Final Exam
Economics 136 – Human Resources
Spring 2008
Prof. Julian Betts

June 9, 2008

Name: _____

Student ID _____

There are 6 written problems in this exam, worth a total of 100 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, whiteout, or erasable pen on a question, then that question cannot be regraded. If you do submit your exam for regrading, you must do within the time and other guidelines listed in the syllabus.

       SHOW ALL YOUR WORK!

       You have 2 hours 50 minutes. Good luck.

For the graders:

1.   _____/14
2.   _____/22
3.   _____/8
4.   _____/20
5.   _____/18
6.   _____/18
SUM   _____/100

STUDENT CONSENT FOR RELEASE OF STUDENT INFORMATION
(Buckley Waiver)
(VOLUNTARY)

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. (14 points) You are hired as a business consultant by the owner of a small firm who is trying to minimize the cost of producing widgets. Here is what she tells you: "The firm hires either low-skill or high-skill workers. Each worker requires a machine, which costs $1 per day to rent. Low-skill labor makes $5 per hour, for an 8 hour day, while high-skill labor makes $8 an hour. Output per day is 4 for low-skill workers and 6 for high-skill workers. A robotics company says that it could instead rent us a machine that will double output per worker, but the better machines cost $60 a day per worker to rent. I have two questions. First, should I rent the new machines? Second, what kind of labor should I hire?"

a) Work through the various scenarios, and make a recommendation. (8)

b) A year later the owner of this firm phones you up again. She reports that a large company has arrived in town and hired lots of less-skilled workers for its manufacturing plant. As a result, the hourly wage of low-skilled workers has risen from $5 to $6, while the wage of high-skilled workers has stayed constant at $8 per hour. The owner asks you to update your analysis. What is the best combination of workers and technology now? Explain. (6)

2. (22 points) A firm is trying to establish a wage $=a+bE$ where E is worker effort and a and b are to be chosen by the firm.

Each unit of effort E produces $40 of sales revenue. But additional worker effort of 1 unit also leads to additional material costs for your firm of $5, and extra energy costs of $3.

The worker maximizes utility, which the firm believes to depend on earnings minus the disutility of effort. By experimenting with increasing the demands placed on workers for a given wage, your firm has learned that the minimum it needs to pay workers to have them produce E units of effort without quitting is as listed below:

Effort firm requires	1	2	3	4	5
Pay required by workers	1	16	81	256	625

Show all of your work!

a) Work out the utility function for workers, and what the numerical value of their "reservation utility" to accept a job at your firm must be. Call this reservation utility U_{res}. (4 points)

b) Calculate the profit maximizing values of a and b, and the optimal effort E and profit π that result. (14 points)

c) (2 points) In part b) we defined U_{res} as the reservation utility. Give an example of something that might cause all workers' U_{res} to rise.

d) Is there a value of U_{res} above which your firm should shut down? (2 points)

3. (8 points) Suppose that the training your firm provides to workers is equally valuable to other firms. Workers work for you for a maximum of 2 periods, receiving training in period 1 and working with increased productivity (thanks to the training) in period 2.
a) Should your firm subsidize the training or make the worker pay for it? Explain in a few sentences. (4)

b) A friend tells you that he has been working for a temp agency, which "rents" his services to other companies that have short-term needs for additional secretarial staff. He tells you that the temp agency has been providing him with training in Microsoft Office and popular database software provided by Oracle. Moreover, he does not have to pay for this training, and receives his full regular hourly wage during these training sessions. Can you explain why the temp agency might be doing this? (4)

4. (20 points) It is often thought that a worker's value marginal product (VMP) and best alternative to working at her current company, Alt, take the general forms shown in the graph below, where T is the "normal" age at which people retire:
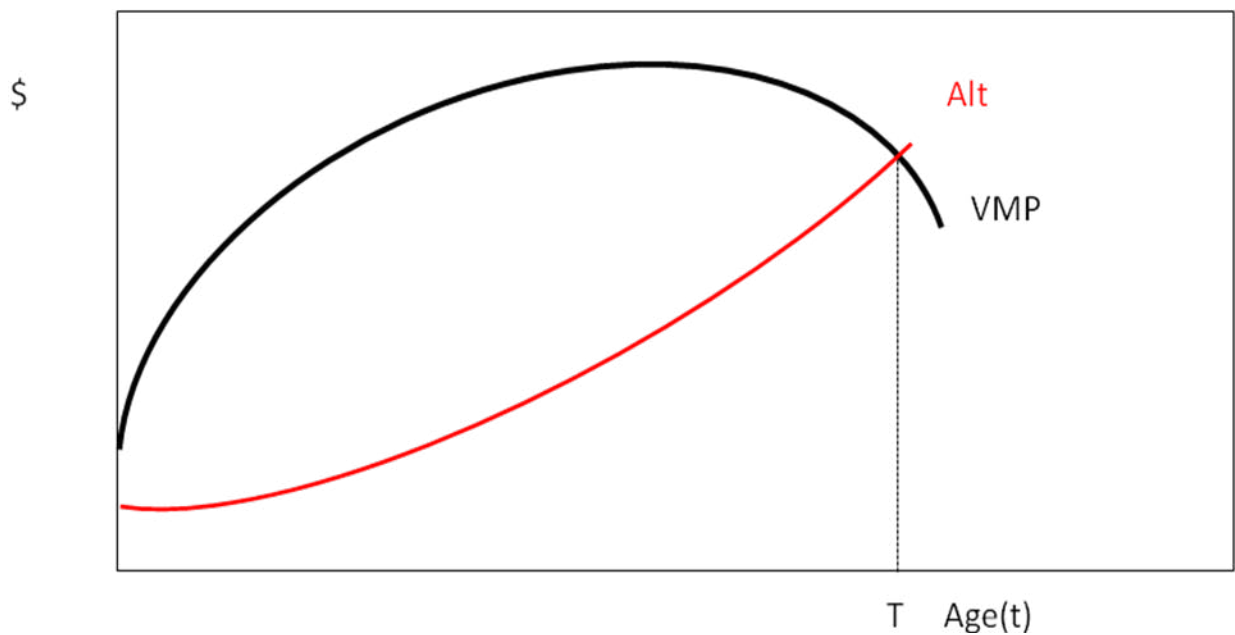
a) Explain what factors lie behind the slopes of VMP and Alt in the above diagram. Also, explain why the VMP curve is concave. (6)

