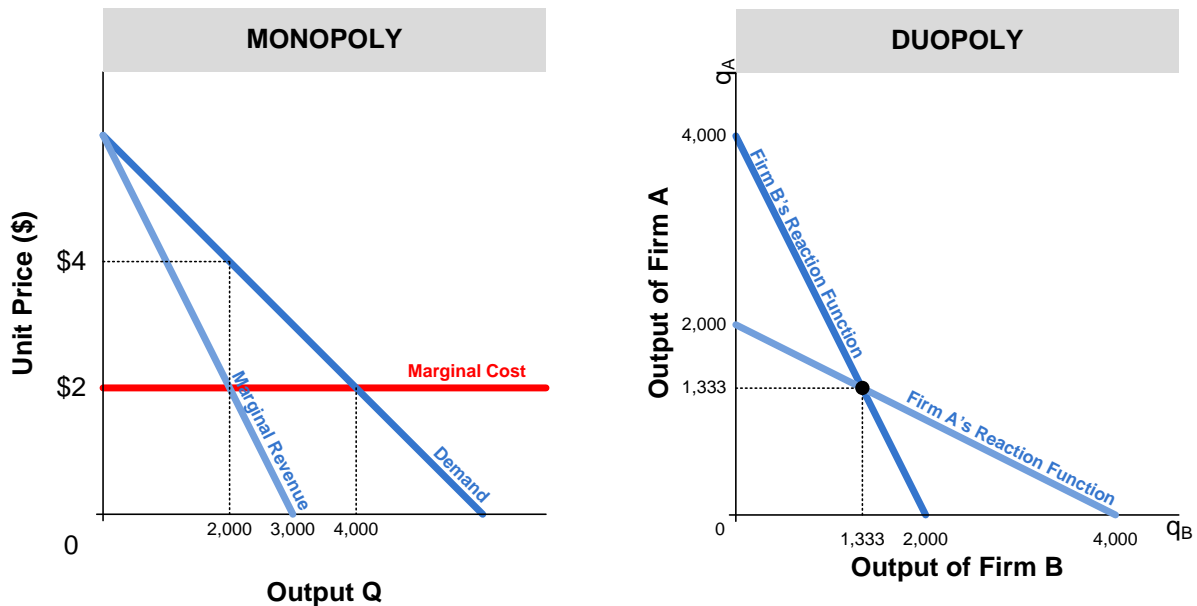
The model holds that a series of output-adjustment decisions leads to a final level of output between that which would prevail under perfect competition and that which would be set by a monopoly.



f) Some textbooks present diagrams for each of the three models (and other oligopoly models). However, whether presented in words or in diagrams, remember the main message — in each case, a behavioral assumption is included. The oligopolist must remain aware that his actions may provoke a response from his rivals.

g) **More on the Cournot – A graphic Example:**

Let's illustrate the Cournot duopoly with Firm A and Firm B. Recall the key feature of the duopoly: Firms must take each other's output into account when choosing their own output. Given this feature, it is helpful to look at how each firm's optimal output might vary with its rival's output. In the figure below, we have drawn two reaction functions, showing each firm's optimal, profit-maximizing output as it depends on its rival's output. The Y-axis shows levels of Firm A's output, denoted q_A and the X-axis shows Firm B's output, denoted q_B .



The left graph shows a profit maximizing output of 2,000 units for a monopolist with marginal cost of \$2. The right graph shows output of 1,333.33 units each for two duopolists with the same marginal cost of \$2, facing the same demand curve. Total industry output increases as we go from the monopolist to the Cournot duopolists, but it does not rise as high as the competitive output (here 4,000 units).

It turns out that the crossing point is the only equilibrium point in the graph to the right. To see why, consider what happens if you start off with a monopoly and then let a second firm compete. Suppose, for example, Firm A expected Firm B to stay out of the market, to produce nothing, leaving Firm A as a monopolist. With that expectation, Firm A would choose to produce 2,000 units. But now look at Firm B's reaction function. If firm A is now producing 2,000 units, Firm B's profit-maximizing output is not zero, it is 1,000 units. Draw a horizontal line from Firm A's output level of 2,000 to Firm B's reaction function and then go down to the X-axis and you will discover that Firm A's optimal output lies at 1,000 units. So, an output level for Firm A of 2,000 units is not an equilibrium because it was predicated on a production level for Firm B that was incorrect.

