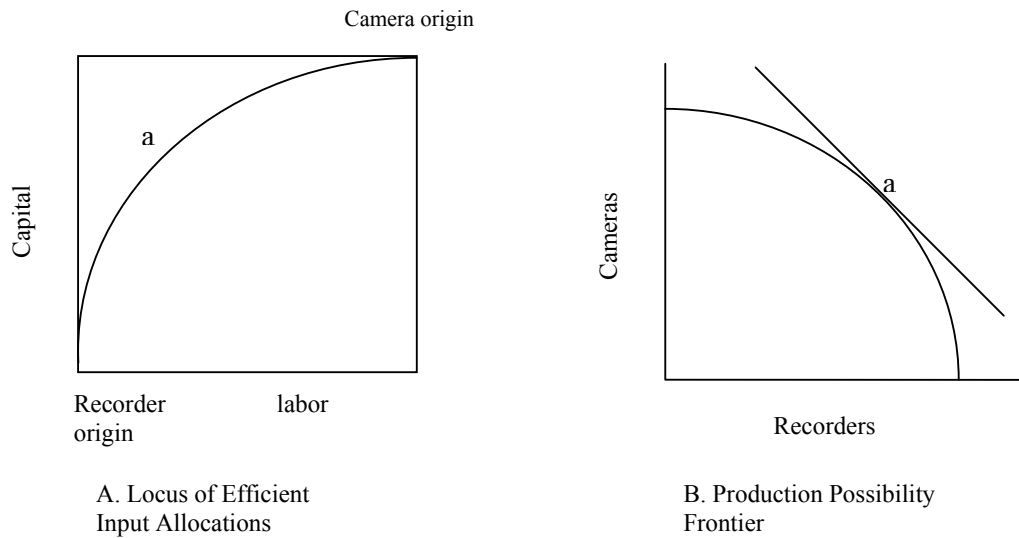


**Graduate Microeconomics
Longer Study Questions**

Areas: 1. *Uncertainty*
2. *General Equilibrium*
3. *Imperfect Competition*
4. *Factor Demand and Supply*

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1. Show that if an individual's utility-of-wealth function is convex, he will be willing to accept somewhat unfair gamble.
2. Consider an individual with total wealth of \$100. He faces probability $p=1/4$ that his wallet containing \$19 will be stolen.
 - a. Plot the "lottery" faced by this individual on a suitable "state-contingent wealth" diagram.
 - b. Suppose that the individual has von Neumann-Morgenstern utility function $u(x)=\sqrt{x}$.
 - i- What is his expected utility from the lottery in (a-)?
 - ii- Sketch his indifference curve through the lottery, and calculate its slope at this point.
 - iii-What is the certainty equivalent of this lottery (i.e. the point on the certainty line such that the individual is indifferent between this point and the original lottery)? What's his indifference curve slope through this certainty equivalent?
3. A small country produces tape recorders and cameras to sell on the world market. Its production functions for these goods are both Cobb-Douglas with two inputs, capital, and labor. The country is so small that it can sell as many cameras and automobiles as it wants on the world market without affecting world prices. Total capital and labor devoted to production of these goods is fixed. The locus of efficient input allocations and the production possibility frontier are depicted below.



Initially international trade opportunities are described by the straight “trade” line in diagram B. Production is at point “a” and the allocation of inputs is at point “a” in diagram A.

- a. Which good is relatively capital intensive?
 - b. What will happen if the world price of cameras rises relative to the world price of recorders? Draw a new trade line on diagram B and label the new choice “b”. What happens to output of cameras? What happens to output of recorders? What happens to the allocation of capital and labor? Label the new allocation on diagram A with “b”. What happens to the capital-labor ratio in the recorder industry? What happens to the capital-labor ratio in the camera industry? What happens to the price of labor relative to the price of capital? Explain.
4. Suppose that fish (F) and mangos (M) are produced by the following production functions:

$$F=L_F^{0.5} \quad \text{and} \quad M=L_M^{0.5}$$

where L_F and L_M are labor used in production of F and M, respectively. Total labor available is 100 units, so:

$$L_F + L_M = 100$$

- a. Verify that the production possibility frontier is $F^2 + M^2 = 100$. Plot the PPF.
- b. Find RPT_{MF} .
- c. The representative consumer in this competitive economy has the following utility function:

$$U = F^{0.75} M^{0.25}$$
 Find MRS_{MF} for the representative consumer.

