

**EC 151 Homework VII**  
**Labor Markets**  
**Solutions**  
**Due November 25th in class**

**1) Finding the No-Shirking Permanent Wage**

As we discussed in class, one of the reasons we see permanent labor is to carry out tasks, tasks that cannot be easily monitored by the employer and thus create an incentive to shirk.

Say a employer hires permanent labor to carry out non-monitorable tasks over two seasons in a year.

Shirking in the first season cannot be found out immediately, but suppose that there is evidence of this available by beginning of the second season. If the employee shirks, the only punishment power that the employer might have is firing her from the job.

Consider the following information:

The permanent wage is  $w_p$  and the casual wage is  $w_c$

The cost of putting effort is  $c$

If the employee does not put in  $c$ , she is fired and goes back into the labor market at the beginning of next season. With probability  $p$ , she will find a new permanent job otherwise she will get a casual job.

(The employee's mental time horizon is just over the two seasons)

Set up an equation that will allow you to solve for the non-shirking permanent wage  $w_p$ . Explain what happens to  $w_p$  as  $c$ ,  $p$  and  $w_c$  increase and the intuition behind why this happens.

When the employee is deciding whether or not to shirk, she will consider the gain from shirking versus the gain from not shirking.

If she shirks, she saves on the cost of effort  $c$ .

If she does not shirk, she will save on the lowered probability of finding a permanent job:

$$p(w_p - w_p) + (1-p)(w_p - w_c)$$

So for the employer to make it worthwhile to the employee to put in effort:

$$c = p(w_p - w_p) + (1-p)(w_p - w_c)$$

$$\Leftrightarrow w_p = w_c + c/1-p$$

As the casual wage increase, probability of finding a new job and cost of effort increase, so must the permanent wage. This is because all of these factors make shirking more attractive so the employer must pay more to induce the employee to keep exerting effort.

## 2) Technological Change & Permanent Labor

As in Figure 13.13, a farm uses two kinds of labor—permanent and casual. Permanent labor does the non-monitored tasks, these tasks are a composite of i) machinery use and ii) proper operation of this machinery. Machines can be rented out at interest rate  $r$ . Thus, the total permanent wage  $w_p$  is the sum of cost of machinery as well cost of effort.

Say credit markets improve and the cost of capital decreases. What happens to the permanent wage rate and proportion of permanent labor use on the farm. Show the dynamics in a figure like 13.13 and explain the intuition.

The problem states that  $w_p$  includes the cost of machines/capital. So if the cost of capital (this would mean something like the interest rate) decreases, so does the permanent wage. Assuming more machines do not require more effort (the other component of the permanent wage), the permanent wage will decrease. The following shift happens in the figure:

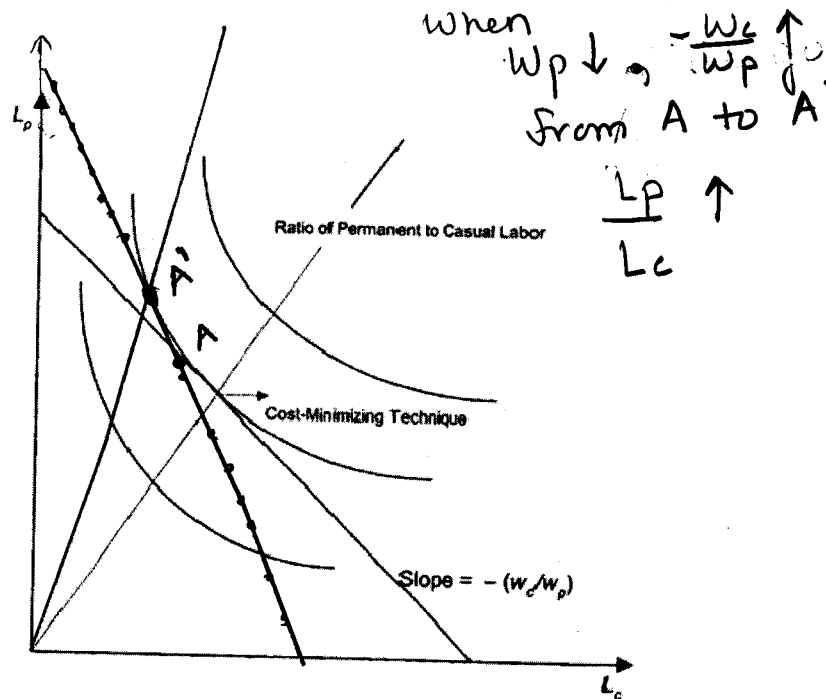


Figure 13.13. Combinations of permanent and casual labor needed for some fixed output level.

