

# Part VI: Compensating Wage Differentials

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## 1 Compensating Wage Differentials

# Introduction

- The labor market is not characterized by a single wage: Workers differ and jobs differ.
- Adam Smith proposed the idea that job characteristics influence labor market equilibrium.
- Compensating wage differentials arise to compensate workers for non-wage characteristics of the job (i.e. how 'pleasant' or 'unpleasant' a job is).
  - If a job is unpleasant, the firm must probably offer a higher wage to attract workers and vice versa.
  - This theory also helps explain why different workers may get paid different wages.
- Workers have different preferences and firms have different working conditions.

# The Market For Risky Jobs

- Suppose we have a simple model: there are only two types of jobs in the labor market (safe jobs versus risky jobs).
  - Safe jobs have probability of zero that worker gets injured. Risky jobs have probability of 1.
  - Workers know this information. They have complete information.
- Workers care about whether their jobs are safe or risky.
- A worker's utility function:  $Utility = f(w, \text{risk of injury})$ 
  - The marginal utility of income gives the change in utility resulting from a \$1 increase in the worker's income, holding constant the risk on the job.
  - The marginal utility of risk gives the change in utility resulting from a one-unit change in the probability of injury, holding constant the worker's income.
  - Assumption: Risk is bad, so the marginal utility of risk is negative. Consequence?

# Indifference Curves Relating the Wage and the Probability of Injury in the Job

- Indifference curves provide information about how much this particular worker dislikes being injured.
- **Reservation price:** Amount of money it would take to bribe the worker into accepting the risky job.
  - The greater the worker's dislike for risk, the greater the bribe required for switching from a safe to a risky job, and the greater the reservation price (case of step indifference curves).
  - Wage differential:

$$\Delta w = w_r - w_s$$

# The Market For Risky Jobs

- From the worker side:
  - ① The supply curve tells us how many workers are willing to offer their labor to the risky job as a function of the wage differential between the risky job and the safe job.
  - ② As we assumed workers dislike risk, no one would want to work at the risky job if the wage differential is zero.

# The Market For Risky Jobs

- From the firm side:
  - ① Firms decide whether to provide a risky or a safe work environment to its workers.
  - ② Suppose that a firm is going to hire  $E^*$  workers regardless of which environment it chooses.
  - ③ If the firm chooses to offer a safe work environment, the firm's production function is:

$$q_0 = \alpha_0 E^*$$

- ④ If the firm chooses to offer a risky work environment, the firm's production function is:

$$q_1 = \alpha_1 E^*$$

# The Market For Risky Jobs

- Notice that  $\alpha_n$  is the marginal product of labor in each safe/risky environment.
- If the price of output equals  $p$  dollars, then the  $VMP_E = p\alpha_n$ , where  $n=0, 1$ .
- Crucial question: how does the marginal product of labor differ between safe and risky environments? Is it  $\alpha_0 > \alpha_1$  or  $\alpha_0, \alpha_1$



# The Market For Risky Jobs

- Profits for the firm:

$$\pi_n = p\alpha_n E^* - w_n E^*$$

- A risky firm has larger revenues because more output is produced, but it also has higher costs because it has to compensate its workers.
- A profit-maximizing firm offers a risky job if  $\pi_0 < \pi_1$
- Define  $\theta = p\alpha_1 - p\alpha_0$ , thus the decision rule for the firm is:
  - Offer safe working environment if  $w_1 - w_0 > \theta$
  - Offer risky working environment if  $w_1 - w_0 < \theta$

# Equilibrium

- The equilibrium is determined by the intersection of the market supply and demand.
- The compensating wage differential received by workers in risky firms is  $(w_1 - w_0)^*$  and the quantity of workers employed at these jobs is  $E^*$
- Note that  $(w_1 - w_0)^*$  is the wage differential required to attract the marginal worker (the last worker hired) into the risky job, thus it measures the reservation price of the last worker hired and not the average dislike for risky jobs in the population.
- As a result, all workers except the last one hired will be overcompensated by the market because they were willing to work at a risky job at a lower wage.

## What happens when workers do not dislike risk?

- For example: motorcyclists, F1 pilots, extreme sports athletes.
- Their reservation price is actually negative because they are willing to pay for the right to be employed in risky jobs.
- Look at the graph (figure 5-3) in the textbook pg. 203.
- Compensating wage differentials can go the other way too.

# Hedonic Wage Function and Job Amenities

- Hedonic Wage Function: it summarizes the relationship between the wage that workers get paid and job characteristics.
- So far we have talked about one characteristic, risk, but there are many other characteristics or amenities to jobs such as repetitive work, work location, physical work, etc.
- In general, individuals have opinion about if a job is “good” or “bad”. If everyone agrees that a job is “good”, then that job is associated with a lower wage rate.
  - Informal jobs are a good example of jobs with different amenities.
- In practice, measuring compensating differentials is hard because higher ability workers are likely to earn higher wages and will probably have more job amenities.

# Compensating Job Differentials and Amenities

- ① Unemployment insurance
- ② Income taxes
- ③ HIV

# Readings

- Borjas 5.1; 5.5 - 5.6