Final Exam
Economics 136 – Human Resources
Winter 2005
Prof. Julian Betts

March 14, 2005

Name: ____________________

Student ID ________________

There are 7 written problems in this exam, worth a total of 80 points. Please write neatly. If you place the answer to a question in an odd place, such as the back of the page, please indicate this clearly, for the sake of the graders.

If you use pencil, the exam cannot be regraded. If you do submit your test for regrading, you must do within the time and other guidelines listed in the syllabus.

SHOW ALL YOUR WORK!

You have 170 minutes. Good luck.

For the graders:

1.	______/7
2.	______/3
3.	______/26
4.	______/12
5.	______/6
6.	______/16
7.	______/10
SUM	______/70

Note: If you would like to have the option of picking up the exam in a public area at the end of quarter (Sequoyah 245) please sign the Buckley Waiver on the next page. You are NOT required to sign this.

STUDENT CONSENT FOR RELEASE OF STUDENT INFORMATION

I hereby authorize the UCSD Economics Department to return my graded final examination/research paper by placing it in a location accessible to all students in the course. I understand that the return of my examination/research paper as described above may result in disclosure of personally identifiable information, that is not public information as defined in UCSD PPM 160-2, and I hereby consent to the disclosure of such information.

Quarter_____________ Course____________________ Date_______________

Instructor____

Student ID#____

Print Name____

Signature____

1. Suppose that workers know their own productivity but firms cannot figure out each worker's productivity. Specifically there is an equal chance that a randomly chosen worker will have productivity per hour of $5, $10 and $20 per hour. A firm decides that it wants to hire the medium productivity ($10) workers, so it places an ad in the paper offering a salary of $10 per hour. What will be the average productivity of workers who actually apply? What will expected profits per worker be? What would you recommend to this firm to reduce this problem? (7 points)

2. (3 points) You may recall that the first Space Shuttle disaster was caused by faulty O-rings in the booster rocket. Suppose you are the manager of the company that manufactures this key component of the Space Shuttle, and you are trying to decide whether to pay the workers in your factory using a fixed salary or a piece rate. Which type of pay would you prefer to use, and why?

3. (26 points) Senior management asks you to devise a promotion tournament for two workers, where the worker who produces more earns W_1 and the worker who produces less earns a smaller amount W_2. The two workers have identical productivity (on average) and the same utility function:

$U = E(wage_i) - m_i^2$ for workers i=k,j where m_i is effort.

Each worker's output is given by
$q_i = m_i + e_i$ where m is effort and e is a random luck factor with mean 0. Each unit of output brings in $20 of revenues to your company. There are no costs apart from labor.

$x = e_k - e_j$ takes on values between $-B/2$ and $+B/2$ with a uniform probability distribution.

To ensure that both workers accept the job, you must pay an expected wage for a given level of effort to ensure that expected utility equals 0.

a) Solve the workers' problems and the firm's problem. Calculate the firm's expected profits. DEFINE ALL NEW VARIABLES THAT YOU USE THAT ARE NOT MENTIONED IN THIS QUESTION. (12 points)

b) (6 points) Suppose that because a new manager comes to work for the company, B rises. Would this be seen by the workers as making the tournament more or less risky? Why? Use differentiation to show the impact of a small increase in B, dB > 0, on W_1 and W_2. How do optimal effort and profits change? What is the intuition for your results?

c) (8 points). The Vice President of the company disagrees, saying that instead of having these two workers compete in a tournament, instead the workers should each individually be paid piece rates of the form a + b(q_j). Because output $q_j = m_j + e_j$, and the expected value of the error term e_j is 0, this is equivalent to paying a + bm_j if the worker is risk neutral. Derive the optimal values of a and b in this case. What will be the optimal effort m and profits? How does this compare to your results on optimal m and profits in part a)?

4. (12 points) a) Summarize in a few sentences the evidence gathered by Wolpin on whether education acts as a signal of ability instead of providing additional human capital to workers. What is the potential flaw in his logic that we mentioned in class? (4 points)

b) Summarize in a few sentences the evidence gathered by Weiss on whether education acts as a signal of ability instead of providing additional human capital to workers. (3 points)

c) Summarize in a few sentences the evidence gathered by Altonji on whether education acts as a signal of ability instead of providing additional human capital to workers. What did Rose and Betts find, and does it potentially change the conclusion made by Altonji about the extent to which education acts as a signal? (5 points)

5. (6 points) a) List two advantages of using promotion tournaments instead of piece rates, and two disadvantages of tournaments (4 points)

b) In our mathematical treatment of tournaments, we treated the two workers as identical in ability. Explain why in a tournament if the two workers differed a lot in ability both workers might not exert much effort (2 points)

6. (16 points) a) You are a senior executive in your company. The Board of Directors has granted you 1200 call options to buy a single share, (or 1200 shares total) of your company's stock, at a price of $20 per share. The options expire in a year. Suppose that you can work at two levels of intensity, Total Slacker and Speed Demon. If you opt for the Total Slacker route, there is a 1/3 chance that within the next year the top price for your company's stock will be $15. Similarly there is a 1/3 chance for a price of either $18 and $21. If you choose to be a Speed Demon, there is a 1/3 chance (each) of your stock reaching a top price of $16, $20 and $24. What is the expected profit of your stock options under the two scenarios? (4 points)

b) Suppose the company instead granted you 2400 call options at an exercise price of \$20.50. Prove that the expected value of these options if you act like a Total Slacker will be the same as in the scenario in a). What about the expected value of the options if you decide to be a Speed Demon? Which stock option scenario is likely to give you the greater motivation to act like a Speed Demon, that in a) or that in b)? (6 points)

c) Another way to provide incentives to senior managers is to force them to grant options to their employer that allows the employer to sell company stock to them at a certain price. Explain in a few sentences how this works. (3 points)

d) So, there are two main ways to provide senior managers with incentives to work hard. One is to make the managers go long in call options and the other is make the managers go short in put options. One of these incentive schemes encourages senior managers to take more risk and the other encourages senior managers to take less risk. Which is which? In the United States, which form of options is the dominant form that is used? What does this tell us about whether in the United States shareholders want senior managers to take more or less risk than they are naturally inclined to take? (3 points)

7. In this course we have seen two competing theories about the relative size of value marginal product (V) and wages (W). According to one theory, firms should pay workers more than they are worth when young (W > V) and less than they are worth when old (W < V. A second theory says the reverse, that firms should underpay workers when young (W < V) and overpay them when old (W > V).

Carefully describe the assumptions underlying each of these theories and then explain how the assumptions in the two theories lead to the resulting patterns of V and W during a worker's lifecycle. (10 points)