

MPP8 – Microeconomics II Fall 2015

Modern Labor Market Review

Problem Set 3

1. Suppose the adult population consists of 100,000 individuals, of which 90,000 are in the labor force and 5,000 are unemployed. The local government adopts a policy to increase the benefits paid to eligible retired workers. As a result, 2,000 previously employed workers drop out of the labor force. Instead of replacing the retired workers, however, firms simply dissolve the jobs so that there are no other changes.

- (a) Calculate the labor force participation rate and the unemployment rate before and after the change in retirement benefits.
- (b) What has happened to the actual number of unemployed workers?

2. In a small, rural community, the aggregate labor supply curve is given by $L_s = -40 + 10\omega$ and aggregate labor demand by $L_d = 160 - 10\omega$, where ω is the hourly wage rate.

- (a) Calculate the equilibrium level of employment and wage. What is the size of the labor force in equilibrium?
- (b) After a national story about the quality of life in the small town, migration shifts out the labor supply curve. The new aggregate labor supply curve is $L_s = -20 + 10\omega$. Calculate the new equilibrium wage.

3. Referring to the previous question, suppose a new firm decides to locate in the small town after the decrease in the equilibrium wage. As a result, the aggregate labor supply curve is $L_s = -20 + 10\omega$ and the new aggregate labor demand curve is now $L_d = 180 - 10\omega$.

- (a) Calculate the new equilibrium wage and the level of employment.
- (b) If a worker in this market works an 8-hour day and plans to spend the entire day's income to buy DVDs at \$20 each, what is the worker's real wage (ω^R) in terms of DVDs?

4. At the local widget factory, the firm can produce the following output per day at various employment levels:

Workers	Output	MPL
0	0	-
1	100	a
2	150	b
3	190	c
4	225	d
5	250	e

- (a) Fill in values for a-e.
- (b) If the price per widget is \$2, plot the marginal revenue product of labor against the number of workers.
- (c) If the firm must pay workers \$75/day, how many workers will the firm employ?

5. The government levies a payroll tax on firms, requiring firms to pay \$2 per labor hour. Prior to the tax, aggregate labor supply is $L_s = 40 + 15\omega$ and labor demand is given by $L_d = 200 - 5\omega$.

- (a) Calculate the equilibrium wage and level of employment before and after the payroll tax.
- (b) What fraction of the payroll taxes paid by firms is passed onto workers?

6. Referring to the previous question, suppose the labor supply curve is instead perfectly inelastic and given by $L_s = 160$. Re-answer questions (a) and (b) from the previous question.

7. To decrease the number of individuals on welfare, the U.S. government agrees to subsidize the employment of either current welfare recipients or individuals who have been on welfare during the past year. Specifically, the government will pay firms \$4/hr for each worker employed meeting these requirements. Prior to the subsidy policy, the labor supply of welfare recipients is given by $L_s = 20 + 5\omega$ and labor demand is given by $L_d = 120 - 15\omega$. Calculate the level of employment and the equilibrium wage rate before and after the subsidy goes into effect.

8. In the small community of Highville, the aggregate labor supply curve is given by $L_s = -50 + 20\omega$ and aggregate labor demand by $L_d = 150 - 5\omega$, where ω is the hourly wage rate.

- (a) Calculate the equilibrium level of employment and wage. What is the size of the labor force and unemployment rate in equilibrium?
- (b) After a national story about the quality of life in Highville, migration leads to an increase in the labor supply curve. The new aggregate labor supply curve is $L_s = 20\omega$. Calculate the new equilibrium wage.
- (c) If the local labor market was slow to react to the new migrants and, as a result, the wage did not adjust to the new equilibrium wage, what would be the level of employment and unemployment and what would be the size of the labor force?

9. Consider the small community directly across the river from Highville, called Lowville. The aggregate labor supply curve in Lowville is given by $L_s = -20 + 5\omega$ and aggregate labor demand by $L_s = 160 - 5\omega$, where ω is the hourly wage rate.

- (a) Calculate the equilibrium level of employment and wage.
- (b) That same national story about the quality of life in small towns reported that the quality of life in Lowville is extremely poor. As a result, many of this town's residents decided to move, thereby shifting in the labor supply curve. The new aggregate labor supply curve is $L_s = -40 + 5\omega$. Calculate the new equilibrium wage.
- (c) As in Highville, the local labor market is slow to react to the exodus of workers. As a result, wage does not adjust to the new equilibrium wage. What is the level of employment and unemployment, and what is the size of the labor force?

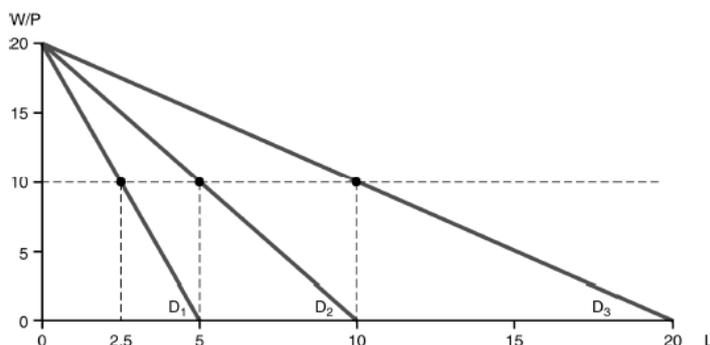


Figure 3-2

10. Figure 3-2 shows the short-run labor demand curves (expressed as a function of the real wage) for the three individual firms that hire this type of labor. At a real wage of 10, what is the market's quantity demanded? (assuming the three individual firms make up for the entire market)

