

Final Exam
Economics 136 – Human Resources
Spring 2007
Prof. Julian Betts

June 11, 2007

Name: _____

Student ID _____

There are 6 written problems in this exam, worth a total of 82 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 exam for regrading, you must do within the time and other guidelines listed in the syllabus.

SHOW ALL YOUR WORK!

You have 3 hours. Good luck.

For the graders:

1. _____/24

2. _____/20

3. _____/12

4. _____/12

5. _____/10

56. _____/4

SUM _____/82

Please sign the following optional form if you would like us to be able to return this exam to you in a publicly accessible location.

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

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 Spring _____ Course Econ 136 Date June 11, 2007

Instructor Julian Betts

Student ID# _____

Print Name _____

Signature _____

1. (24 points) **Before you do parts a, b and c read through question d. In answering question d your answer will be much easier to write down if you carefully number your equations in parts a-c, so that you can refer to them later!**

You are trying to set up the salary scale for salespeople at your company, Acme Widgets. Widgets sell for \$12 each and sales are produced by worker i as follows:

$$q_i = m_i + e_i$$

where q is the number of widgets sold, m is effort, and e is a luck factor with mean 0, reflecting a luck factor involving whether your salesperson happens to visit a client's company at a time when the purchasing manager is available, and other things over which the worker has no control.

The costs to the firm are the wages it pays workers, plus \$2 per widget in materials and energy costs.

Workers are risk neutral, so that their utility equals their expected wage minus the disutility of effort. The country you live in, Swedefin, has generous unemployment benefits of \$10 per period. This means that if you offered to pay salespeople \$10 per period, nobody would accept the job because they could stay at home, exert no effort and get utility $U=10$. So you must pay more than \$10 to get anybody to work for you.

Your firm has experimented with different wage rates in different parts of Swedefin, and has found that if a worker is required to work at an effort level that produces 1 widget sale per period he must be paid \$11 to work or he will resign. If he must produce 2 sales he must be paid \$14, for 3 sales \$19, for 4 sales \$26 etc. There are two workers, j and k . Each worker experiences luck, e_j and e_k , respectively. $x = e_k - e_j$ takes on values between $-1/2$ and $1/2$ with a uniform probability distribution.

a) You know that the worker's utility depends on expected earnings per period and effort per period. Based on the payments required for each level of effort what is the worker's utility function (write as a function of $E(W)$ which is expected earnings, and effort m). EXPLAIN YOUR REASONING. (2 points)

b) Your firm decides to set up a piece rate system in which workers are paid $\alpha + \beta q_i$ where $q_i = m_i + e_i$. Because the workers are risk neutral, the expected utility to the worker of being paid this way is just the expected wage of $\alpha + \beta m_i$, minus the disutility of effort. Derive the profit-maximizing values of α and β , optimal worker effort, and

expected utility for the worker and expected profits per worker for the firm. Show ALL of your work. (8)

c) Another way to induce effort is to have your two salespeople compete in a tournament. Suppose that after a trial period, one of two workers will be promoted to boss. The person with greater production will get the promotion. In this post-tournament period, the boss earns W_1 and the worker earns W_2 , where $W_1 > W_2$. The two workers k and j have identical productivity (on average) and the same utility function that you derived in part a.

Solve the workers' problems and the firm's problem. What are the optimal values of W_1 and W_2 , and expected profit per worker and expected utility per worker? Does this method of payment lead to different profits per worker than the piece rate scheme you studied in part b? DEFINE ALL NEW VARIABLES THAT YOU USE THAT ARE NOT MENTIONED IN THIS QUESTION. (8 points)

d) Suppose that a new government is elected in Sweden that is more “pro-worker” than the previous government. It knows that some firms use a piece rate system and others use a tournament system like the ones you have just studied. You are hired as a government consultant to answer the following question:

How high could we raise the unemployment benefit, which is currently \$10 per period, while still allowing firms like the ones studied earlier in this question to stay in business? (As long as firms earn profits per worker or zero or above, they will be happy to stay in business.) Solve for this maximum unemployment benefit and call it UB_{max} so that the grader can follow your reasoning.