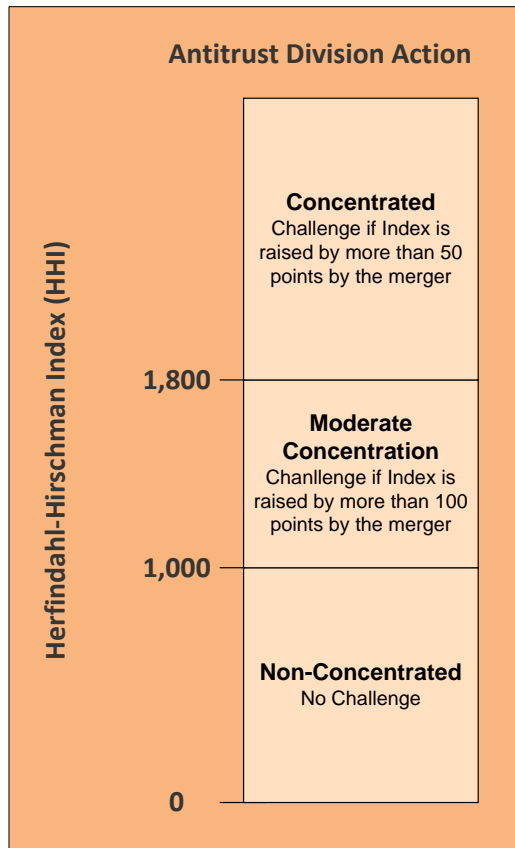
Going one step further, with Firm B now producing 1,000 units, Firm A will cut back from 2,000. This in turn lead to a further increase in Firm B's output and the process will go on until both are producing 1,333.33.

4. **Describe ways in which an oligopolistic industry may be inefficient.**

There is some debate regarding the efficiency of oligopolies. Oligopoly is inefficient because output is restricted to less than that which society would prefer ($P > MC$). Firms may end up in wasteful deadlocks. Product differentiation and advertising may also be wasteful. Although they may reap economies of scale and foster technological improvements, the balance of opinion is that oligopolies allocate resources inefficiently.



5. Explain what the Herfindahl-Hirschman Index is, how it is calculated, and how it is used in antitrust matters



The Clayton Act of 1914 gave the government the authority to limit mergers that might "substantially lessen competition in an industry." The **Celler-Kefauver Act** (1950) enabled the justice Department to move against a proposed merger. Currently, the Justice Department uses the **Herfindahl-Hirschman Index (HHI)** to determine whether it will challenge a proposed merger.

HHI is a measure of competition and market structure and is used as a guide to decide whether mergers are permitted. The percentage market share of each firm is squared, and the values totaled. In general, the higher the score, the greater the degree of concentration. If the score is less than 1,000, the industry is thought of as non-concentrated — mergers would go unopposed. In the range 1,000 to 1,800, any proposed merger that would increase the index by 100 or more would be challenged. In an industry with an HHI of greater than 1,800 (a concentrated industry), any merger pushing the index up by 50 points or more would be challenged.

Example: Industry A has 100 firms, each having a 1 percent share. The HHI is 100 and a merger between any two firms would be unopposed. Industry B has 100 firms, with 99 each having a 0.5 percent share and the other having a 50.5 percent share. The HHI would be 2575. A merger between the big firm and any one other firm would be challenged because it would increase the index by 50.5.