b) Assume that the worker receives a wage equal to her VMP at each age, as shown in the diagram. In what sense does the risk that the worker will goof off (that is, shirk) on the job change with age t? Explain! For full points discuss the benefits and costs to the worker of goofing off. (4)

c) How could the firm alter the wages paid at each age to reduce the risk described in part b? Be specific about what mathematical requirements the new wage:age profile should obey. (4)

d) What are the two risks to the worker of accepting the wage offer you outlined in c)? (4)

e) In what way could the existence of company pension plans reduce the incentive for older workers to goof off on the job? (2)

5. (18 points) For this question assume that workers' utility function is given by

$U = \text{earnings} - e^2$

where e is effort.
a) Suppose that a firm has a team of two workers working on a project, and the revenues of the firm will be the price of the product, P times output Q which obeys

$Q = (e_1 + e_2)^{1/2}$

where e_i is the effort of worker i, i=1,2. Suppose that the firm decides to divide the share of revenues equally among the 2 workers. So the earnings for each worker will be

$PQ/2 = (P/2) (e_1 + e_2)^{1/2}$

What will worker 1's optimal level of effort be? **Hint: workers 1 and 2 have identical ability and identical preferences.** (4)

b) A second firm in the same industry has a slightly different technology, where the size of the team is 20 workers. This firm also decides to share revenues equally among workers, so that the earnings for each worker will be

$$PQ/20 = (P/20) (e_{1} + e_{2} + \ldots + e_{20})^{1/2}$$

What will worker 1's optimal level of effort be? **Hint: All 20 workers have identical ability and identical preferences.** (4)

Show all of your work!

c) Each of these two firms must invest some capital to equip each worker, and so the firm wants to maximize the effort per worker. Which size of team will lead to higher effort? What is the phrase that economists use to refer to the problem that you have uncovered above? (2)

d) Would this problem be reduced if workers could monitor each other's effort? Explain in a sentence or two. (2)

e) Let's consider two other firms (not the ones we have just talked about). Suppose one firm's production process requires all workers to do roughly identical work, while a second firm's production process requires the firm to hire workers from quite different occupations to work together. At which firm does it make more sense to assign workers to teams and to make their pay depend on team output in some way? Why? (2)

f) Explain how a firm, by establishing "norms" for effort expected of workers in teams, might be able to induce greater effort. These norms are NOT written down in any employment contract, but instead are informal understandings of what is expected. How

could a firm use a team bonus as a way of strongly encouraging all workers to exert maximum effort? In what sense could the firm rely on the workers in the team to ensure that nobody would "shirk", that is, goof off? (4)

6) (18 points) Suppose that the stock price of your company next year has an equal chance of equaling $10 and $20 next year.
a) Give and explain two reasons why owners of the firm might want to grant senior management stock options in the company. (4)

b) The firm has decided to grant the Vice President of the company 10,000 call options at a strike price of $15. These options will expire one year from now. What is the expected value of these options? (4)

c) Suppose that the Vice President could change the distribution of the stock price next year. If she works really hard, she could boost profits and therefore the price of the company's stock one year from now so that the stock price now has equal probability of being $11 and $21. What would be the expected worth of the stock options should she decide to work this hard? (4)

d) Give an example of how the firm could restructure its offer of call options to the Vice President so as to give her a bigger incentive to work hard. Your example should have an equal expected value to the stock options described in c), assuming that the stock price has equal probability of equaling $10 and $20 next year. Demonstrate that your proposal does indeed have an equal expected value to the options offer in c). Also, prove that the stock option offer you have created here leads to a bigger gain to the Vice President if she decides to work hard, relative to the stock option offer in c). (6)