
14.01 Principles of Microeconomics, Fall 2007

Chia-Hui Chen
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Lecture 31

Factor Market

Outline

1. Chap 14: *Supply of Labor*
2. Chap 14: *Demand of Labor*

1 Supply of Labor

We derive the supply of labor by solving consumers' utility maximization problems.

Two variables determining the utility are leisure (L), which is measured by hours, and income (Y); the prices are w and 1 respectively.

To maximize $u(L, Y)$, we have

$$\frac{\frac{\partial u}{\partial L}}{\frac{\partial u}{\partial Y}} = w.$$

If w increases, on one hand, higher wages encourage people to work more (point A to point B), which is a substitution effect; on the other hand, higher wages allow the worker to purchase more goods, including leisure, which reduces work hours (point B to point C), which is an income effect (see Figure 1).

When the wage is higher, if the substitution effect exceeds the income effect, labor supply increases, and leisure decreases; if the income effect exceeds the substitution effect, labor supply decreases, and leisure increases (see Figure 2).

Like product markets, competitive, monopolistic, and monopsonistic markets are types of factor markets.

In a competitive factor market, if the product market is also competitive,

$$MRP_L = P \times MP_L.$$

If the product market is monopolistic,

$$MRP_L = MR \times MP_L = P\left(1 - \frac{1}{|ed|}\right) \times MP_L.$$

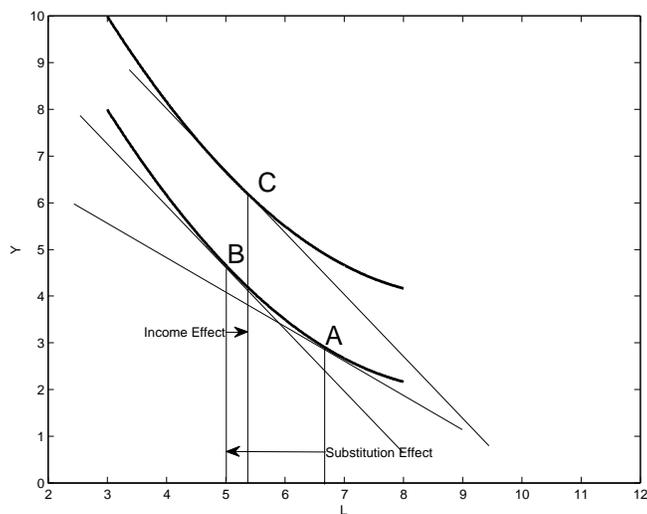


Figure 1: Substitution Effect and Income Effect of Labor Supply.

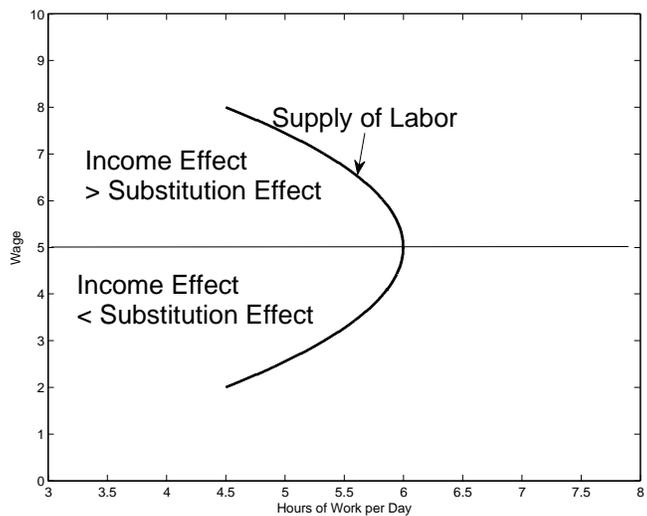


Figure 2: Backward-Bending Supply of Labor.

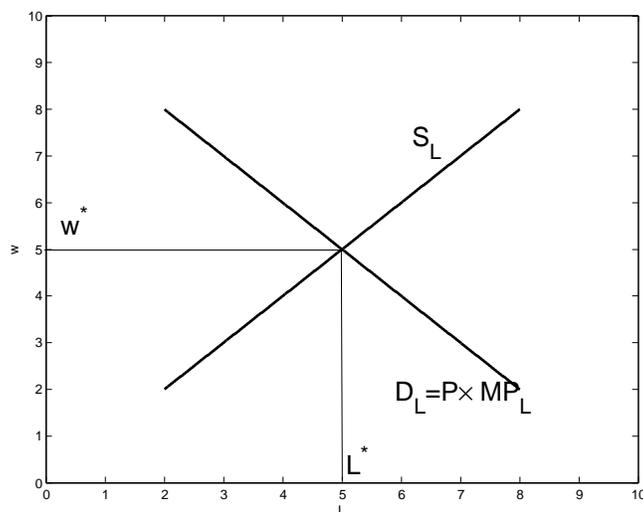


Figure 3: Competitive Factor Market.

