

# Sample Questions \*

Economics of Education (ECO383)

October 3, 2010

## Background

Consider the following technology relating student ability ( $A$ ) and teacher quality ( $Q$ ) in the production of student learning ( $L$ ):

$$L = \alpha_0 + \alpha_1 A + \alpha_2 Q + \alpha_3 A \times Q. \quad (1)$$

## Teacher-Student Matching Question (worth 15 points)

The earlier notes I circulated included the following Policy (Quiz) Question: “if ability-teacher quality complementarities are positive and strong, how should this guide the assignment of teachers to students?” Let us develop that here, by considering the following assignment problem of heterogeneous students to heterogeneous teachers.

Suppose there are two teachers, one with quality  $Q_L$  and the second with quality  $Q_H$ , where  $Q_L < Q_H$ . Specifically, let  $Q_L = 0$ , and  $Q_H = 1$ . There are also four students, two of low ability  $A_L$  and two of high ability  $A_H$ , where (for simplicity)  $A_L = 0$  and  $A_H = 1$ .

Let the relevant production technology for student learning be given by equation (1). And suppose we specify values for the production function parameters as follows:  $\alpha_0 = 1$ ,  $\alpha_1 = 2$ ,  $\alpha_2 = 1$  and  $\alpha_3 = 1/2$ .

Throughout this question, the following constraint must apply: class size is fixed at two students per class.

1. Suppose the policy objective is to maximize the aggregate sum of student scores, summing over the four students. How should students be assigned to teachers and (equivalently) classes? Please explain your reasoning carefully. (6 points)

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\*Instructor: Robert McMillan, email: [mcmillan@chass.utoronto.ca](mailto:mcmillan@chass.utoronto.ca).

2. Now suppose that the policy objective is to maximize the aggregate sum of the scores of low ability students. How should students be assigned to teachers and (equivalently) classes in this instance? Please explain your reasoning carefully. (4 points)
3. Would your answer to the first part of the question (relating to maximizing the aggregate sum of student scores) change if the  $\alpha_3$  parameter was negative? Please explain clearly. (3 points)
4. Beyond the simple education production function given in (1), can you suggest circumstances in which it might pay to have mixed ability classes? (2 points)