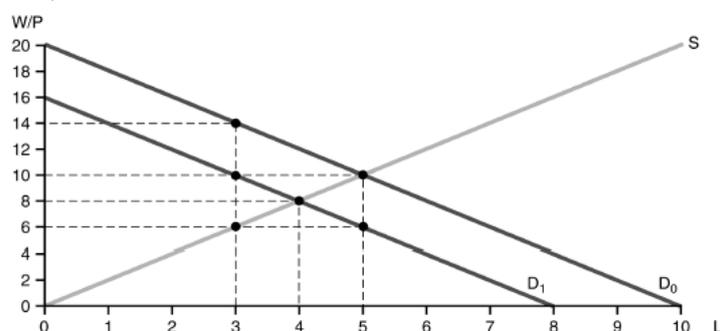


Figure 3-3

11. In figure 3-3, the curve labeled D_0 represents the short-run market demand before the payroll tax is imposed, while D_1 represents the curve after a tax (in real terms) of X per employee has been imposed on the firm. The curve labeled S is the market supply curve for labor. The wage on the vertical axis represents the real wage (w/P) employees actually receive.

- What is the amount of the tax?
- What is the percentage of the tax the workers bear in the form of lower wages?
- What has been the effect of the payroll tax on the employment level?
- What percentage of the tax would the worker bear in the form of lower wages if the supply curve (S) were perfectly vertical (i.e., quantity supplied was extremely insensitive to changes in the wage)?

12. Suppose the following equations represent the demand for two firms demanding a particular type of

labor. The curves are expressed as functions of the real wage.

Firm 1: $L_1 = 50 - (w/P)$.

Firm 2: $L_2 = 25 - 0.5(w/P)$.

- Plot the two curves on the same axes and then construct the market demand.
- Find the equation for the market demand curve.

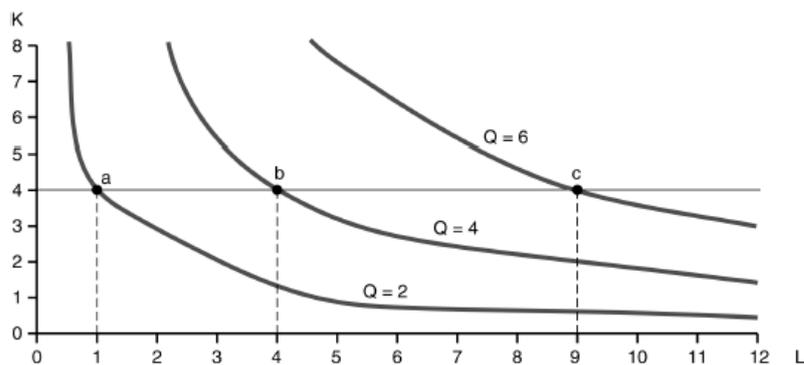


Figure 3-5

13. Consider the isoquants shown in Figure 3-5. Assume the level of capital is fixed at 4 units in the short run.

- (a) Find the marginal product of labor associated with a movement from point a to point b. Do the same for a movement from point b to point c.
- (b) Is the diagram consistent with the notion of a diminishing marginal product of labor? If so, does it help to explain why the marginal product declines?

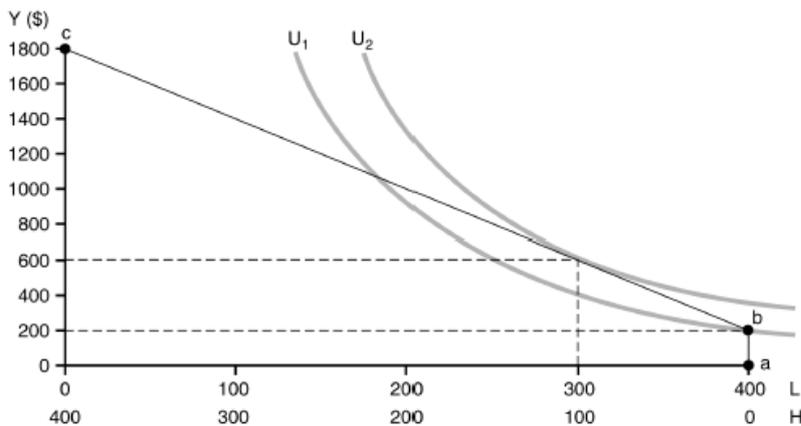


Figure 6-4

14. In Figure 6.4, the budget constraint is represented by line abc.

- (a) What is the wage rate?
- (b) What is the optimal level of leisure?

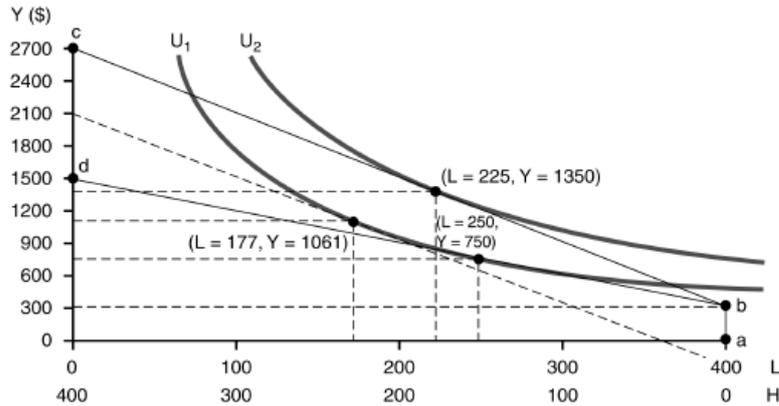


Figure 6-7

15. Consider Figure 6-7, which depicts a wage decrease. The original constraint is line abc. The new constraint is line abd.

- (a) By how much has the wage decreased?
- (b) What is the income effect of the wage decrease? What is the substitution effect of the wage decrease?
- (c) Find the coordinates of two points on this individual's labor supply curve. Is the labor supply curve upward or downward sloping over the range of the wage change?