6. Lexicon

Cartel	A group of firms that gets together and makes joint price and output decisions to maximize joint profits.
Five Forces Model	A model developed by Michael Porter that helps us understand the five competitive forces that determine the level of competition and profitability in an industry.
Celler-Kefauver Act (1950)	Extended the government's authority to control mergers.
Concentration Ratio	The share of industry output in sales or employment accounted for by the top firms.
Contestable Markets	Markets in which entry and exit are easy.
Duopoly	A two-firm oligopoly.
Herfindahl-Hirschman Index (HHI)	An index of market concentration found by summing the square of percentage shares of firms in the market.
Price Leadership	A form of oligopoly in which one dominant firm sets prices and all the smaller firms in the industry follow its pricing policy.
Tacit Collusion	Collusion occurs when price- and quantity-fixing agreements among producers are explicit. Tacit collusion occurs when such agreements are implicit.
Oligopoly	A form of industry (market) structure characterized by a few dominant firms. Products may be homogenous or differentiated.



XIII- Chapter 15 – Monopolistic Competition

1. **Identify the features that characterize a monopolistically competitive firm and industry.**

a) **A monopolistically competitive industry has the following structural characteristics (Restaurants are an excellent example):**

- i) A large number of small firms;
- ii) No barriers to entry;
- iii) Product Differentiation – relatively good substitutes for a monopolistic competitor's products are available. Monopolistic competitors try to achieve a degree of market power by differentiating their products;
- iv) No one firm can control market price.

b) Monopoly has *one* firm, oligopoly a *few*, perfect competition and monopolistic competition *many*. The distinguishing characteristic of monopolistic competition is **product differentiation**. Except for the downward-sloping demand and marginal revenue curves, the perfectly and monopolistically competitive short- and long-run stories are very similar. Monopolistic competition differs from monopoly and oligopoly in that firms in these industries can't affect the market price by virtue of their size. The oligopolist may or may not differentiate its product — as with most things in oligopoly, it depends.

c) **It will help you to keep in mind clear examples of each market structure:**

- i) **Perfect competition:** the stock market (unless there is insider trading), word processing
- ii) **Monopolistic competition:** your local restaurant scene
- iii) **Oligopoly:** DeBeers, the diamond cartel that functions almost like a monopoly; OPEC, the cartel with a fairly homogeneous product (oil); the U.S. car industry, which tries to differentiate
- iv) **Pure monopoly:** Glaxo, the developers of AZT, the first anti-AIDS drug, or Pfizer, the originator of Viagra

d) **The table below summarizes the characteristics that distinguish each market structure.**

Market Type	Number of Firms?	Are products differentiated or Homogeneous?	Is Price a Decision Variable?	Easy Entry?	Distinguished by	Examples
Perfect Competition	Many	Homogeneous	No	Yes	Market setting the price	Wheat farmers and textile manufacturing
Monopoly	One	One version or many versions of one product.	Yes	No	Still being constrained by market demand	Public utilities and Patent drug-makers
Monopolistic Competition	Many	Differentiated	Yes, but limited	Yes	Existence of price and quality competition	Restaurants and Soap makers
Oligopoly	Few	Either	Yes	Limited	Strategic behavior	Automobiles and Aluminum

2. **Define product differentiation and explain why it occurs.**

a) The amount of product differentiation in an industry depends on a number of features of the industry. How different are customers' tastes? Are there gains to customers in buying a product that is identical to one bought by everyone else? Are there large-scale economies associated with making only one variety of a good? Industries with many different products reflect strong heterogeneity of consumers, low gains from coordination, and small cost gains from standardization.



b) Products can be differentiated horizontally or vertically.

- i) Horizontal differentiation produces different types of a good with different appeals to different types of people.
- ii) In vertical differentiation, people agree that one product is better than another; they just may not be willing to pay for the better good.
- iii) Product differentiation occurs when a product is distinguished in the minds of consumers from alternatives in some positive way. Product differentiation may be affected by differences in tastes, coordination needs, or economies of scale. Proponents of product differentiation believe that consumers' tastes differ and that they prefer variety over sameness — evidence from behavioral economics suggests that this can be taken too far, however.

c) Product Differentiation and Advertising:

Advertising and expectations play a powerful role in product differentiation, as the following (true) story shows. Various regulars in a bar were firm supporters of one or the other of two brands of cheap Scotch. Sometimes, the bar would run out of the favorite brand of one faction and its patrons would grudgingly have to consume the other brand. Invariably, expressing dissatisfaction, they swore that they could tell the difference. The point is that they drank with their eyes: both bottles contained the *same* brand of Scotch. The barman topped them up before opening time—using a third, even cheaper, brand!

