

**Human Resources**  
**Homework 4**  
**Suggested Answer**

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Answer following questions on separate sheets of A4 papers. Answer should be in English. You may discuss questions with your friends, but you have to submit your own answer. Just copying your friends' answer will be harshly punished. **The due date is 2/17/2005.** You must submit your answer in the class.

1. Borjas, 3rd edition, p. 232, Problem 4 (5pts)

Suppose all workers have the same preferences represented by

$$U = \sqrt{w} - 2x$$

where  $w$  is the wage and  $x$  is the proportion of the firm's air that is composed of toxic pollutants. There are only two types of jobs in the economy, a clean job ( $x=0$ ) and a dirty job ( $x=1$ ). Let  $w_0$  be the wage paid by the clean job and  $w_1$  be the wage paid by the polluted job. If the clean job pays \$16 per hour, what is the wage in dirty jobs? What is the compensating wage differential?

The worker's utility from the clean job is

$$U_0 = \sqrt{16} = 4.$$

In the market equilibrium, the utility obtained from the clean job and the dirty job should be equal, thus the wage in the dirty job is obtained by solving the following equation.

$$\sqrt{w_1} - 2 = 4$$

by moving -2 to the right hand side, we obtain

$$\sqrt{w_1} = 6$$

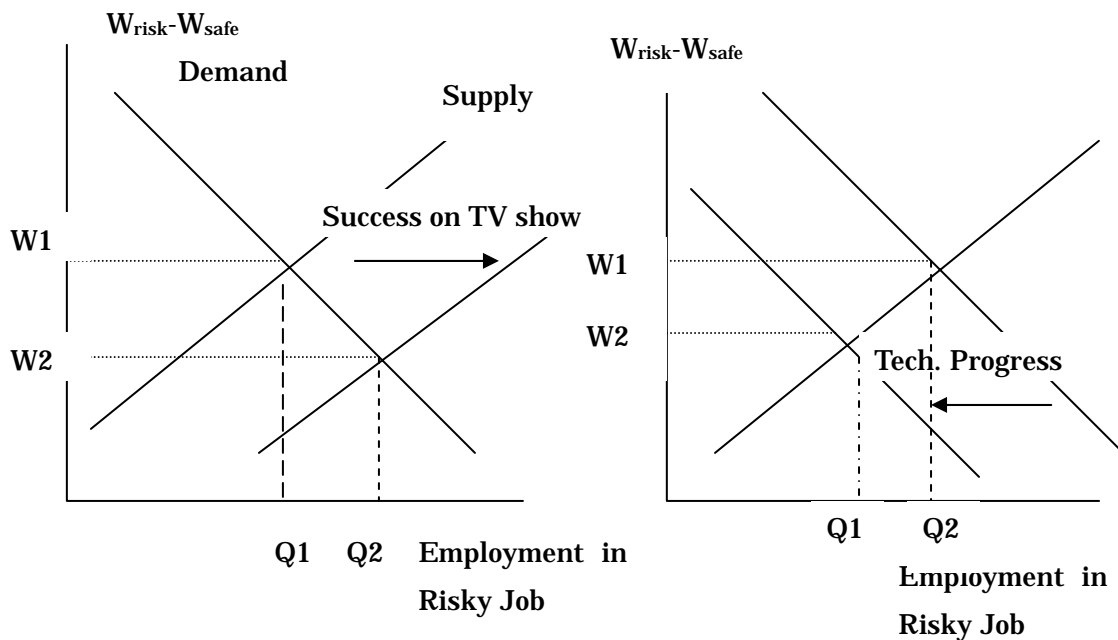
Thus  $w_1=36$ . The wage for dirty job should be 36 in the equilibrium. Compensating

wage differential is  $36-16=20$ .

2. Borjas, 3rd edition, p. 232, Problem 5 (5pts)

Suppose a drop in the compensating wage differential between risky jobs and safe jobs has been observed. Two explanations have been put forward: First, engineering advances have made it less costly to create a safe working environment; second, the phenomenal success of a new reality show *Die on the Job!* has imbued millions of viewers with a romantic perception of work-related risks. Using supply and demand diagrams, support each of the two explanations for the drop in the compensating wage differential. Can information on the number of workers employed in the risky occupation help determine which explanation is the right one?

The drop of the compensating wage differential could occur due to the right-ward shift of labor supply curve (Success of *Die on the Job!*) or left-ward shift of labor demand curve (technological progress). These two cases are illustrated in the following diagrams.



If the wage differential between risky job ( $W_{\text{risk}}$ ) and safe job ( $W_{\text{safe}}$ ) dropped due to the success of TV show, *Die on the Job!*, the employment in risky job should increase. On contrary, if the wage differential dropped due to the technological progress, the employment in the risk job should decrease. Thus by looking at the change in the number of employment in risk job, we can determine which is the right explanation for the drop of wage differential.