

**Final Exam**  
**Economics 136 – Human Resources**  
**Fall 2003**  
**Prof. Julian Betts**

December 8, 2003

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 180 minutes. Good luck.

For the graders:

1.	_____	/6
2.	_____	/12
3.	_____	/17
4.	_____	/12
5.	_____	/11
6.	_____	/6
7.	_____	/16
SUM	_____	/80

1. (6 points) List 2 advantages of piece rates over fixed salaries, and 4 disadvantages.

2. (12 points) Suppose that a firm has a production function given by  $Q = \{L + 4H\}^{1/2}$  where  $Q$  is output per hour and  $L$  and  $H$  are the numbers of workers who are low-skilled and high-skilled respectively.

a) Calculate the marginal product of workers of either type, e.g.  $\partial Q / \partial L$  and  $\partial Q / \partial H$ . Then calculate the ratio of these marginal products per worker. (5 points)

b) Suppose that there is no capital cost in this business, so that the total cost of hiring one worker with low or high skills is given by the corresponding wage rates  $W_L$  and  $W_H$ . Write down a rule that explains which type(s) of workers to hire for a given wage ratio  $W_L/W_H$ . (3 points)

c) Suppose that currently the hourly wage for the two type of workers is  $W_L=\$8$  and  $W_H=\$24$ . Draw a graph of  $L$  vs.  $H$  that illustrates the firm's optimal choice of high-skill and low-skill workers for a given output  $Q^*$ . (You don't need to worry about the exact number for output.) Hint: the slope of the isoquant at any point is related to the marginal products of the two types of workers. Knowing this, what does your answer to part a) tell you about the shape of the isoquant? (4 points)

3. (17 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. Your company asks you to design a probation program at the firm 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. (If a worker is identified as unskilled at the end of period 1, he is fired.) You are asked to design the program so that no unskilled worker would ever apply for the job, but skilled workers would apply. Assume that the interest rate is zero.

In the general labor market, skilled and unskilled workers earn  $W_S = \$16$  and  $W_U = \$10$  respectively.

*At the end of period 1 a proportion  $P$  of unskilled workers will be incorrectly identified as skilled workers, even though all skilled workers will be correctly identified.*

a) Write down an equality that determines  $W_1$  as a function of  $W_2$ , under the assumption that only skilled workers apply and that your firm minimizes costs. This equation should be valid for any value of  $P$ . Show your reasoning. (4 points)

b) Derive inequalities for  $W_2$  and  $W_1$  that will ensure that no unskilled workers will want to apply. (7 points)

c) Prove that as  $P$ , the proportion of unskilled workers who could escape detection at the end of period 1, rises, that  $W_2$  must rise and  $W_1$  must fall. For full points, prove this by taking derivatives. (4 points)

d) Explain in a sentence or two the intuition behind the result in c). (2 points)

4. (12 points) a) Let  $W_t$ ,  $V_t$  and  $A_t$  represent the wage, value marginal product and value of the worker's best alternative use of time at age  $t$ . Draw the typical shapes of these curves against age  $t$ , between the age of hire, (say, age 0) and the normal retirement date  $T$ .

Below this graph, draw the shape of rent to the firm from having the worker work at the firm until age  $T$ . Label this  $R_t$  in your diagram.

Finally, define in words what rent to the firm is in this context. Explain it in simple language. (6 points)

b) Suppose that demand falls for the specialized product that this firm produces, so that the price of output produced by the firm falls permanently. Re-draw *from part a)* the graph of  $W_t$ ,  $V_t$  and  $A_t$  against  $t$  and the graph of  $R_t$  against  $t$ , and then use dotted lines to indicate the likely position(s) of any of these four curves that might have changed. Label the lines clearly. (4 points)

c) Given your results in b), which types of workers are most likely to be laid off? What U.S. legislation affects the firm's ability to take this approach to layoffs? (Name the legislation and explain in a sentence what it does.) (2 points)

5. (11 points) a) State 4 cases in which it might make sense for your firm to raid workers from another firm. (8)

b) What is the winner's curse as it applies to raiding workers from other firms? In your answer be careful to state your assumptions about "who knows what". (3)



6. (6 points) Firms sometimes announce a policy of “no offer matching”. Explain what this is in a sentence. Then list the two criteria that make it more likely that the firm will use this policy.

7. (16) a) Towards retirement workers may develop an increased incentive to “shirk”, that is, goof off. Suppose that the employer pays a fixed wage  $W$  for all years the worker is at a firm. This wage equals the VMP of workers assuming that they do not shirk. What is the cost to the worker of being fired, and why might this cost go down towards retirement? (3)

b) One solution is for the firm to underpay workers while young and overpay them when old. Explain in a sentence or two why this might reduce the incentive of older workers to shirk. Second, write down an equality that must be met in order for workers at the start of their careers to be willing to accept this arrangement. (Assume that the worker has potentially 45 years until retirement, and  $VMP(t)$  and  $W(t)$  are VMP and wages at each age  $t$ . The worker discounts future earnings at the rate  $r$ .) (6)

c) What is the *general* risk that this arrangement of being underpaid when young and overpaid when old might pose to the worker? Then give two specific examples of how this problem could arise for the worker. (3)

d) What risk does this arrangement pose for the firm? Lazear (1979) uses this idea to explain the existence a certain labor market phenomenon. In a sentence, what is this phenomenon? (4)