d) Product Differentiation and Consumer Tastes:

Local radio is a good example of monopolistic competition — the airwaves are abuzz with radio stations claiming that they're the answer to your listening requirements. In the mid-1990s, KLAX in Los Angeles was languishing at the lower end of the top 40 stations with a playlist that was indistinguishable from that of its competitors. Changing formats, KLAX zoomed to be the city's premier station within three months, claiming the loyalty of one million listeners. KLAX found a "new" product—*ranchera* and *banda* (Mexican country music). As we would expect, because barriers to switching formats in the radio industry are low, other stations challenged for a share of this market, which is estimated at between three and five million listeners.

Similarly, between 1995 and 2005, the Hispanic population in the state of North Carolina increased fivefold. Inevitably, Spanish language radio stations and groceries emerged to meet the needs of these new consumers.

3. Explain the arguments for and against advertising.

- a) Product differentiation (making one's product appear unique) is important in monopolistic competition, and advertising can be an important aid in making the firm's or industry's demand curve less elastic (sensitive to price).
- b) Behavioral economics suggests that there may be times when too much variety reduces consumers' purchases. Behavioral economics also suggests that there may be times when consumers prefer one form of a good over another as a way to commit themselves to different actions in the future than they would otherwise take.
- c) Advocates of free and open competition believe that differentiated products and advertising give the market system its vitality and are the basis of its power. Critics argue that product differentiation and advertising are wasteful and inefficient.
- d) Supporters of advertising argue that the firm must make consumers aware of its products and differentiate them from those of its competitors. In addition, higher quality (or more efficiently produced) goods should prevail over inferior rivals, resulting in greater efficiency in the use of scarce resources. However, consumers need to know about the choices open to them, so advertising is necessary.
- e) Opponents of advertising argue that it contains little information and squanders resources while highlighting small or nonexistent distinctions between brands. Advertising distorts consumer preferences and may reduce the buyer's ability to choose rationally. In addition, the high level of costly and distracting promotions—billboards, junk mail, radio and TV jingles—that consumers must endure, and ultimately pay for, may represent a barrier to entry that reduces competition. There is no clear answer one way or the other.

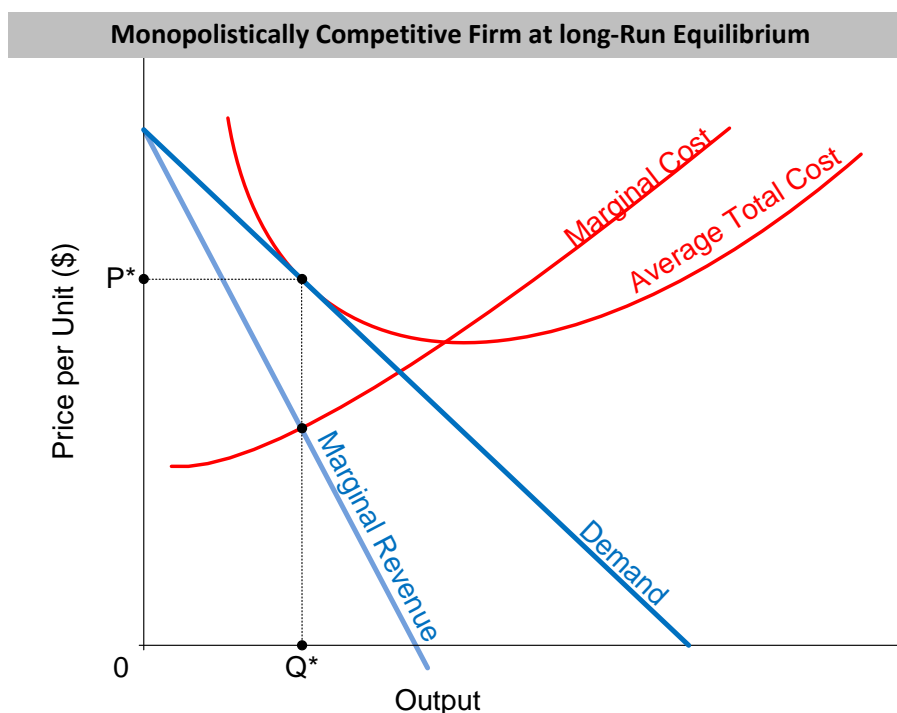
f) Right Answers in Economics:

President Truman once wished for a "one-handed economist." On all issues his economic experts invariably told him "on one hand, this, and on the other hand, that." Economics often gives "maybe" answers—in the current chapter, for example, advertising has both benefits *and* costs.



4. **Interpret the graph of a profit-maximizing, monopolistically competitive firm, indicating the profit-maximizing output level and price. Explain why the monopolistically competitive firm will make only normal profits in long-run equilibrium.**

- By differentiating their products, firms hope to be able to raise prices without losing all demand. The demand curve facing a monopolistic competitor is less elastic than the demand curve faced by a perfectly competitive firm but more elastic than the demand curve faced by a monopoly.
- To maximize profit in the short run, a monopolistically competitive firm will produce as long as the marginal revenue from increasing output and selling it exceeds the marginal cost of producing it.
- When firms enter a monopolistically competitive industry, they introduce close substitutes for the goods being produced. This attracts demand away from the firms already in the industry. Demand faced by each firm shifts left, and profits are ultimately eliminated in the long run. This long run equilibrium occurs at the point where the demand curve is just tangent to the average total cost curve.
- Graphically, monopolistic competition is similar to Chapter 13's monopoly picture while conceptually quite different on the demand side — the demand curve in the monopoly diagram shows the entire market demand. Demand is downward sloping, as in monopoly, but is more elastic because of the many close substitutes for the monopolistic competitor's product. Unlike perfect competition, the demand faced by the firm is not perfectly elastic, because of the presence of product differentiation. Profit maximization occurs at the production level where marginal revenue is equal to marginal cost — as with monopoly. Short-run profits or losses are possible — as with monopoly. In long-run equilibrium, *unlike* monopoly, only *normal* profits must prevail due to easy entry into, and exit from, the industry. Economic profits attract new firms which in turn, lessen the demand for each firm's product, driving the demand curve leftward towards the average cost curve and normal profits.
- The "cost diagram" for monopolistic competition is the same as that for perfect competition and monopoly — it's the demand side that's different. Draw the cost curves first, and then fit in the demand and marginal revenue curves to suit your needs. In monopolistic competition, the long-run equilibrium graph *must* have the demand curve just touching the average cost curve. This is the profit-maximizing output level so, to be consistent, *MR* must equal *MC* at that same output level, too! If you can't work out why this must be true, go back to Chapter 8 and review profit maximization.



5. **Identify and analyze the factors in monopolistic competition that cause inefficiency and resource misallocation.**

Monopolistically competitive firms end up pricing above marginal cost. This is inefficient, as is the fact that monopolistically competitive firms do not realize all economies of scale available. There may be offsetting gains from increased variety.



The presence of monopolistic competition has some welfare consequences. Because the firm produces where $MR = MC$ and, because price is greater than MR , price is greater than marginal cost at the profit-maximizing output level. This is inefficient because society wants production to occur up to the point where $P = MC$. In the long run, because demand is downward sloping, average cost is not minimized or, to put it another way, resources are not used to their maximum efficiency — there is excess plant capacity. Note, though, that despite the inefficiencies generated by this market structure, there are benefits springing from an extensive menu of choices.

6. **Lexicon**

Behavioral Economics	A branch of economics that uses the insights of psychology and economics to investigate decision making.
Commitment Device	Actions that individuals take in one period to try to control their behavior in a future period.
Horizontal Differentiation	Products differ in ways that make them better for some people and worse for others.
Monopolistic Competition	A common form of industry (market) structure in the United States, characterized by a large number of firms, no barriers to entry, and product differentiation.
Product Differentiation	A strategy that firms use to achieve market power. Accomplished by producing products that have distinct positive identities in consumers' minds.
Vertical Differentiation	A product difference that, from everyone's perspective, makes a product better than rival products.