Youngberg

Econ 301—Bethany College

**Homework 06**

Answer all the following on a ***typed, stapled*** (if applicable)separate sheet of paper. You do not need to type equations and graphs. I charge 25 cents to staple your homework. Make sure that you justify your answers, use your own words, and show your work. All questions are equally weighted.

1. Calculate the elasticity of scale using the following information. Use the equation as described in II.d. of Lecture 17 (as in, use the MC/AC equation as written; don’t take any averages). Using the starting costs and quantity as C and Q, respectively. Indicate if the firm is experiencing economies or diseconomies of scale.
	1. Starting at a cost of $10 and quantity of 50, increase quantity by 25 which cost an additional $1.
	2. Starting at a cost of $100 and a quantity of 20, increase quantity by 1 which costs an additional $5.
	3. A cost of $16 produces a quantity of 10. At this point, the marginal cost of production is $32.
	4. When the average costs are $40, increase production by 100 which costs an additional $10.
2. *($1/$10) / (25/50) = 0.2, economies of scale.*
3. *($5/$100) / (1/20) = 1, neither economies or diseconomies of scale*
4. *$32 / ($16/10) = 20, diseconomies of scale*
5. *($10/100) / $40 = 0.0025, economies of scale*
6. Last year the CEO of Netflix, Reed Hastings, believed that two companies would collectively be more productive than one company and proposed to separate its DVD-by-mail service from its streaming media service. Sketch two product transformation curves showing “DVDs by mail” on one axis and “Streaming” on the other axis. Depict one curve as if Hastings was correct and the other curve as if he is incorrect (which he probably is since Netflix backtracked on its change).

*PTC A indicates production if Hastings is wrong—the firm is more productive by providing both. PTC B indicates production if Hastings is correct—the firm is more productive splitting up.*

Streaming

DVDs by mail

A

B

1. Suppose the price of labor is $5, the rental rate of capital is $10, and the production function is 2K0.7L0.3. Using the cost minimization method, find out how many capital and labor you must rent/hire if you want to make 100 units. Remember to show your work, deriving each step of the Lagrangian.

$$θ=5L+10K-λ(2K^{0.7}L^{0.3}-100)$$

$$\frac{∂θ}{∂L}=5-λ2\left(0.3\right)K^{0.7}L^{-0.7}=0$$

$$\frac{∂θ}{∂K}=10-λ2\left(0.7\right)K^{-0.3}L^{0.3}=0$$

$$\frac{∂θ}{∂λ}=100-2K^{0.7}L^{0.3}=0$$

$$\frac{5}{2\left(0.3\right)K^{0.7}L^{-0.7}}=λ=\frac{10}{2\left(0.7\right)K^{-0.3}L^{0.3}}$$

$$\frac{5}{\left(0.3\right)\left({K}/{L}\right)^{0.7}}=\frac{10}{\left(0.7\right)\left({L}/{K}\right)^{0.3}}$$

$$5\left(0.7\right)\left({L}/{K}\right)^{0.3}=10\left(0.3\right)\left({K}/{L}\right)^{0.7}$$

$$3.5=3\left({K}/{L}\right)$$

$$1.1667L=K$$

$$100=2\left(1.1667L\right)^{0.7}L^{0.3}$$

$$50=1.1139L$$

$$L=44.8856$$

$$K=\left(1.1667\right)\*44.8856=52.3666$$

1. Check your work in number 3 using the general form of the solution of the Cobb-Douglas production function we derived in class. Describe the returns to scale of this function.

$$K=\left(\frac{αw}{βr}\right)^{^{β}/\_{α+β}}\left(\frac{Q}{A}\right)^{^{1}/\_{α+β}}$$

$$K=\left(\frac{0.7\*5}{0.3\*10}\right)^{^{0.3}/\_{0.7+0.3}}\left(\frac{100}{2}\right)^{^{1}/\_{0.7+0.3}}$$

$$K=\left(\frac{3.5}{3}\right)^{0.3}\*50=52.3666$$

$$L=\left(\frac{βr}{αw}\right)^{^{α}/\_{α+β}}\left(\frac{Q}{A}\right)^{^{1}/\_{α+β}}$$

$$L=\left(\frac{0.3\*10}{0.7\*5}\right)^{^{0.7}/\_{0.7+0.3}}\left(\frac{100}{2}\right)^{^{1}/\_{0.7+0.3}}$$

$$L=\left(\frac{0.3\*10}{0.7\*5}\right)^{0.7}\*50=44.8856$$

*Since 0.3 + 0.7 = 1, this function has constant returns to scale.*

1. As much fun as it is determining optimal bundles of production, F.A. Hayek would probably disagree with our emphasis on Lagrangians. ***Briefly*** summarize one of Hayek’s criticisms from the *Use of Knowledge in Society*.

*Perhaps Hayek’s most important point is that it is not just scientific knowledge which matters, but local knowledge, or the knowledge of time and place. This local knowledge is crucial to understanding how the economy functions and how it must be considered when adapting to day-to-day fluctuations. By emphasizing mathematics, we not only assume away the role of knowledge, but implicitly assume that once the starting values are determined, the factories will work by themselves mechanically and predictably. Thus, central planning—which has difficulty employing such knowledge—will fail to efficiently run the economy.*