5-5. Suppose a drop in the compensating wage differential between risky jobs and safe jobs has been observed. Two explanations have been put forward:

- Engineering advances have made it less costly to create a safe working environment.
- The phenomenal success of a new action serial “Die On The Job!” has imbued millions of viewers with a romantic perception of work-related risks.

Using supply and demand diagrams show how each of the two developments can explain 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 engineering advances make it cheaper for firms to offer safe jobs, and hence reduce the gain from switching from a safe environment to a risky one. This will shift the demand curve for risky jobs in and reduce the compensating wage differential (Figure 1). Note that the equilibrium number of workers in risky jobs goes down.

The glamorization of job-related risks may make people more willing to take these risks. This shifts supply to the right and reduces the compensating differential (Figure 2). Note that the equilibrium number of workers in risky jobs goes up.

Thus, information on whether employment in the risky sector increased or decreased can help discern between the two competing explanations.

Figure 1. Labor Market for Risky Jobs
There are two types of farming tractors on the market, the FT250 and the FT500. The only difference between the two is that the FT250 is more prone to accidents than the FT500. Over their lifetime, one in ten FT250s is expected to result in an accident, as compared to one in twenty-five FT500s. Further, one in one-thousand FT250s is expected to result in a fatal accident, as compared to only one in five-thousand FT500s. The FT250 sells for $125,000 while the FT500 sells for $137,000. At these prices, 2,000 of each model are purchased each year. What is the statistical value farmers place on avoiding a tractor accident? What is the statistical value of a life of a farmer?

The FT500 is associated with an extra cost of $12,000, but its accident rate is only 0.04 compared to the 0.10 accident rate of the FT250. Also, each farmer that buys the FT250 is willing to accept the additional risk in order to save $12,000. Thus, these workers are willing to receive $24 million ($12,000 x 2,000) in exchange for 200 – 80 = 120 accidents. Thus, the value placed on each accident is $200,000. Likewise, the 2,000 farmers who buy the FT250 are willing to receive $24 million in exchange for 2 – .4 = 1.6 fatal accidents. Thus, the value placed on each life is $15 million.

Peter lives for three periods. He is currently considering three alternative education-work options. He can start working immediately, earning $100,000 in period 1, $110,000 in period 2 (as his work experience leads to higher productivity), and $90,000 in period 3 (as his skills become
obsolete and physical abilities deteriorate). Alternatively, he can spend $50,000 to attend college in period 1 and then earn $180,000 in periods 2 and 3. Finally, he can receive a doctorate degree in period 2 after completing his college education in period 1. This last option will cost him nothing when he is attending graduate school in the second period as his expenses on tuition and books will be covered by a research assistantship. After receiving his doctorate, he will become a professor in a business school and earn $400,000 in period 3. Peter’s discount rate is 20 percent per period. What education path maximizes Peter’s net present value of his lifetime earnings?

The present discounted values of Peter’s earnings associated with each of the alternatives are

\[
P_{HS} = 100,000 + \frac{110,000}{1.2} + \frac{90,000}{1.2^2} = $254,167,
\]

\[
P_{COL} = -50,000 + \frac{180,000}{1.2} + \frac{180,000}{1.2^2} = $225,000,
\]

and

\[
P_{PhD} = -50,000 + \frac{0}{1.2} + \frac{400,000}{1.2^2} = $227,778.
\]

Thus, the best option for Peter is to start working upon completely high school.

6-8. Suppose there are two types of persons: high-ability and low-ability. A particular diploma costs a high-ability person $8,000 and costs a low-ability person $20,000. Firms wish to use education as a screening device where they intend to pay $25,000 to workers without a diploma and $K$ to those with a diploma. In what range must $K$ be to make this an effective screening device?

In order for a low-ability worker to not pursue education, it must be that $25,000 \geq K - 20,000$ which requires $K \leq 45,000$. Similarly, in order for a high-ability worker to pursue education, it must be that $K - 8,000 \geq 25,000$ which requires $K \geq 33,000$. Thus, in order to use education as a signaling device, it must be that educated workers are paid between $33,000 and $45,000.

7-2. What effect will each of the following proposed changes have on wage inequality?

(a) Indexing the minimum wage to inflation.

Indexing the minimum wage to inflation should reduce wage inequality because the minimum wage helps prop up the wages of less skilled workers. Note that an increase in the minimum wage may have negative employment effects, but the proposed policy is not to increase the minimum wage but rather simply to prevent it from falling in real terms.

(b) Increasing the benefit level paid to welfare recipients.

Wage inequality measures the dispersion of wages in the working population. An increase in welfare benefits would likely induce less-skilled workers out of the labor force, and would reduce measured wage inequality by effectively eliminating the bottom of the wage distribution.

(c) Increasing wage subsidies paid to firms that hire low-skilled workers.

Wage subsidies would increase the demand for less skilled workers, reducing wage inequality.

(d) An increase in border enforcement, reducing the number of illegal aliens entering the country.