- d. Use the PPF and your results from b. and c. to find the amounts of F and M that are produced in a competitive equilibrium. Plot this point on the diagram in a. and sketch the indifference curve that passes through it.
 - e. What will the price ratio (P_M/P_F) be in the competitive equilibrium?
 - f. How much labor will be allocated to F production?
 - g. How much labor will be allocated to M production?
5. Suppose the economy's PPF is given by $Y=100-X^2/100$ and that there are only two people in the economy, Thomas with a utility function of $U_T=X_T Y_T$ and Dupond with a utility function of $U_D=X_D+Y_D$.
- a. What is the Pareto optimal quantity of each good produced in the economy?
6. Jane has 8 liters of soft drinks and 2 sandwiches. Bob, on the other hand, has 2 liters of soft drinks and 4 sandwiches. With these endowments, Jane's marginal rate of substitution (MRS) of soft drinks for sandwiches is three; Bob's MRS is equal to one. Draw an Edgeworth box diagram to show whether this allocation of resources is efficient. If it is, explain why. If it is not, explain what exchanges will make both parties better off.
7. Aziz and Bhutto have the following utility functions:
 $U_A=X_A Y_A$ and $U_B=(X_B Y_B)^{1/2}$ for Aziz and Bhutto respectively. Aziz has an endowment $(X_A, Y_A)=(3,7)$ and Bhutto has an endowment $(X_B, Y_B)=(7,3)$. There are a total of 10 units of X and 10 units of Y in the economy, with Aziz and Bhutto as the only two members of the economy.
- a. Is this a Pareto Optimal allocation?
 - b. If not, find another allocation which makes both consumers better off and is Pareto optimal?
8. A monopolist has a total cost structure given by $TC=500+0.5Q+0.03Q^2$. In this case the $MC=0.5+0.06Q$.
- a. If the monopolist serves one market, where the demand curve is given by $Q^d=50-2p$, how much will it sell and what price?
 - b. If the monopolist serves another market only, where the demand curve is given by $Q^d = 80 - p$, how much will be produced and at what price will the monopolist sell the product?
 - c. If the monopolist serves both markets, but must charge only one price, how much will be produced and at what price will the monopolist sell it? What will be the amount of profit?
 - d. Suppose that now the monopolist finds that it can separate the two markets and charge each market a different price. How much will be produced (in total, for

- each market), what prices will be charged, and what will be the amount of profit?
- e. Suppose that the monopolist has developed a method to perfectly price discriminate among consumers, what will profits be in this case?
9. Given the demand function $P = 41 - Q$ and the total cost function $C = (1/2)Q^2 + 8Q + 2$, find:
- Output that could maximize a monopolist's total profit and the corresponding levels of price and total profit.
 - Assume that the monopolist can now operate any number of separate plants, each having the above cost function. What will be his maximum profit behavior (optimum output, price, profits, and number of plants operated)?
10. Suppose that firms can produce an item at a constant marginal cost of \$ 20 per unit. In addition, the demand curve for the industry is $Q=140-P$.
- Find the Cournot Duopolist's price and quantity. Calculate profits for each firm. Calculate the consumer surplus.
 - Find the Stackelberg duopoly outcome- the leading firm's price and quantity and the following firm's price and quantity. Calculate profits for each firm. Calculate the consumer surplus.
 - Find the competitive market outcome. What is price and quantity in this case? Calculate profits and consumer surplus.
11. A duopoly faces the demand curve $D(P)=30-0.5P$. Both firms in the industry have a total cost function given by $C(q)=4q$. Suppose that Firm 1 is a Stackelberg leader in choosing its quantity first. Find firm 1's profit function and solve for its equilibrium output level.
12. A monopolist has a total cost structure given by $TC = 400 + 2Q + .5Q^2$. The monopolist serves two markets, where the demand curves are given by $Q^d = 70 - p$, and $Q^d = 80 - 2p$.
- Suppose that the monopolist finds that it can separate the two markets and charge each market a different price. How much will be produced (in total, for each market), what prices will be charged, and what will be the amount of profit?
 - Suppose that the monopolist has developed a method to perfectly price discriminate among consumers, how much will he sell in each market, what will profits be in this case?