To answer this question, look at your answers to b) and c) and **in each case** write a paragraph or two on how the objective functions for the worker and therefore the employer change. (Hint: Where does the constraint that the worker must be as well off at your firm as staying at home enter each problem?) You can work out the problems all over again if you want to, but you should be able to show how the wage payments will change by referring to your equations in b) and c), and explaining in a paragraph or two. For full points, indicate how a and b change in the piece rate system, how W_1 and W_2 change in the tournament, and how expected utility will change once you have set the unemployment benefit as high as possible. (6)

2.(20) The Board of Directors of Giggle.com is trying to set up a stock option program that will align the interests of the Chief Executive Officer (CEO) of the company with the interests of shareholders. The problem is that the Board does not know as much as the CEO about the opportunities for new projects, and must rely on the CEO to make the right decisions. Board members know that typically expansion into a new market can be done in one of two ways:

i) Project A: a low-risk, low-expected-profit approach

ii) Project B: a higher-risk, high-expected profit approach

a) The table below shows that both projects have an equal chance of a “low” outcome and a “high” outcome depending on whether the economy is in a recession or a boom. The table shows overall profits for the company as well as the stock price that will result

	Project A			Project B		
State of economy	Probability	Profits	Stock price	Probability	Profits	Stock price
Recession	1/2	-5 million	95	1/2	-10 million	90
Boom	1/2	+ 5 million	105	1/2	+ 15 million	115

Use this information on profits in booms and recessions to calculate the expected profits to shareholders from each of the two projects. As always, show your work. (4)

b) The Board of Directors is thinking about offering the CEO compensation consisting of a salary of \$1000 as well as 1000 call options in the company’s stock, with a strike price of \$103. Given the information above on the stock price, calculate expected earnings to the CEO if he or she adopts Project A. Do the same for Project B. Which project is the CEO likely to choose? (6)

c) However, the Board of Directors is advised by a consulting firm that the firm should instead offer the CEO a salary of \$10,000, while making him or her grant 1000 put options to the firm, as a strike price of \$103. That is, if the stock price falls below \$103, the firm can sell stock to him or her at \$103 a share. Work out the expected earnings of the CEO if he or she adopts Project A, then do the same for project B. Which project would the CEO adopt if he or she was paid in this way? (6)

d) Which stock option plan should the Board of Directors adopt in order to maximize the firm's expected profits? Why? (4)

3.(12 points)

a) One problem a firm often has is that it cannot monitor its workers' effort very well. Is this problem likely to be bigger or smaller for workers who are getting close to retirement? Explain, using a few sentences and a diagram. (6)

b) How could the firm reduce this problem by altering the wages it pays to workers over their career at the firm? Again, a diagram may help. (2)

c) What are the two risks to the worker of accepting a job with the wages you described in part b? (4)

4. (12 points) Suppose that your firm wants to hire only skilled workers, but it cannot detect a worker's skills until after the first period of employment. Workers can work for you at most two periods before retiring. In the general labor market, skilled and unskilled workers earn $W_S > W_U$ respectively. Workers maximize the sum of wages over the two periods of their working lives.

Suppose that the firm designs a probation program under which new hires earn a wage W_1 in period 1, and if they are not fired at the end of period 1 they earn W_2 in period 2. Derive values of these two wages that will ensure that the skilled will want to work for your company while unskilled workers will be indifferent between working for your firm or any other firm. Show your work.

5.(10 points)

a) Consider a firm that is considering offering a buyout to an older worker. Let

$PV(A_t)$ = present value of best alternative job at age t

$P(V_t)$ = present value of production at current job

B = present value of buyout

Prove that the only way in which a firm will be willing to offer a buyout with present value of B which the worker will actually accept is if $PV(A_t) > PV(V_t)$. (6)

b) Suppose that the firm offers a buyout worth \$30,000 in present value to all workers aged 55 and older. Suppose that these workers vary a lot in general skills and ability. What problem is likely to result? Why? (4)

6. (4 points) Suppose a firm is trying to decide between having more young workers or older workers. In terms of skills, what are two advantages the older worker is likely to have? What are the two advantages of younger workers?