1.1 Factor Competitive

Competitive market is most efficient, and there is no deadweight loss (see Figure 3).

When $MR < P$, both w and L decrease; the market is then not as efficient as competitive market, and has deadweight loss (see Figure 4).

1.2 Factor Monopsony

Marginal Value equals the demand. Marginal Expenditure

$$ME = \frac{\partial P_S(Q)Q}{\partial Q} = \frac{\partial P_S}{\partial Q} Q + P_S > P_S.$$

Because L is determined by

$$ME = MV,$$

we can see that

$$w' < w^*,$$

and

$$L' < L^*$$

(see Figure 5).

One example of factor monopsonist is the government hiring soldiers.

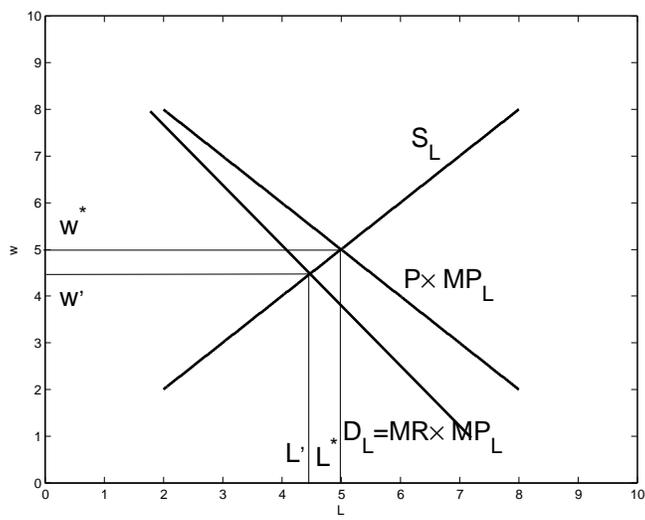


Figure 4: Noncompetitive Factor Market.

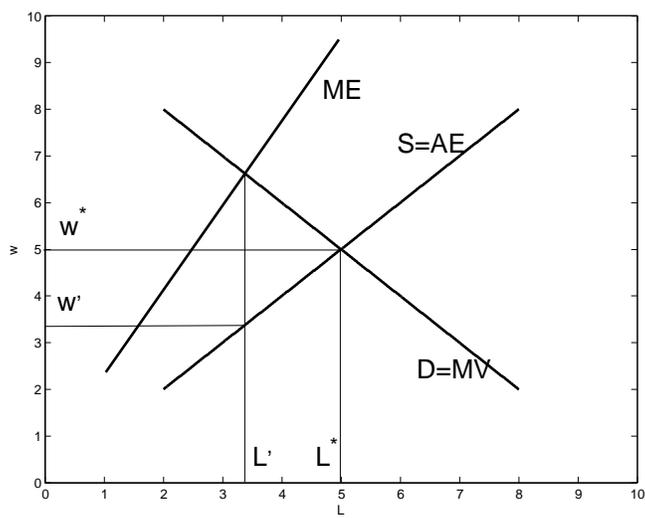


Figure 5: Monopsonistic Factor Market.

1.3 Factor Monopoly

An example of monopoly power in factor markets involves labor unions.

Economic rent is the difference between payments to a factor of production and the minimum payment that must be spent to obtain the factor; it is like producer surplus in a product market (see Figure 6).

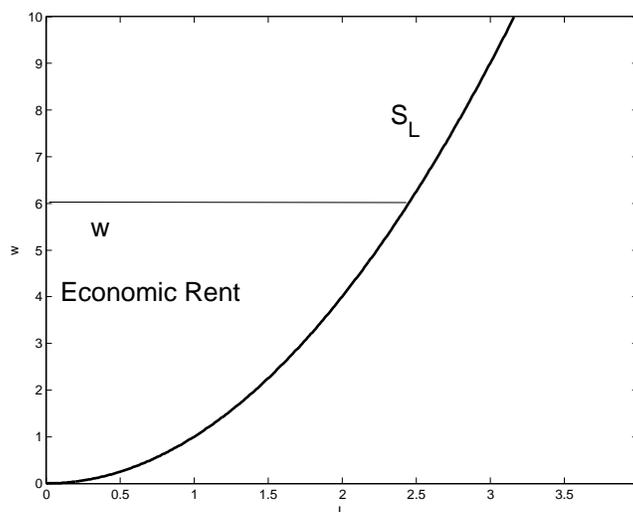


Figure 6: Economic Rent.