13. A monopolist faces a market demand function given by $P = 70 - Q$. The total cost function of a typical plant he operates is given by $C = Q^2 + 4Q + 9$. Assume that the monopolist can now operate any number of separate plants, each having the above cost function. What will be his maximum profit behavior (optimum output, price, profits, and number of plants operated)?

14. Carl the clothier owns a large garment factory on an isolated island. Carl's factory is the only source of employment for most of the islanders, and thus Carl acts as a monopsonist. The supply curve for garment workers is given by

$$L = 80w,$$

Where L is the number of workers hired and w is their hourly wage. Assume also that Carl's labor demand (marginal revenue product) curve is given by

$$L = 400 - 40 \text{MRP}_L$$

a. How many workers will Carl hire in order to maximize his profits, if he behaves as a monopsonist, and what wage will he pay?

b. Assume that the government implements a minimum wage law covering all garment workers. Carl must now pay this wage rate to everyone he employs. How many workers will Carl now hire. How much unemployment will there be if the minimum wage is set at \$4.00 per hour?

c. Suppose Carl makes a deal with the government for it to eliminate the minimum wage of \$4.00 and in return he will behave as if he were in a competitive situation. Will he be better or worse off than he was with the minimum wage? What will happen to the number unemployed?

d. Graph the results of the above three situations.

15. Suppose that a firm faces a constant marginal cost of \$20 per unit. In addition, the demand curve for the industry is $Q = 140 - P$.

a. Find the monopolist price and quantity. Calculate profits and the consumer surplus.

b. Find the Cournot Duopolist's price and quantity. Calculate profits for each firm.

c. Continuing with a two firm world, find the Stackelberg duopoly outcome—the leading firm's price and quantity and the following firm's price and quantity. Calculate profits for each firm.

d. Find the competitive market outcome. What is price and quantity in this case? Calculate profits.

16. Suppose the demand for labor is given by

$$L = -50w + 450$$

and the supply of labor is given by

$$L = 100w$$

Where L represents the number of people employed and w is the real wage per hour.

- a. What will be the equilibrium levels for w and L in this market?
 - b. Suppose that the government wishes to raise the equilibrium wage to \$4 per hour by offering a subsidy to employers for each person hired. How much will this subsidy have to be? What will the new equilibrium level of employment be? How much total subsidy will be paid?
 - c. Suppose instead that the government declared a minimum wage of \$4 per hour. How much labor would be demanded at this price? How much unemployment would there be?
17. Suppose a country produces only wheat and cloth, using inputs land and labor. Both are produced by constant returns-to-scale production functions. Wheat is the relatively land-intensive commodity.
- a. Explain in words, or algebra or diagrams, how the price of wheat P_w relative to the price of cloth P_c determines the ratio of land to labor employed in the production for each of the two industries.
 - b. Suppose that the relative price of wheat to cloth is given by external forces to this country (the small country assumption of international trade). Explain using an Edgeworth box diagram, or any other means, what will happen to the output of cloth and wheat if the supply of labor is increased in the country?
18. Suppose that a monopolist can produce any level of output it wishes at a constant marginal (and average) cost of \$5 per unit. Assume that the monopoly sells its goods in two different markets that are separated by some distance. The demand curve in the first market is given by $Q_1 = 55 - P_1$,
- and the demand curve in the second market is given by, $Q_2 = 70 - 2P_2$,
- d. If the monopolist can maintain the separation between the two markets, what level of output should be produced in each market, and what price will be charged in each in each market? What are total profits in this situation?
 - e. How would your answer change with respect to the output sold in each market, price charged, and total profits, if transportation costs were zero and the firm was forced to follow a single-price policy?