If illegal aliens tend to be relatively less-skilled, the decrease in supply of illegal aliens would raise the relative wage of less skilled workers. In addition, if the less-skilled illegal aliens complement the skills of skilled natives, the reduction in the number of illegal aliens would decrease the wages of skilled natives. In sum, reducing the number of illegal aliens should reduce wage inequality.
8-4. Suppose a worker’s skill is captured by his efficiency units of labor. The distribution of efficiency units in the population is such that worker 1 has 1 efficiency unit, worker 2 has 2 efficiency units, and so on. There are 100 workers in the population. In deciding whether to migrate to the United States, these workers compare their weekly earnings at home \((w_0)\) with their potential earnings in the United States \((w_1)\). The wage-skills relationship in each of the two countries is given by:

\[
\begin{align*}
    w_0 &= 700 + 0.5s, \\
    w_1 &= 670 + s,
\end{align*}
\]

where \(s\) is the number of efficiency units the worker possesses.

(a) Assume there are no migration costs. What is the average number of efficiency units among immigrants? Is the immigrant flow positively or negatively selected?

The earnings-skills relationship in each country is illustrated in the figure below. The US line is steeper because the payoff to a unit of skills is higher in the United States. All workers who have at least 60 efficiency units will migrate to the United States. Therefore, there is positive selection and the average number of efficiency units in the immigrant flow is approximately 80 (the exact answer depends on whether the person with 60 efficiency units, who is indifferent between moving or not, moves to the United States).

(b) Suppose it costs $10 to migrate to the United States. What is the average number of efficiency units among immigrants? Is the immigrant flow positively or negatively selected?

If everyone incurs a cost of $10 to migrate to the United States, the U.S. wage-skill line drops by $10, and only those persons with more than 80 efficiency units will find it worthwhile to migrate. The immigrant flow is still positively selected and has, on average, 90 efficiency units.
(c) What would happen to the selection that takes place if migration costs are not constant in the population, but are much higher for more skilled workers?
If migration costs are much higher for skilled workers, it is possible that no skilled workers will find it worthwhile to migrate. We already know that even in the absence of migration costs no worker with fewer than 60 efficiency units finds it worthwhile to migrate. If highly skilled workers find it very costly to migrate it might be the case that there is no migration to the United States.

Non-book problem: Suppose there are two “types” of people in the population. One type is more risk averse, and thus values workplace safety relatively highly. The other type is less risk averse, and thus values workplace safety relatively less. A couple of indifference curves (over wage and job safety) for each type are shown in the figure below.
a. One type of worker has solid indifference curves and the other type has dashed indifference curves. Which type of worker has the solid indifference curves?

The more risk averse type has the dashed indifference curves. The less risk averse has the solid indifference curves.

b. Suppose that you are a manager in a relatively unsafe firm. Your firm has 2 “units” of workplace safety and pays hourly wages of $15. That is, the firm can be represented by point A. Another firm, firm B, similar in all other ways, offers a wage of $12 and has a safer work environment (6 units). Which type of worker chooses to work at your firm and which chooses to work at firm B?

The more risk averse worker chooses firm B (they are on a higher indifference curve at B than they would be at A), while the less risk averse worker chooses firm A (they are on a higher indifference curve at A than they would be at B).

c. Suppose that someone offers to sell your firm a new, safer technology that would increase workplace safety to 4 units. In order to exactly cover the cost of the new technology, your firm would have to decrease hourly wages by $1. Do you recommend that your firm purchase the new technology? Why or why not? Two things to consider:

i. After covering costs by decreasing wages, would your workers be worse off? (If so, they would leave to another firm located at point A.) Could you decrease wages even further and therefore raise the firm’s profits?

ii. If you do purchase the new technology, which types of workers would choose to work at your firm? How might this make a difference in your decision?

Note that decreasing wages from $15 to $14 and increasing workplace safety to 4 units would cause your workers to be on a higher indifference curve than they were previously. Thus, you could decrease wages more until the workers are exactly as well off as they were before. In this graph, this occurs at a wage of $13.50 (at this point, they are on the same indifference curve as the one that goes through point A). So, the technology would seem to be a good investment for the firm, since the benefit (in terms of being able to decrease wages) is greater than the cost. However, at a wage of $13.50 and 4 units of safety, the more risk averse workers (who previously chose firm B) would now be willing to work at your firm. Thus, unlike before, your wage-safety combination is unable to work as an effective screening device of workers. This may be a good thing or a bad thing. If, for whatever reason, a worker’s risk aversion is inversely correlated with productivity at your firm, then it’s possible that your firm may end up worse off.

d. Ignore part c. Suppose OSHA, out of concern for workers welfare, mandates that all firms increase workplace safety up to a level of 6 units. Thus, all firms become like firm B (since wages must be lowered in order to pay for the safety improvements). Are your workers better or worse off due to this change?

Despite the intentions of OSHA, your workers would be worse off. Point B places them on a lower indifference curve than the one going through point A.
Non-book problem 2. Based on your observation, describe a couple of ways that the Southpark episode shown in class (Season 8: "Goobacks" -- http://www.southparkstudios.com/full-episodes/s08e06-goobacks) captures elements of the debate over immigration in this country. Also describe one or two relevant aspects of this debate that were not addressed in this episode.

Answers may vary.