When some workers lose their jobs, remaining workers have higher wages.

If the union tries to maximize the number of workers hired, it should set the wage and labor employed w^* and L^* ; if the union tries to maximize economic rent, it should set the wage and labor employed w_1 and L_1 .

$$w_1 > w^*,$$

and

$$L_1 < L^*$$

(see Figure 7).

It is hard to say which one is better for the workers.

Now consider a model of union workers and non-union workers. Assume the demand for union workers is D_U , and the demand for non-union workers is D_{NU} . The total market demand

$$D_L = D_U + D_{NU}$$

is fixed.

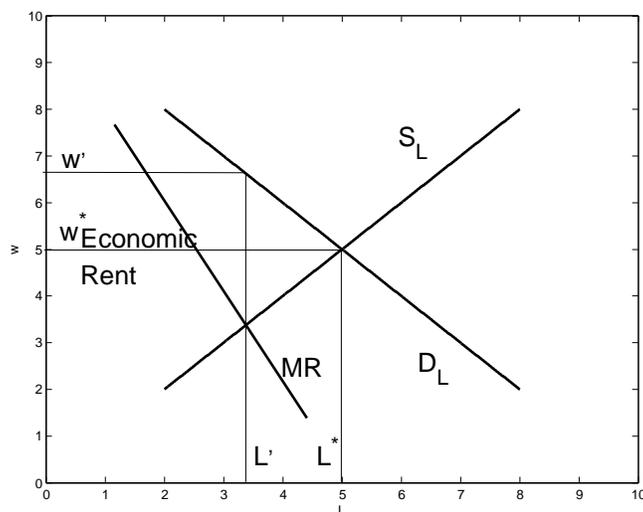


Figure 7: Monopoly Power of Sellers of Labor.

When a monopolistic union raises the wage rate in the unionized sector of the economy from w^* to w_U , employment in that sector falls; for the total supply of labor to remain unchanged, the number of non-union workers increases and the wage in the non-unionized sector must fall from w^* to w_{NU} (see Figure 8).

Assume the total supply of workers is 60; the demands for nonunion and union workers are

$$w_{NU} = 30 - \frac{1}{2}L_{NU},$$

$$w_U = 30 - L_U.$$

- When the union does not intervene,

$$w_{NU} = w_U = w.$$

Thus

$$L_{NU} = 60 - 2w,$$

and

$$L_U = 30 - w.$$

Then

$$L = 90 - 3w = 60,$$

which gives

$$w = 10,$$

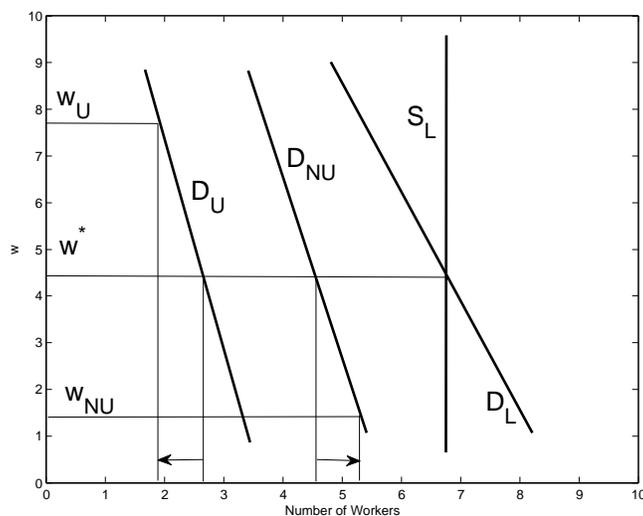


Figure 8: Wage Discrimination in Labor Market.

and therefore

$$L_U = 20,$$

$$L_{NU} = 40.$$

- When the union maximizes the total wage of union workers as a monopolist, the first order condition is

$$\frac{d}{dL_U}(w_U \times L_U) = \frac{d}{dL_U}(30 - L_U) \times L_U = 0.$$

Then

$$30 - 2L_U = 0,$$

$$L_U = 15;$$

thus

$$w_U = 15.$$

For the nonunion workers,

$$L_{NU} = 45,$$

$$w_{NU} = 7.5.$$

2 Demand of Supply

In competitive factor market, assume

$$Q = 10L - L^2,$$

and

$$P = 1.$$

$$MRP_L = MP_L \times MR = 10 - 2L.$$

w is marginal cost of hiring labor, thus

$$w = 10 - 2L,$$

then

$$L_D = \frac{10 - w}{2}.$$