

**Economics 460: Labor Economics**  
Department of Economics, Finance and Legal Studies  
University of Alabama

Problem Set #4

1. Debbie is about to decide which career path to pursue. She has narrowed her options to two alternatives. She can either become a marine biologist or a concert pianist. Debbie lives two periods. In the first, she gets an education. In the second, she works in the labor market. If Debbie becomes a marine biologist, she will spend \$15,000 on education in the first period and earn \$472,000 in the second period. If she becomes a concert pianist, she will spend \$40,000 on education in the first period and then earn \$500,000 in the second period.
  - (a) Suppose Debbie can lend and borrow money at a 5 percent annual rate. Which career will she pursue? What if she can lend and borrow money at a 15 percent rate of interest? Will she choose a different option? Why?
  - (b) Suppose musical conservatories raise their tuition so that it now costs Debbie \$60,000 to become a concert pianist. What career will Debbie pursue if the discount rate is 5 percent?
2. 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?
3. Suppose the skills acquired in school depreciate over time, perhaps because technological change makes the things learned in school obsolete. What happens to a worker's optimal amount of schooling if the rate of depreciation increases?
4. Suppose workers differ in their ability, but have the same discount rate. Is it possible for the more able workers to choose less schooling?
5. In the typical signaling model, it is assumed that the costs of acquiring an education are higher for low-ability than for high-ability workers. Suppose the government subsidizes low-ability workers for the higher costs they incur in obtaining an education. What happens to the signaling value of education? Can there be a perfectly separating equilibrium in this labor market?

6. 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?
7. It has been argued that the minimum wage prevents workers from investing in on-the-job training and discourages employers from providing specific training to low-income workers. Why would the minimum wage have an adverse effect on human capital accumulation for low-income workers?