- f. Suppose the firm adopted a two part pricing policy where the each market as a whole must pay an equal entry fee for the right to buy from the monopolist (equal to the smallest consumer surplus in the two markets). In addition the customers in each market must pay a price per unit sold. In this case what would be the entry fee, what would be the per unit price, how much would be sold in the two markets, and what are total profits of the monopolist?
- g. How much dead weight loss (economic loss) is created by the monopolist in each of the above three situations? (If for any reason you are unable to estimate the dead weight losses numerically, please show the areas of deadweight loss using diagrams of the above situations.)
19. Suppose a country produces to items (a) goods and (b) services. Both goods and services are produced by industries with constant returns-to-scale production functions using capital and labor as inputs The factor inputs are fixed in supply to the country. Initially only goods are subject to a tax of T percent tax on their market prices which is collected by the government. Now the government imposes an identical T percent tax on market price of all services and the additional revenues collected by the tax on services is given back to the entire population by way of an equal grant to each member of the population.
- a. Will the introduction of the tax on services increase, decrease or leave unaltered the amount of dead weight loss created by the tax system in the country? Explain your reasoning.
- b. In what ways will the introduction of this new tax on services change the overall level of economic welfare in the society?
20. A foreign government has recently proposed a tax on firms that would be proportional to the number of persons employed by each firm.
- 21.
- a. Assuming homogeneous labor and differences in the labor intensity among industries, how would this tax affect wage rates.
- b. Assuming two classes of labor, skilled (high wage rate) and unskilled (low wage rate), how would the tax affect the relative wage rate.
- c. Determine the effects on overtime hours in case a and case b.
22. The same camera could have recently been bought at \$130 from Toad Hall, \$125 from Sears under its own label, and for \$117 from a mail-order discount house (Monroe). Does this mean that the retail camera market is very imperfect?

23. Assume that production functions are Cobb-Douglas of the first degree and that competition reigns. Let there be only two factors, say, labor (L) and capital (C).
- What is the Cobb-Douglas form?
 - Show that the share of wages in the total output is independent of the quantity of labor, and equal to the exponent of labor, say \underline{a} .
 - Let there be one additional worker:
 - Because wages are equal to marginal product, he gets the whole of what he adds to output.
 - Yet by (b) labor gets only the fraction \underline{a} of the additional output.

How do you reconcile (i) and (ii).

24. Smith and Jones are stranded on a desert island. Each has in his possession some slices of ham (H) and cheese (C). Smith eats 1 slice of ham with two slices of cheese. His utility function is given by $U_S = \min(H, C/2)$. Jones has a utility function given by $U_J = 4H + 3C$. Total endowments are 100 slices of ham and 200 slices of cheese.
- From the utility functions of Smith and Jones, what can we infer about the degree of substitutability they have in consumption between Ham and Cheese?
 - Draw the Edgeworth box diagram that represents the possibilities for exchange in this situation. What is the only exchange ratio that can prevail in any equilibrium?
 - Suppose that Smith initially had 40H and 80C. What would the equilibrium position be? Explain and show it using the Edgeworth Box diagram.
 - Suppose that Smith initially had 60H and 80C. What would the range of equilibrium positions be? Explain.
25. Ms. Fogg is planning an around-the-world trip on which she plans to spend \$10,000. The utility from the trip is a function of how much she actually spends on it (Y), given by $U(Y) = \ln Y$.
- If there is a 25 percent probability that Ms. Fogg will lose \$1000 of her cash on the trip, and hence will not be able to spend it on the things she would like to enjoy. What is the trip's expected utility?
 - Suppose Ms. Fogg can buy insurance against losing the \$1,000 at an "actuarial fair" premium of \$250. Show (using a diagram as well as calculations) how her expected utility is higher if she purchases this insurance than if she faces the choice of losing the \$1,000 without insurance.
 - What is the maximum amount that Ms. Fogg would be willing to pay to insure her \$1,000?