Thus, a new lower permanent wage encourages employers to shift towards techniques that employ more permanent laborers, increasing the ratio of permanent to casual labor.

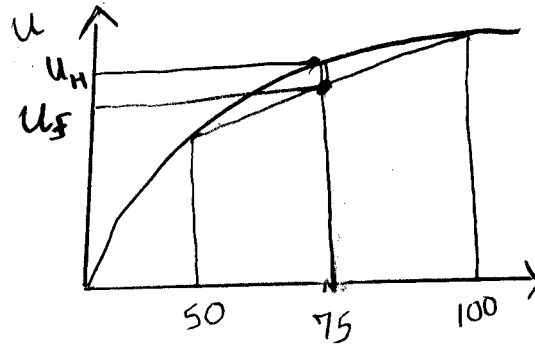
### 3) Permanent Labor & Fluctuation-Aversion

Chapter 13, Question 5 a-c

- a. The employer only cares about expected wages (since he is risk-neutral). If he were to hire laborers in the spot market, his expected wage payments would be  $.5 * \$50 + .5 * \$100 = \$75$ . The expected wage payments of any contract would be  $.5w_1 + .5w_2$ .

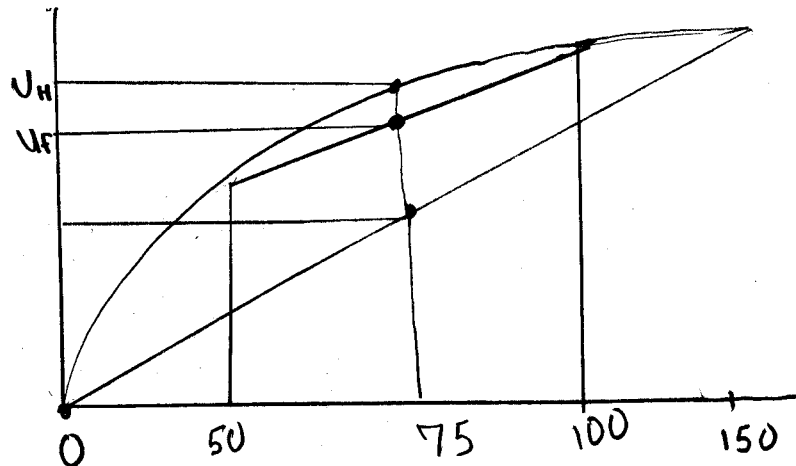
Therefore, the set of contracts that are acceptable to the employer are the pairs  $(w_1, w_2)$  such that  $(w_1 + w_2)/2$  less than or equal to 75.

- b. Consider the following diagram depicting the risk-averse employee's utility



The employee gets the highest utility from a non-fluctuation wage of 75. However, any wage contract that gives him expected utility above  $u_F$  would be acceptable to him.

As we stated before, for an employer, the expected wage has to be equal or less than 75. Say the wage contract was  $w_1=0$  and  $w_2=150$ . In this case, the contract is acceptable to the employer because its expected value is 75. However, now the employee's utility is less than  $u_F$ .



You should see that any wage contract in which  $w_1 < 50$  and  $w_2 > 100$  will create a risky gamble that is unacceptable to the employee because the spot market wages offer a less risky gamble in any case.

c. If the spot wage is \$100, then under the long-term contract the worker is receiving  $w_1 < 100$ . This means he has an incentive to break the contract, work in the spot market, and have the short-run gain of  $100 - w_1$ .