

**Labor Economics**  
**MIT Department of Economics**  
**Spring 2006**

**J.D. Angrist**

Final Exam  
May 22<sup>nd</sup>, 2006

You have two hours for this exam. There are three parts, worth a total of 120 points. Point totals are provided after each question. Some questions are worth more than others - be sure to plan your time accordingly. Partial credit will be awarded for incomplete answers.

Please answer each part in a separate blue book.

*Good luck!*

PART I. True/false/uncertain. Briefly defend your answers (in one paragraph). (20 points, 5 points for each)

1. A wage subsidy given to firms for hiring high-skilled workers reduces firms' demand for low-skilled workers through the substitution and scale effects.
2. A binding minimum wage may reduce the amount of specific human capital firms invest in, because the minimum wage prevents firms from recouping training costs through a lower training wage.
3. Skill-biased technical change is the best explanation for increasing inequality since the late 1970s.
4. Managers who complain about labor shortages probably work for firms that have some market power in the factor market.

PART II. Short answer. Respond to each question in at most a few paragraphs. (55 points, 11 points each)

1) Although US automakers negotiate collective bargaining agreements separately, the same union (the UAW) represents all auto-workers employed at the “Big 3” automobile manufacturers. Assume that the Big 3 make products that are not perfect substitutes. Should we expect the same contract wage to be negotiated for each employer? Explain your answer.

2) “The minimum wage costs jobs.” Briefly assess this statement from a theoretical and empirical standpoint.

3) “Discrimination cannot be sustained in competitive markets.” Briefly assess this statement from a theoretical point of view.

4) A large firm employs many Black and White workers. You observe that highly qualified Blacks (as measured by educational degree) working at this firm earn *less* than equally qualified Whites, but less-qualified Blacks earn *more* than equally qualified Whites. What might explain this?

5) A 1999 study of MIT faculty (in the School of Science) found evidence that “women are seriously underpaid,” and that female faculty are victims of “inequitable distributions” of goodies like space and research money. The committee also argued that “Despite discrimination, most of these women achieved at an outstanding level within their professions.” Assuming that the factual statements about male-female differentials and female achievement are correct, briefly explain why this is not necessarily evidence of discrimination. Describe the sort of evidence you would find most convincing.

PART III. Longer questions. (45 points total)

- 1) **(21 points)**. In class, we developed a model of educational investment whereby the market equalizes the net present value of all schooling choices. Using the set-up from lecture, let  $f(s)$  denote the amount that *anyone* with  $s$  years of schooling earns at a moment in time, and assume that *everyone* discounts the future using the same continuously compounded interest rate,  $r$ .
- Assuming that people work forever, derive an equation for  $\ln f(s)$  in terms of  $f(0)$ ,  $r$ , and  $s$ . What are the returns to education in this model?
  - Suppose (realistically!) that people can work for only  $T$  years. How does this affect the economic returns to schooling?
  - Now suppose people have different latent ability, indexed by  $a_i$ , where  $a_i \in [0,1]$  and higher values indicate higher ability. Earnings are a function of ability,  $f(s, a_i)$ , and so is the interest rate,  $r(a_i)$ . Who gets more schooling, the more or less able? (Make sure to spell out the assumptions you use when answering this question).

- 2) Suppose you are interested in estimating the economic return to an additional year of education of white men.

- a. **(12 points)**. First, you run the regression:

$$\ln wage_i = \alpha + \beta_1 ED_i + \beta_2 EXP_i + \beta_3 EXP_i^2 + \varepsilon_i$$

where: ED= years of education, and EXP=potential experience.

- Why is experience included in this model? How does the inclusion of experience affect the measured returns to education?
  - Is your measure of  $\beta_1$  likely to be a good estimate of the causal effect of schooling on wages? (Hint: Use your answer to 1c, above).
- b. **(12 points)**. From the 1980 U.S. Census, you have the following information on men born between 1930 and 1939:

	Born 1 <sup>st</sup> quarter	Born 2 <sup>nd</sup> , 3 <sup>rd</sup> , 4 <sup>th</sup> quarter
Log wage	5.89	5.9
Years of education	12.69	12.79

- Give a likely explanation for quarter-of-birth differences in educational attainment.
- Using the information in this table, construct an estimate of the returns to education.
- What must be true in order for your estimate to be an estimate of the causal effect of education on wages?