26. Suppose that a firm can produce an item at a constant marginal cost of \$20 per unit. In addition, the demand for the industry is $Q=140-P$.
- Find the competitive market outcome. What is price and quantity in this case? Calculate profits and consumer surplus.
 - Assume that there are two firms in the sector and no other firms are allowed to enter. Find the Cournot Duopolist's price and quantity. Calculate profits for each firm. Calculate the consumer surplus.
27. Consider an industry faced with an overall demand schedule $Q=200-4p$ and the following individual establishment total cost curves $TC=100+5q+q^2$, where $Q=\sum q$. Derive the equilibrium values of p , Q , profits, and n , the number of establishments for the following market structures (1) competition with free entry; and (2) monopoly operating only with one plant (3) monopoly operating with many plants.
28. Please answer the following questions.
- What is meant by "Moral Hazard"? How does it affect the premiums that insurance companies charge for insurance?
 - Draw the graph of an individual's utility-of-wealth function when he prefers fair gambles to income certainty.
 - Suppose the owners of two types of building that have different risk of being destroyed by fire are offered two actuarial fair insurance policies. If the types of buildings are known, will the insurance company be able to sell the fire insurance policy that has the lowest premium. Explain your answer.
29. Suppose that the production process for making gold jewelry is characterized by fixed proportions, Jewelers and Gold. The share of total labor cost in the production of gold jewelry is 40 percent. The elasticity of supply of gold in the world is 1.5 and the demand for gold jewelry is -1.2. In this case what will be the elasticity of demand for jewelers with respect to their wage rate?
30. Suppose the own price elasticities of demand for labour facing the union locals in the trucking, restaurant, and railway sectors are -0.7, -0.9, and -0.8, respectively. If the proportion of the union members in the trucking sector is 0.5, the proportion in the restaurant sector is 0.3, and the proportion in the railway sector is 0.2, what is the elasticity of demand facing the total union for the services of its members?
31. Suppose the elasticity of demand for labour under the assumption that the prices of the other factors are held constant is -0.8. Assume that the cross-price elasticity of demand for labour with respect to the price of the other factor is 0.5 and the cross price elasticity of demand for the other factor with respect to the price of labor is 0.4. In addition, suppose the elasticity of supply of the other factor is 1.5 and the own price elasticity of demand for the other factor is -1.0. What then is the own-price elasticity of demand when the market for the other factor is kept in equilibrium?

32. Assume that we are evaluating the elasticity of demand for labour in a competitive industry (bakery) characterized by constant returns to scale. Assume that the share of labour in the value added of the bakery products sector is 0.6 and the elasticity of substitution between labor and capital in the production of bakery products is 0.5. Also assume the own price elasticity of demand for bakery products is -0.8. Also assume that the rental price of capital is initially fixed for the sector.
- What is the elasticity of demand for labour in the bakery products sector with respect to its wage rate?
 - Suppose the share of labour was increased to 0.7. What is the impact of the elasticity of demand for labour? Briefly explain.
 - Suppose that the industry was characterized by increasing returns to scale so that if output doubles the factors only need to be increased by 80 percent. What is the elasticity of demand for labour now in this sector?
 - Again assuming constant returns to scale, suppose the capital used by this sector is supplied with an elasticity of supply of 2.0. What is the elasticity of demand for labour now in this sector?
33. A certain type of mushroom used to be produced on 50 farms in Honduras, each of which had a cost function $C(y) = y^2 + 1$ where $y > 0$ and $C(0) = 0$. The farms operated as competitors. The demand curve for this kind of mushroom is given by $D(P) = 52 - P$. A wicked hurricane then wipes out many of the original mushroom farms.
- If exactly half of these farms are eliminated, but the survivors remain competitive, what will happen to output?
 - If only two farms survive and they compete as Cournot oligopolists, what will happen to output?
34. Suppose that a drug curing Alzheimers is invented and only one firm holds the patent. Suppose further that the market demand for the drug is given by $Q = 10 - P$. Market price is currently 3. Is the firm exercising market power?
35. The owner of a luxurious resort has initial wealth of \$900million but faces the risk of suffering a loss of \$400million if there is a disastrous fire. There is a 10% chance of this occurring. His von Neumann Morgenstern utility index is
- $$U(W) = \sqrt{W}$$
- What is the maximum premium that he is willing to pay for full insurance against fire?
 - The cheapest insurance contract that is currently available requires a premium of \$250,000 per \$1million of coverage in the case of fire. How much coverage will he purchase under this contract?

