

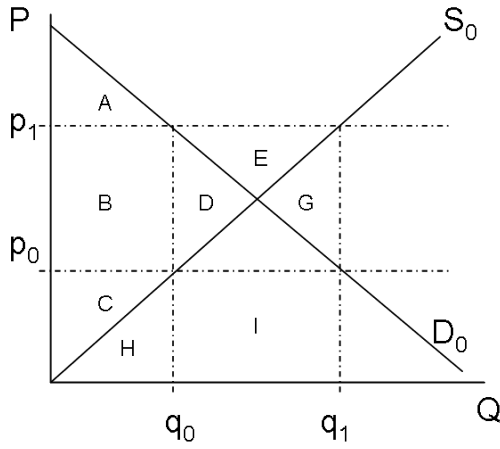
EEP 100 - Problem Set 2

Date Due: Thursday 10/08/2009

1. Edgeworth box: Suppose Jon and Eric are stranded on a deserted island. Jon has with him 10 boxes of matches and 10 gallons of drinking water. Eric has 20 boxes of matches and 20 gallons of water. At the initial allocation, Jon's  $MRS_{water,matches} = 4$  (i.e. Jon would be just as well off if he gave away 4 boxes of matches in return for 1 gallon of water). Eric's  $MRS_{water,matches} = 0.5$ .
  - (a) Using Graph (1a) on the last page, label the origins, axes, and the initial endowment. Using the given MRS's, draw and label Eric and Jon's indifference curves (use generically shaped, convex, indifference curves).
  - (b) Give one trade that makes both Jon and Eric better off. Identify the region of the Edgeworth box that represents where Jon and Eric are better off.
  - (c) Give one trade that makes Jon better off and Eric worse off. Identify the region of the Edgeworth box that represents where Jon is better off and Eric is worse off.
  - (d) Give one trade that makes both Jon and Eric worse off. Identify the region(s) of the Edgeworth box that represents where Jon and Eric are worse off.
  
2. Agricultural policy and deadweight loss: Consider the following two agricultural policies used by the U.S. government to support farmers.

Loan rate: (Despite the name of the program, it has very little to do with loans.) Under the loan rate program, the government guaranteed farmers a price ( $p_1$  on the graph below) for their goods. Under that guarantee, the farmers would decide how much to produce and they would sell their produce on the market at that guaranteed price. The government would buy up any surplus produce and pay the farmers ( $p_1$  per unit) for that produce.

Target price: Under the target price program, the government again guaranteed farmers  $p_1$  for their goods and farmers would decide how much to produce according to that price. This time, though, farmers would sell **all** their goods on the market and receive the market-clearing price (the price that makes supply and demand equal) at that quantity. If the market-clearing price was below the target price of  $p_1$ , the government would pay the farmers the difference for every unit sold.



- Identify the price received by farmers, the quantity produced by farmers, the price paid by consumers, the quantity purchased by consumers, and the quantity purchased by the government under each policy by filling in the Table (2a) on the last page.
- Using the labeled areas in the above graph, complete the first column of Table (2b) on the last page associated with the loan rate.
- Using the labeled areas in the above graph, complete the second column of Table (2b) associated with the price support.
- The price support program is equivalent to a government subsidy. Using the above graph, identify the size of the subsidy that would produce identical outcomes to the price support program.

Note: The U.S. government has been using loan rate type policies to support farmers since 1929. In the 1996 and 2002 farm bills, the government implemented a target price approach (sometimes in combination with the loan rate). In addition to supporting domestic producers, these policies have led to overproduction of some goods (relative to the unregulated market). For example, the introduction of inexpensive corn syrup into many processed food products, which may be associated with the rising rate of obesity, is one of the by-products of a large government surplus of corn. See Modern Industrial Organization (Carlton and Perloff) p.718-721 for more information.

### 3. Production

A firm uses labor to produce widgets with a production function of  $Q(L) = L^{\frac{1}{2}}$ .

Given that the price of labor is \$2/unit and the firm's fixed cost is \$8, give a graphic representation of:

- (a) The production function
- (b) The variable cost function
- (c) The marginal cost, average variable cost and average fixed cost functions
- (d) The average cost function

For full credit, label the axes, write the algebraic form of the function next to its curve, and find *at least* three points on each curve. (Hint: *always* label the point where the curve touches an axis.) If the curve has a minimum or maximum (at a point *other* than zero or infinity), label that point. Show your work.

#### 4. Price-taker Profits

Assume that this firm is a price-taker. Find:

- (a) The firm's profit function, profit-maximizing quantity ( $Q^*$ ), and optimized profit function (the one that includes the price,  $P$ ).
- (b) Given a widget price of \$4, find the quantity produced if the firm is already in business (short-run decision). Find the quantity produced if the firm is deciding whether to start up.
- (c) Find the short run and start up quantity produced if widgets sell for \$12.
- (d) In the perfectly-competitive long run, what's  $Q^*$  and  $P^*$ ?

#### 5. Now assume that the firm is a monopolist facing a demand function of $Q = 12 - P$ . Find:

- (a) The firm's profit function and profit-maximizing quantity ( $Q^*$ ).
- (b) Draw curves for demand, supply and marginal revenue. Label equilibrium price and quantity and calculate the firm's profits.
- (c) Is it possible for a firm that controls the market to produce zero? Explain.

Graph (1a)

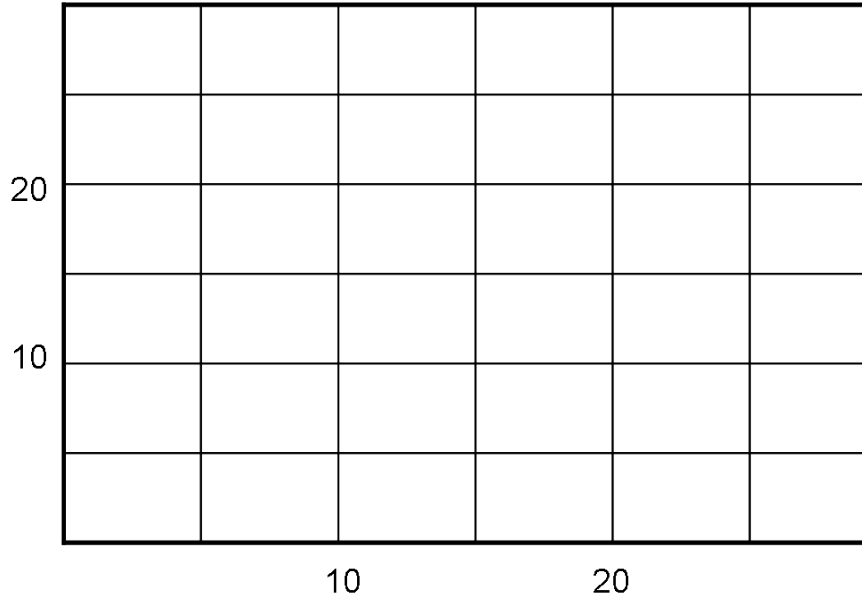


Table (2a)

	Loan rate	Price support
Price received by farmers		
Quantity produced by farmers		
Price paid by consumers		
Quantity bought by consumers		
Quantity bought by government		

Table (2b)

	Loan rate	Price support
Consumer surplus		
Producer surplus		
Government expenditure		
Total welfare		
DWL		