

**ECON 5850**

**PROBLEM SET #4**

*Due in class on Tuesday, April 18*

Question 1:

The marginal costs ( $c_i$ ) and marginal benefits ( $b_i$ ) of getting more education can vary across individuals – i.e., heterogeneous costs and benefits. Assume that marginal costs increase with the education level and marginal benefits decrease with the education level.

a)

Suppose the marginal costs and benefits of getting more education are the same for all individuals ( $b_i = b$  and  $c_i = c$  for everyone). Also suppose that ability varies, but there are only two types of people (indexed by  $j$  and  $k$ ) where the  $k$ -type has higher ability ( $a_k$ ) than the  $j$ -type ( $a_j$ ); and assume that ability has a constant effect on earnings – i.e., the difference in log-earnings between  $k$ - and  $j$ -types at each education level is  $a_k - a_j > 0$ . Draw a figure (with log-earnings on the  $y$ -axis and education on the  $x$ -axis) to show the educational choice of the two-types of people. Will they choose different education levels?

b)

Suppose that the two-types of people also have different marginal benefits ( $b_j$  and  $b_k$ ) from an extra year of schooling; the  $k$ -type has a higher benefit than the  $j$ -type ( $b_j < b_k$ ); but both types face the same marginal costs functions ( $c_j = c_k = c$ ). Also suppose that the  $k$ -type has higher ability than the  $j$ -type ( $a_k > a_j$ ). Use a figure to show the education choice made by the two-types, and what the OLS estimate of the return to education would be in this case? How does the OLS estimate compare to the “true” returns to education for the two-types?

c)

Now suppose that everyone has the same abilities ( $a_i = a$ ) and marginal benefits to education ( $b_i = b$ ), but that marginal costs vary in the population; the  $j$ -type faces higher marginal costs than the  $k$ -type ( $c_j > c_k$ ). Show graphically the education choices made by the two groups and illustrate the OLS estimate. How does it compare to the “true” return to education in the population.

d)

Angrist and Krueger (1991) find that the instrumental variables estimate of the return to education is *higher* than the OLS estimate. Evidence from “twins” studies (e.g., Ashenfelter and Krueger, 1994) suggests very little omitted variables bias in the conventional OLS estimate of the return to education.

- i) Using a figure similar to those you made above, illustrate a situation that could explain these findings in a model that allows for heterogeneous marginal benefits and costs of schooling.
- ii) Describe the relative importance of marginal benefits and costs in determining schooling choice in your figure.
- iii) What do you conclude about the implications for the role of government in reducing education costs in order to increase the human capital of the U.S. population? Explain.