

Test 3
Economics 136 – Human Resources
Spring 2008
Prof. Julian Betts

May 29, 2008

Name: _____

Student ID _____

There are 4 written problems in this test, worth a total of 60 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 test to a TA for regrading, you must do within the time and other guidelines listed in the syllabus.

SHOW ALL YOUR WORK!

You have 80 minutes. Good luck.

For the graders:

1. _____/26
2. _____/8
3. _____/20
4. _____/6
SUM _____/60

Show all of your work!

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_____

Show all of your work!

1. (26 points) Suppose that a firm will hire a worker for up to 5 periods, after which the worker retires. The firm has to provide *firm-specific* training in periods 1 and 2, which boosts the worker's Value Marginal Product (VMP) in periods 3 to 5, such that VMP by period is 4,7,13,13,13. The worker can choose to work for this firm or can work for a firm that provides no training, earning 10 each of the 5 periods before retirement.

Assume that neither the worker nor the firm discount future cash flows.

a) One option is for the firm to make the worker pay for the entire costs of the specific training, and then boost his pay in periods 3 to 5 to reflect the increase in productivity that results in periods 3 to 5, so that his wages are his VMP each period: 4,7,13,13,13.

Explain clearly why the worker would not want this. For full points explain what the firm will be tempted to do when wages are set this way. (2)

b) A second option is for the firm to bear the entire costs of the training, and then to “pay itself back” in later periods, so that the wages it pays are 10 in each period.

Explain clearly why the firm would not want this. For full points explain what the worker will be tempted to do when wages are set this way. (2)

c) A good compromise is for both the worker and firm to share in the training costs in periods 1 and 2, with both the worker and firm sharing in the rents that accrue in periods 3 to 5. **Suggest a set of wages in the five periods that would allow for such sharing of training costs and rent.** Remember that for your suggestion of wages to be acceptable both to the firm and the workers, the present value of the firm's profits should be 0 i.e. the firm makes normal profits, and the worker's total pay over 5 periods should be the same as if he had instead taken the alternative job that pays \$10 each period. Prove that your suggested set of wages satisfies both requirements. **(Hints: 1) Don't be alarmed if you find there are a number of “correct” possibilities. 2) Recall that both worker and firm have a discount rate of 0.)**

(The pay rates that you choose will apply for questions d, e and f below.)

(5)

Show all of your work!

d) The firm's rent at the start of age t for a worker, $R(t)$, is defined as the present value of the sum of VMP - wages from age t through period 5. Let's call the rent to the firm over the entire 5 periods $R(1)$. In part c) you proved that $R(1)=0$. Now calculate $R(2)$, $R(3)$, $R(4)$ and $R(5)$. For example, $R(4)$ is the sum of VMP-wage in period 4 plus VMP - wage in period 5. Finally, draw a graph of R against age t , plotting the values you obtained for $t=1$ through $t=5$. (6)

e) Suppose that because of increased international competition the price of the product the firm makes falls permanently, so that the VMP of ALL workers at the firm regardless of age falls by \$2 per period. That is, VMP, instead of being 4, 7, 13, 13, 13, is now 2, 5,

Show all of your work!

11, 11, 11. Calculate $R(1)$ through $R(5)$ in this new state of the world. Re-draw your graph of rent $R(t)$ against t . (6)

f) Use this graph to decide whether

i) the firm will want to hire any new young workers ($t=1$) (YES/NO) (1 point)

ii) whether the firm will want to lay off any of the other workers (aged 2 through 5).
Explain. (1)

g) Suppose that the federal government sets a minimum wage of \$10 for all workers in the economy. That is, it now becomes illegal to pay workers less than \$10 per period. Would this make the schedule of wage payments you suggested in part c) unworkable? If so, which party is likely to suffer from the new wage rate of \$10, the firm or the worker? Explain. (3)

Show all of your work!

2. (8 points) a) Suppose that another firm is attempting to raid one or more workers at your firm. What are the two key factors that determine whether your firm should always match or never match the outside firm's wage offer? Explain in a sentence or two. (6)

b) Suppose that the firm you manage is in La Jolla. Does your firm's location suggest that it is more or less likely to want to match outside offers compared to an identical firm that is located in Regina, Saskatchewan, Canada? (Hints: La Jolla: beach, Regina: no beach, lots of snow in winter) (2 points)

Show all of your work!

3. (20 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:

$$U = E(\text{wage}_i) - m_i^3 \text{ for workers } i=k,j \text{ where } m_i \text{ is effort.}$$

Each worker's output is given by

$q_i = m_i + e_i$ where m is effort and e is a random luck factor. Each unit of output brings in \$6 of revenues to your company. However, for each unit of output there are additional costs of \$1 for electricity and \$2 for raw materials. These are costs in addition to the cost of labor.

$x = e_k - e_j$ takes on values between $-1/4$ and $+1/4$ 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. What is the firm's total profit from hiring the two workers? DEFINE ALL NEW VARIABLES THAT YOU USE THAT ARE NOT MENTIONED IN THIS QUESTION. (16 points)

Show all of your work!

Show all of your work!

b) (4 points) You solved part a) under the assumption that the worker's expected utility had to be 0 for him or her to accept a job. Suppose that because of the strengthening of the economy, wages rise to the point where workers will accept a job only if expected utility obeyed $E(U) = 2$ or more. Without working through the entire solution to part a) again, explain which parts of your answer to part a) would change, and from this work out the new optimal W_1 , W_2 and profits from hiring the two workers.

Show all of your work!

4. (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)