- c. Without doing any calculations (you may use diagrams), explain how, if at all, your answers to (1) and (2) would be different if his von Neumann Morgenstern utility index were $U(W)=W^3$.
36. Consider an economy with two consumers (named Consumer 1 and Consumer 2) and two goods (called good 1 and good 2). Suppose that Consumer 1's preferences are given by the Cobb-Douglas utility function $u_1(x_{11}, x_{21}) = x_{11}x_{21}$ where x_{11} is the amount of good 1 that Consumer 1 consumes and x_{21} the amount of good 2 that Consumer 1 consumes. Suppose that Consumer 1 is endowed with 5 units of good 1 and 1 unit of good 2. Suppose that Consumer 2's preferences are given by the Leontief utility function $u_2(x_{12}, x_{22}) = \min\{x_{12}, x_{22}\}$ where x_{12} is the amount of good 1 that Consumer 2 consumes and x_{22} the amount of good 2 that Consumer 2 consumes. Suppose that Consumer 2 is endowed with 1 units of good 1 and 5 units of good 2. Normalise the price vector so that $p_2 = 1$.
- Find the contract curve.
 - Find the equilibrium price and the equilibrium allocation.
 - Represent this economy in an Edgeworth Box diagram. Clearly mark the initial endowment, the equilibrium allocation, and the equilibrium price vector. Also draw the contract curve and clearly label it.
 - On the same diagram draw the indifference curves through the initial endowment for the two consumers, labelling clearly which is which.
 - Mark clearly the set of Pareto optimal allocations that make each consumer at least as well off as the were at the initial endowment.

37. The town of Podunk has decided to provide security services to its residents by hiring workers (L) and guard dogs (D). Security services (S) are produced according to the production function

$$S = \sqrt{LD},$$

and residents of the town wish to consume 10 units of such services per period.

- Suppose that L and D both rent for \$1 per period. How much of each input should the town hire to produce the desired services at minimal cost? What will that cost be?
- Suppose now that Podunk is the only hirer of people who work with guard dogs and that the supply curve for such workers is given by

$$L = 10w,$$

where w is the per-period wage of guard dog handlers. If dogs continue to rent for \$1 per period, how much of each input should the town hire to produce the desired services at minimal cost? What will those costs be? What will the wage rate of dog handlers be?

38. Suppose two individuals (Smith and Jones) each have 10 hours of labor to devote to producing either ice-cream (X) or chicken soup (Y). Smith's utility function is given by

$$U_s = X^{0.3}Y^{0.7}$$

Whereas Jones' is given by

$$U_j = X^{0.5}Y^{0.5}$$

The individuals do not care whether they produce X or Y, and the production function for each good is given by

$$\begin{aligned} X &= 2L \\ Y &= 3L, \end{aligned}$$

where L is the total labor devoted to production of each good. Using this information,

- a. What must the price ratio, P_x/P_y , be?
- b. Given this price ratio, how much X and Y will Smith and Jones demand? (Hint: Set the wage equal to 1)
- c. How should labor be allocated between X and Y to satisfy the demand calculated in part (b)?