

ECON 301, Professor Hogendorn

Problem Set 7

1. *Growing.* Along with the fracking boom has led to a increased demand for drilling supply equipment. Suppose Stewart Manufacturing Co. (perhaps owned by a distant cousin of Wesleyan physics professor Brian Stewart) is one of many perfectly competitive firms in the drilling supply industry. It has a production function that uses labor and steel and an upward-sloping marginal cost curve. Both labor and steel are variable factors in the short run.
  - (a) Market demand for drilling supply equipment rises. Draw a graph of the overall equipment market and separately draw a graph of Stewart's firm-level demand and cost curves. Show how, in the short run, the increase in market demand affects prices and quantities on both graphs.
  - (b) Though market demand for oil equipment rose, Stewart buys labor and steel in much larger markets where wages and the price of steel remain unchanged. Draw a graph showing Stewart's isoquants and isocost lines. Show the situation before and after the increase in market demand (again in the short run, but remember both factors are variable).
2. *Coke.* Suppose that all around the world, there are small towns in which the price elasticity of demand for Coca-cola is constant at  $-1.2$ . Each of these towns is served by a monopoly Coke distributor. However, the technology for distributing Coke varies widely: huge bottling plants and 18-wheeler truck delivery in the USA, local bottlers and van delivery in Japan, delivery by pack mule to isolated parts of Bolivia, etc.

- (a) What is the Lerner Index on Coke in these markets?
- (b) Let the production function be  $f(K) = \beta K^2$ , where  $\beta$  varies from place to place, and let the price of capital be 20. How does the price of Coke vary with  $\beta$ ? (This is pretty tricky. Note that there is a constant elasticity demand, check review problem *Minus2*.)

Review problem only, not to turn in:

3. *Minus2*. Suppose the demand curve for a good is:

$$x(p) = 1000p^{-2}$$

There is a monopoly which produces this good, and it has constant marginal cost of \$2 per unit.

- (a) What is the monopoly optimal price, quantity, and profit?
- (b) What is the deadweight loss of this monopoly?

Answers to Review Problem:

3. *Minus2\_a*.

- (a) This is easy because we have a constant elasticity demand curve with  $\epsilon = -2$  and a constant marginal cost of \$2. Thus, the Lerner Index form of the monopoly's first order condition tells us that

$$\frac{p-2}{p} = -\frac{1}{-2} \Rightarrow p^* = 4$$

The demand curve tells us that  $x(4) = 1000 \times 4^{-2} = 62.5$ . The constant MC is the same as the AC, so there is a profit of \$2 per unit, or a total profit of 125.

(b) At  $p^* = MC = 2$ , the monopoly quantity is

$$x(2) = 1000 \times 2^{-2} = 250$$

The deadweight loss is the area between the price of 2 and 4, but not including the monopoly profit:

$$\int_2^4 1000p^{-2} dp - 125 = -1000 \times 4^{-1} + 1000 \times 2^{-1} - 125 = \$125$$

This is represented by areas A and B in the following figure:

