

Factor Markets

(FRANK, Chapter 14)

Overview of Factor Markets

Firms that we have studied so far operate in **Commodity (goods and services) Markets, where commodities are traded.**

But for the firms to supply their products, they need factors of production, e.g. labor, capital, and raw materials.

These factors of production are traded in Factor Markets.

Thus, the demand in the factor markets will depend on the demand in the commodity markets: “Derived Demand”.

We are particularly interested in the labor market, as labor is used in virtually all production.

Overview of Factor Markets

Players in Commodity Markets

- **Buyers: Consumers**
- **Sellers: Firms**

If there are many buyers and sellers,
Then we have a **competitive commodity market**.

If there are many buyers and ONE seller,
Then we have a **monopolistic commodity market**.

Overview of Factor Markets

Players in Factor Markets (e.g. labor market)

- Buyers: Firms
- Sellers: Owners of Factors (Workers)

If there are many buyers and sellers,
Then we have a **competitive factor market**.

If there are many buyers and ONE seller,
Then we have a **monopolistic factor market**.
e.g. strong labor union, controlling how many workers to work.

If there are many sellers and ONE buyer,
Then we have a “**MONOPSONISTIC**” factor market.
e.g. one company in a small town, hiring workers.

Competitive Labor Market

First, we will look at a **COMPETITIVE LABOR MARKET**.

In the **COMPETITIVE LABOR MARKET**, there are

- Many buyers (firms) and sellers (workers)
- Identical products (labor from each worker is the same)
- No barriers to entry
- Perfect information

As a result, everyone is price-taker. Thus, the price is set by the market forces of demand and supply.

Competitive Labor Market

We will start with the demand for labor.

- when the commodity market is competitive.
- when the commodity market is monopolistic.

Then we will look at the supply of labor.

- e.g. how workers supply their labor.

Later, we will study other models:

- **Monopsonist in the labor market**
- **Monopoly in the labor market**
- **Bilateral Monopoly**

Demand for Labor

How many workers should a firm in the competitive labor market hire in the short run?

**Note that capital (K) is fixed in the short run.
Wage is also fixed as it is set by the market forces.**

Profit of the firm = $TR - TC = P(Q) \cdot Q - wL - rK$

where $Q = F(K, L)$

Consider two cases:

- 1) Competitive product market
- 2) Monopolistic product market

Individual Demand for Labor

How many workers should a firm in the competitive labor market hire in the short run?

In competitive product market, firms are price-takers.

$$P(Q) = P \quad \text{Profit of the firm} = P \cdot F(K, L) - wL - rK$$

The firm chooses L to maximize the profit by setting $\frac{\partial \pi}{\partial L} = 0$.

This gives $P \cdot \text{MPL} = w$.

Let $\text{VMPL} = P \cdot \text{MPL}$ or value of marginal product of labor.

Individual Demand for Labor

How many workers should a firm in the competitive labor market hire in the short run?

In monopolistic product market, the monopolist sets price.

- It faces a downward-sloping demand curve, $P(Q)$.
- If it charges high P , its Q will fall.

Profit of the firm = $P(Q) \cdot F(K, L) - wL - rK$

The firm chooses L to maximize the profit by setting $\frac{\partial \pi}{\partial L} = 0$.

This gives $(P + Q \frac{\partial P}{\partial Q}) \cdot MPL = MR \cdot MPL = w$.

Let $MRPL = MR \cdot MPL$ or marginal revenue product of labor.

Individual Demand for Labor

How many workers should a firm in the competitive labor market hire in the short run?

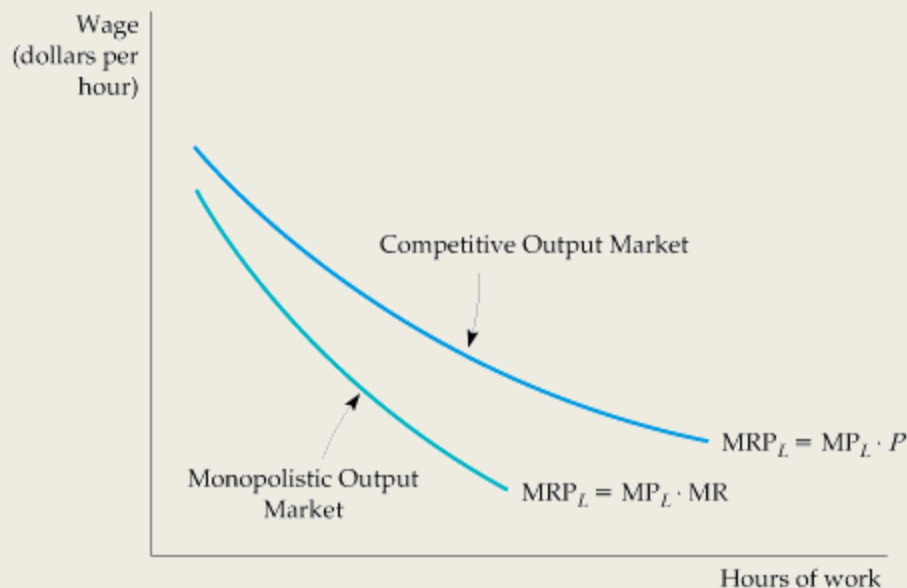
In competitive product market, firms should hire workers at the point where $VMPL = P \cdot MPL = w$

In monopolistic product market, the firm should hire workers at the point where $MRPL = MR \cdot MPL = w$

Recall that we derive the two conditions above from profit maximization, so they are actually the same as $MR = MC$.

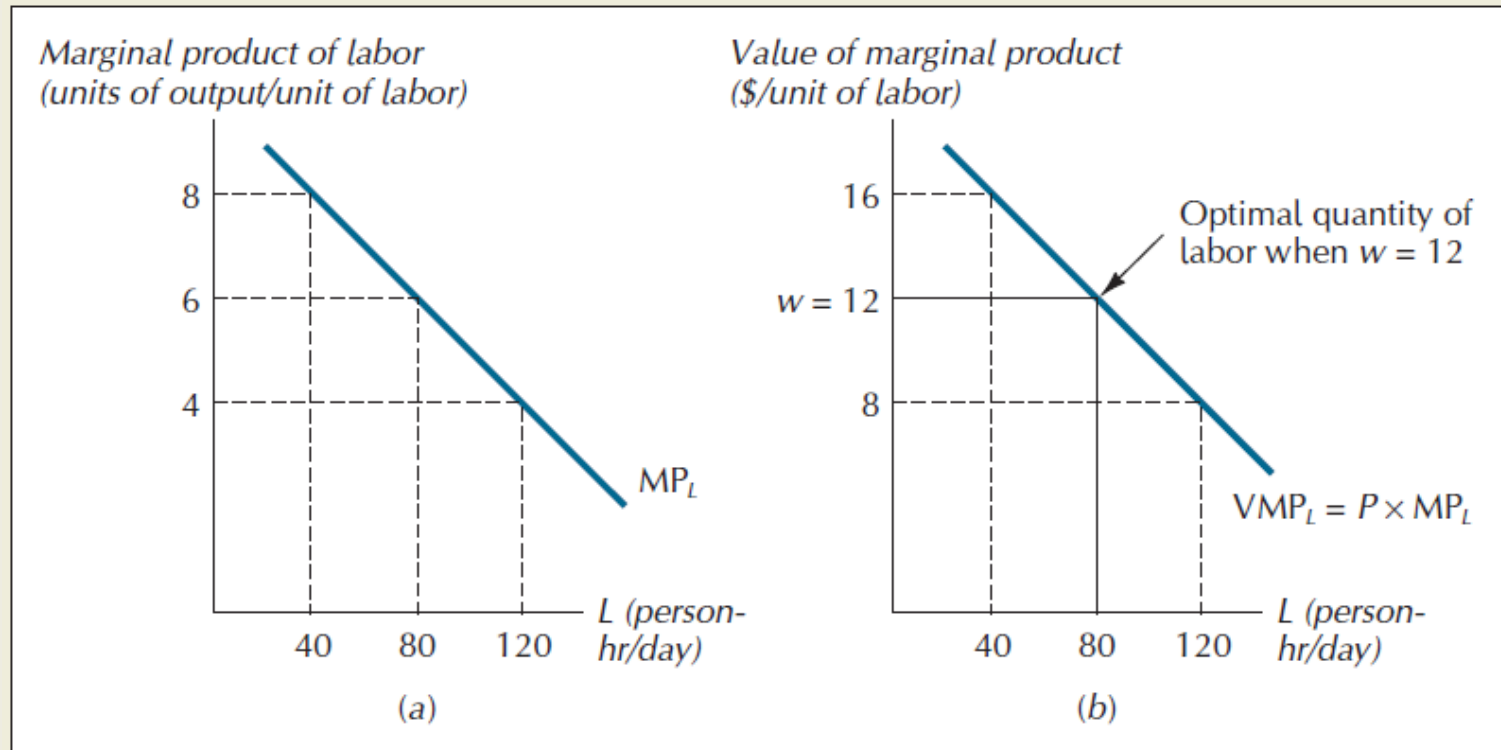
That is, **the extra revenue from hiring one more worker** equals **the extra cost of hiring that worker**.

Individual Demand for Labor



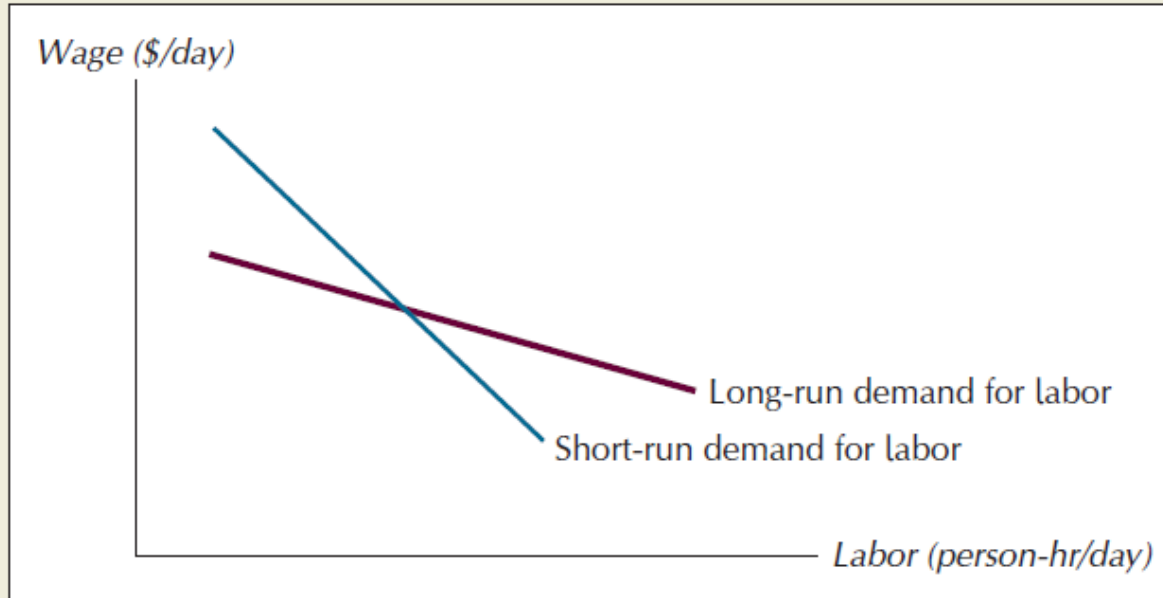
For a given level of wage, MRPL (left line) and VMPL (right line) suggest that **a monopolist should hire fewer workers than a competitive firm**. This is because the monopolist will not “overproduce” due to its downward-sloping demand.

Example



At a wage rate of \$12/unit of labor, how many units of labor would the firm shown in Figure 14.1 hire if its product sold not for \$2/unit but for \$3/unit?

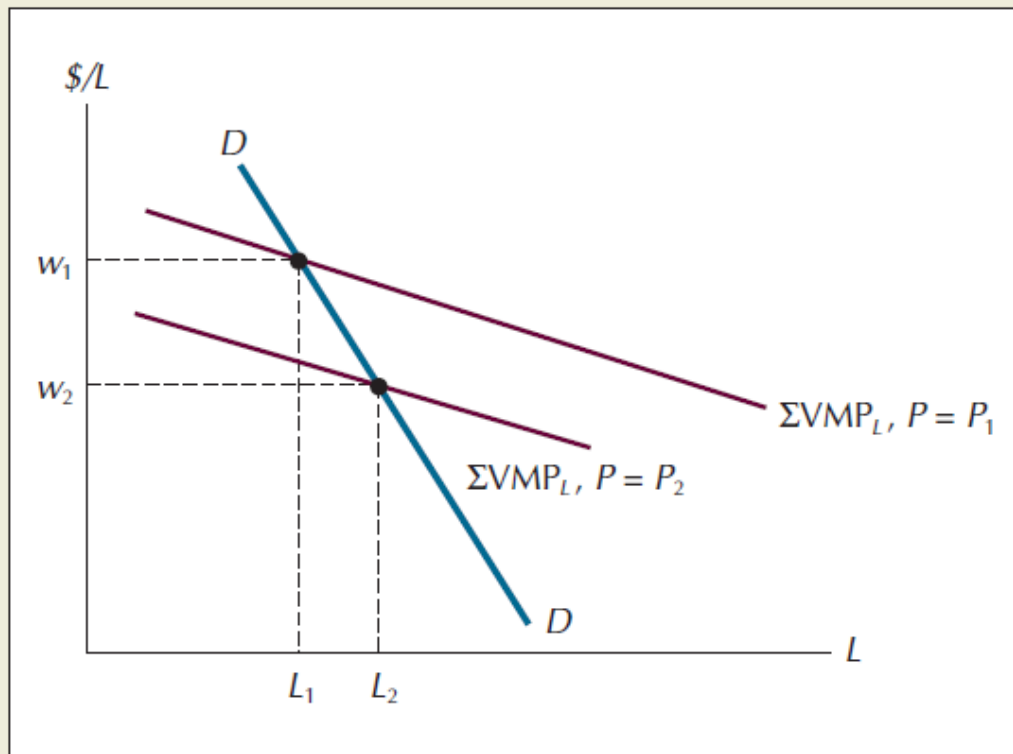
Individual Demand for Labor



The demand for labor is more elastic in the long run because the firm can substitute labor for capital.

The firm's demand for labor will also tend to be more elastic the more elastic the demand is for its product. If a price reduction stimulates a large increase in the quantity of the product demanded, it will also stimulate a large increase in the amount of labor required to produce it.

Market Demand for Labor



The Market Demand Curve for Labor

When the wage rate falls from w_1 to w_2 , **each firm hires more labor and produces more output.**

The increase in output causes output price to fall, which reduces the value of labor's marginal product. The market demand curve for labor is thus more steep than the horizontal summation of the individual demand curves.

Individual Supply of Labor

- All workers face labor-leisure trade-off.
- They have 24 hours a day, which are allocated between working and resting.
- Workers value both income from working and their leisure time.
- MU for both are positive but diminishing.

Individual Supply of Labor

- **One can think of “wage” as “price of leisure”** since when we rest, we forego wage income.
- Leisure is a normal good: as income rise, people want to consume more leisure.
- Now, if wage rises, leisure becomes more expensive.
- **SE** implies that workers will work more and rest less.
- **IE** implies that, with more money from higher wage, workers can work less and rest more.
- Two effects work in the opposite directions.

Individual Supply of Labor

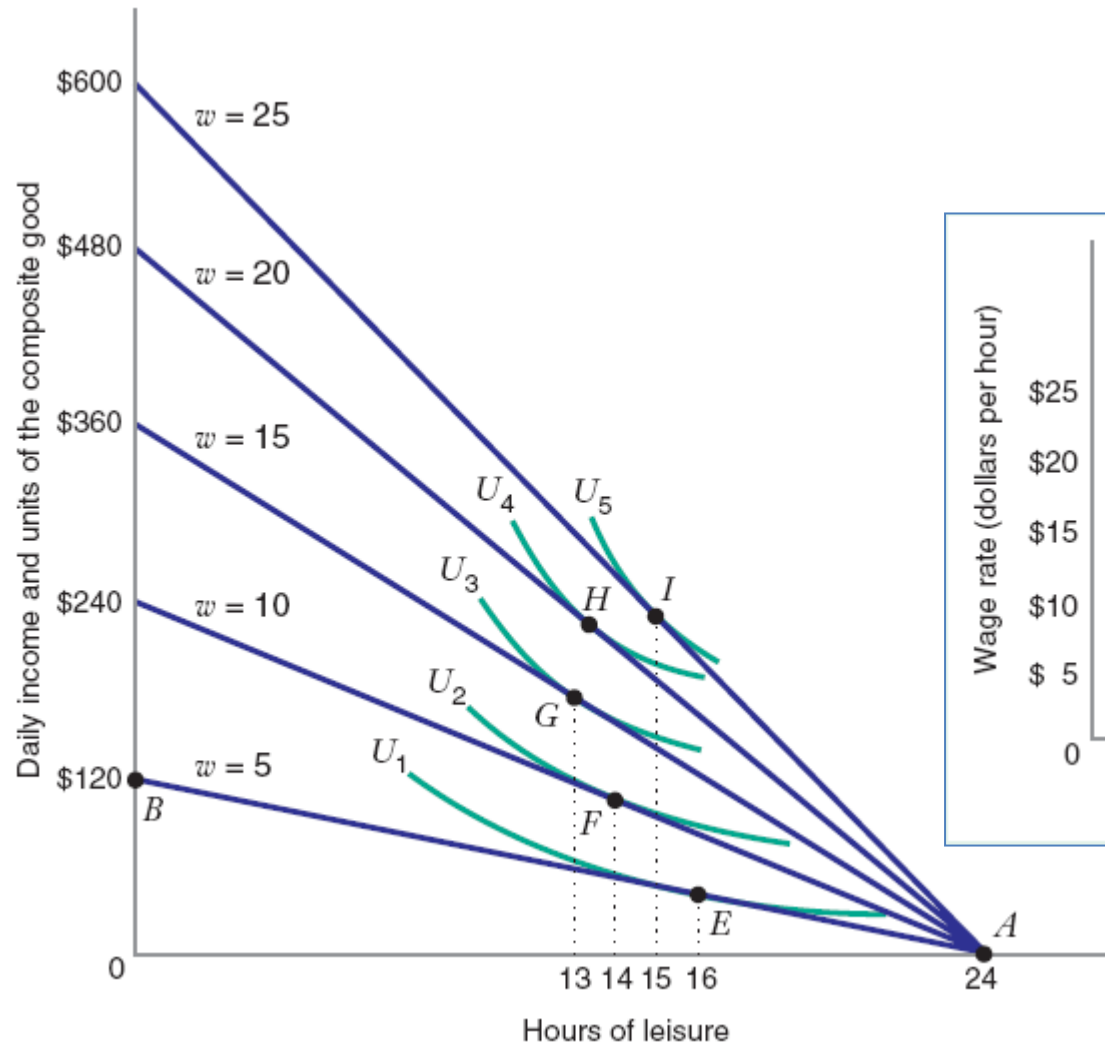
The labor supply curve slopes upward over the region where the SE associated with the wage increase outweighs the IE.

- Because leisure is more expensive, workers substitute away from leisure and work more.

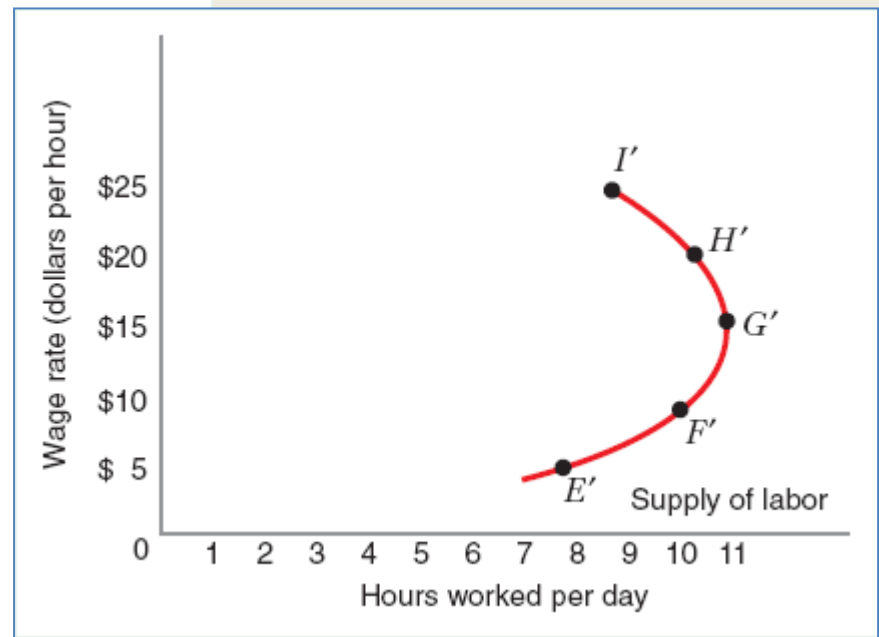
The labor supply curve bends backward over the region where the IE outweighs the SE.

- Given a higher wage, workers now become richer. Since leisure is a normal good, more leisure is consumed, and workers work less.

Individual Supply of Labor



Backward-Bending Labor Supply



Hrs of Leisure
Hrs of Work

Market Supply of Labor

The market supply curve of labor is obtained by horizontally adding the individual supply curves of labor.

Even though many individuals may have backward-bending supply curves, the supply curve for any particular category of labor is almost certain to be upward-sloping.

The reason is that wage increases in one category of labor not only change the number of hours worked by people already in that category, but also lure people into that category from other categories. For example, an increase in the price of soybeans causes many cotton farmers to switch to soybeans.

Competitive Labor Market

We have derived an individual firm's demand for labor:

- $VMPL = w$ for a competitive firm in the product market
- $MRPL = w$ for a monopolist in the product market

Market demand for labor = Sum of individual firms' demand.

An individual worker's supply of labor comes from his/her optimal choice between leisure and wage.

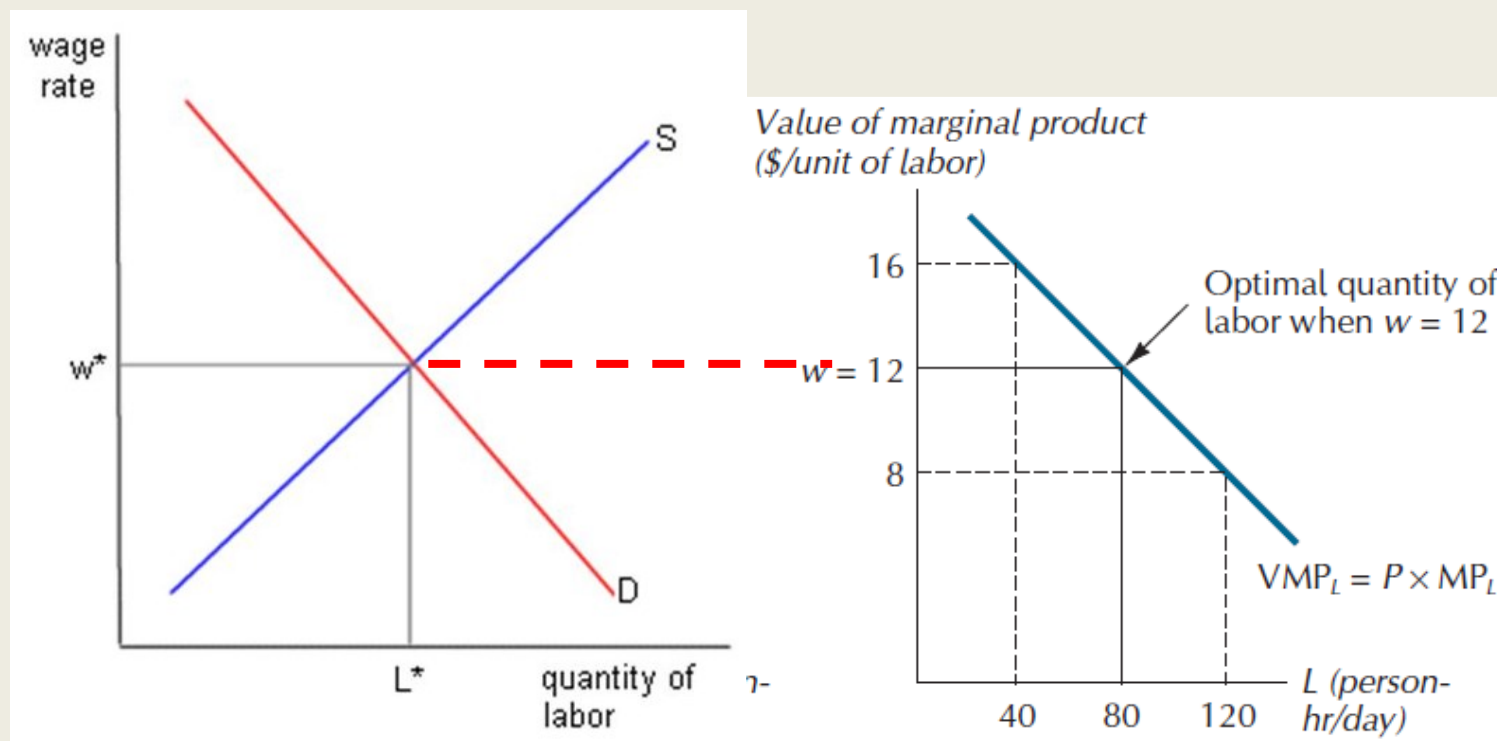
The individual labor supply curve can be backward-bending.

Market supply of labor = Sum of individual workers' supply.

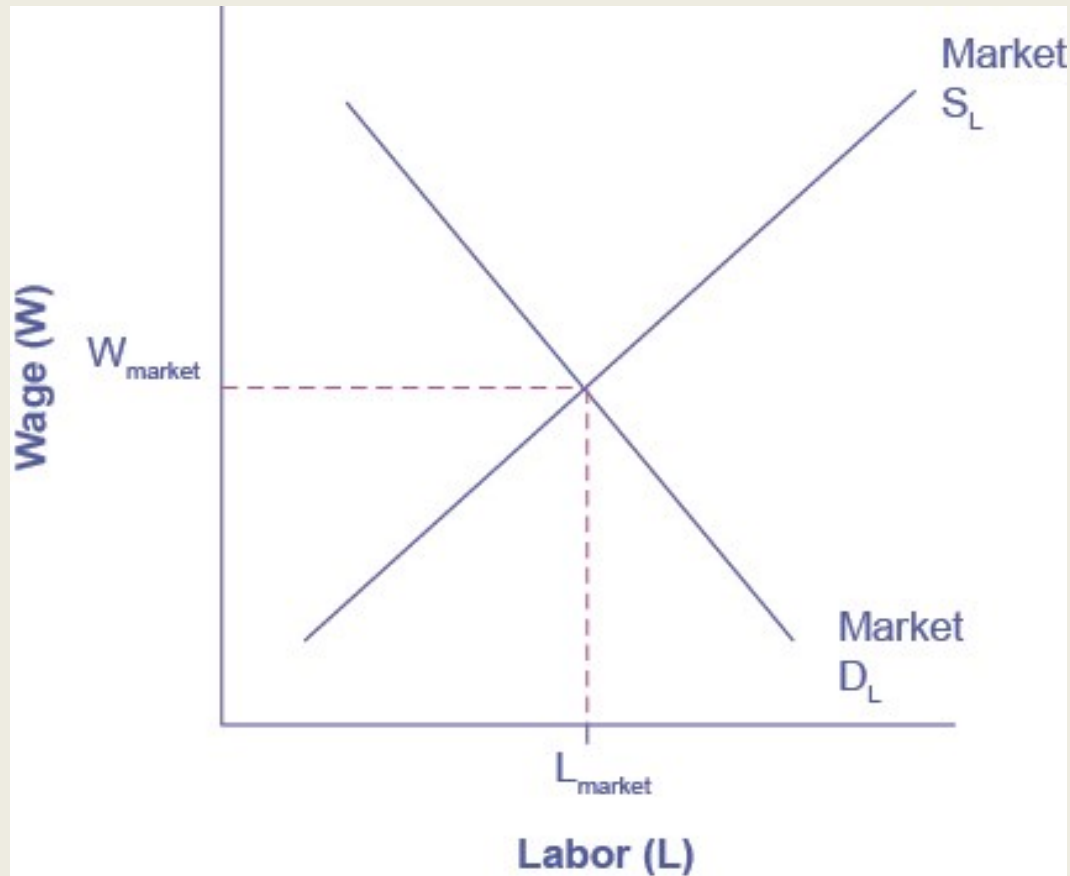
The market labor supply curve is upward-sloping.

Competitive Labor Market

In the competitive factor market, Market Demand for Labor and Market Supply of Labor determine the equilibrium wage W^* . An individual firm then takes W^* as given, and decides how many workers to hire.



Welfare in Competitive Labor Market



Monopsony

A monopsonist is the “sole buyer” in the factor market.

A classical example is one company in the town where workers cannot or will not leave the area.

In the competitive factor market, firms takes W^* as given and face a horizontal labor supply curve at W^* .

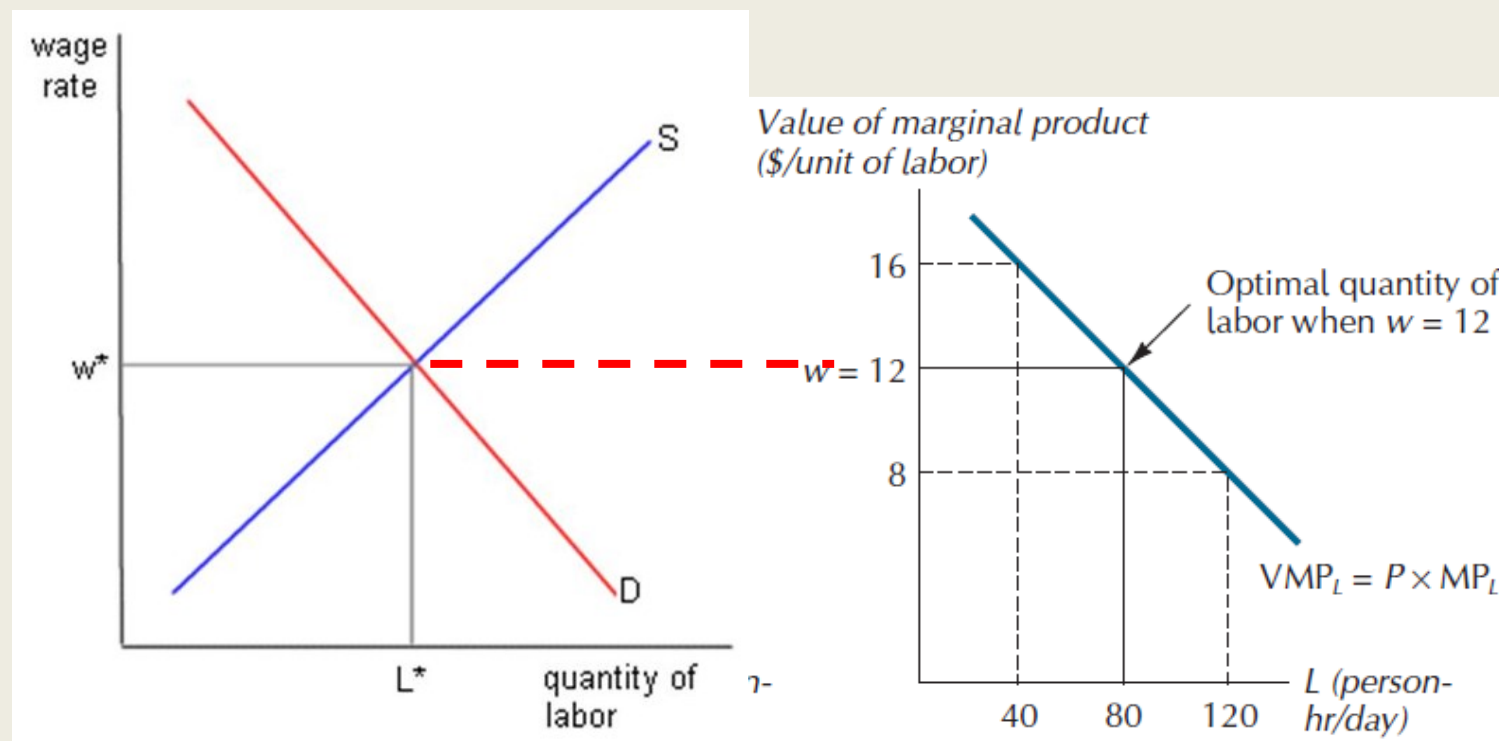
In the monopsonist factor market, the monopsonist faces the upward-sloping market labor supply curve.

**Here, the monopsonist no longer takes W^* as given.
How many workers it hire will affect the wage it faces.**

Monopsony

Monopsonist faces the market supply of labor. (BLUE S)

Competitive firms face the horizontal supply at W^* . (RED Dotted)



Monopsony

In factor markets,

Average Factor Cost (AFC) is another name for the supply curve for an input.

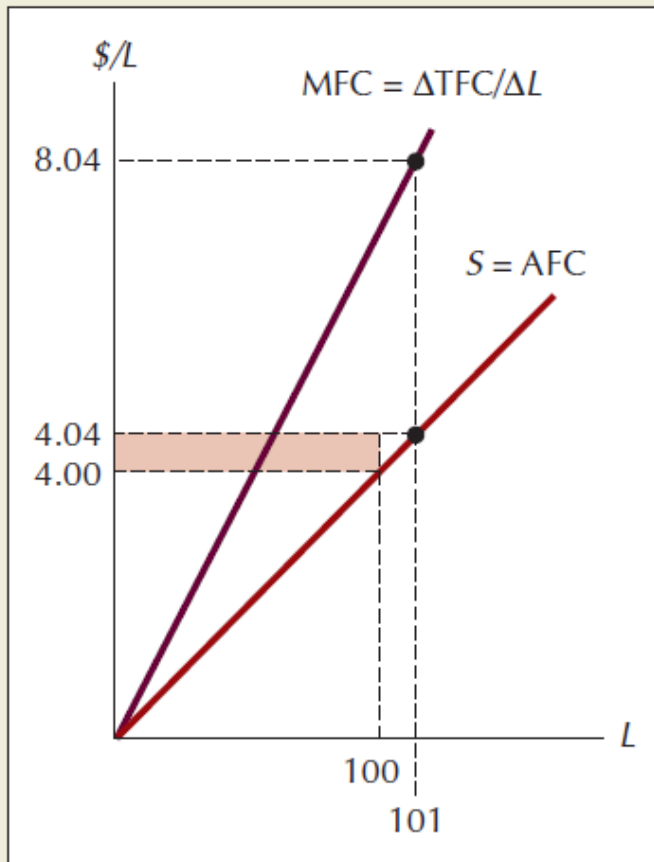
AFC represents the average payment per worker to achieve any given level of employment.

Total Factor Cost (TFC) = $AFC \times L$

Marginal Factor Cost (MFC) = $\Delta TFC / \Delta L$

Monopsony

Labor Supply in the monopsonistic market is upward-sloping.



To hire 100 workers, the firm has to pay wage of \$4 per worker.

$$TFC = 4 \times 100 = 400$$

To hire 101 workers, the firm has to increase wage to \$4.04 per worker.

However, the firm has to pay this high wage to everyone else.

$$TFC = 4.04 \times 101 = 408.04$$

MFC is the addition cost from this additional (101ST) worker, equal to \$8.04.

$$MFC = (408.04 - 400) / (101 - 100) = 8.04$$

Monopsony

AFC and MFC

In the monopsonistic market, the labor supply is upward-sloping.

Suppose AFC is linear, i.e. **$AFC = a + bL$** .

We have $TFC = aL + bL^2$

$$MFC = a + 2bL$$

The slope of MFC is twice as much as that of AFC.

Monopsony

Monopsonist's Profit Maximization

Firms in the competitive factor market will hire the workers at the point where **VMPL = w or MRPL = w**.

But for a monopsonist, w is NO LONGER constant.

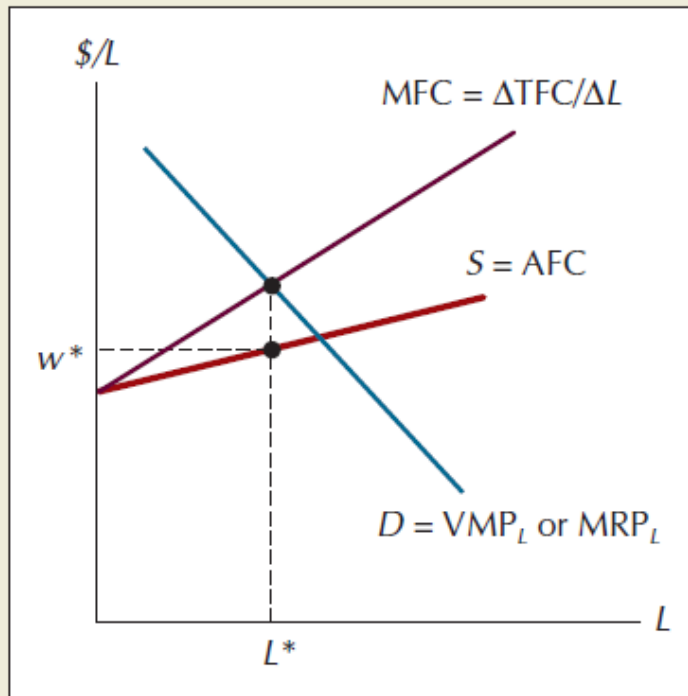
To hire more workers, it has to pay higher wage.

The monopsonist will hire the workers at the point where **VMPL = MFC or MRPL = MFC**.

That is, **the extra gain from hiring extra worker** equals **the extra cost from hiring extra worker**.

Monopsony

The monopsonist will hire the workers at the point where $VMPL = MFC$ or $MRPL = MFC$. This will be at L^* .



At L^* , the market supply indicates that the wage will be W^* .

This will be the wage that the monopsonist pays their workers.

Example

CONCEPT CHECK 14.8

A monopsonist's demand for labor is given by $w = 12 - L$. If her AFC curve is given by $w = 2 + 2L$, with corresponding $MFC = 2 + 4L$, what wage rate will she offer and how much labor will she hire?



LEARNING-BY-DOING EXERCISE 11.8

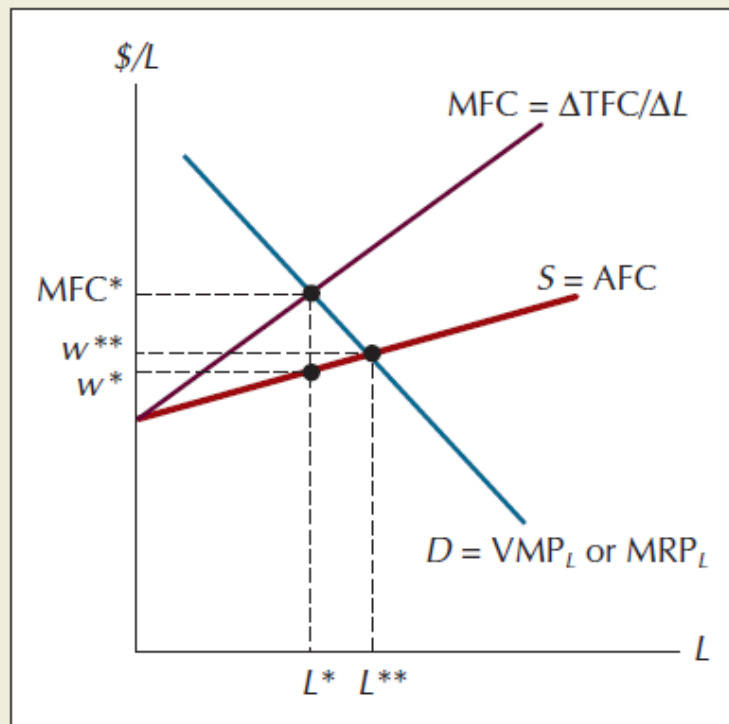
Applying the Monopsonist's Profit-Maximization Condition

Suppose that a monopsonist's only input is labor and its production function is $Q = 5L$, where L is the quantity of labor (expressed in thousands of hours per week). Suppose, too, that the monopsonist can sell all the output it wants at a market price of \$10 per unit and that the supply curve it faces for labor is $w = 2 + 2L$.

Problem How much labor would the monopsonist hire, and what wage rate would it pay, to maximize profit?

Monopsony

Comparison b/w Monopsony and Competitive Factor Market



In the competitive factor market, wage is determined by market demand (D) and market supply (S).

The competitive equilibrium is therefore at (L^{**}, w^{**}) .

The monopsonist equilibrium is (L^*, w^*) .

Workers are paid lower wage, and fewer workers are hired.

Monopsony

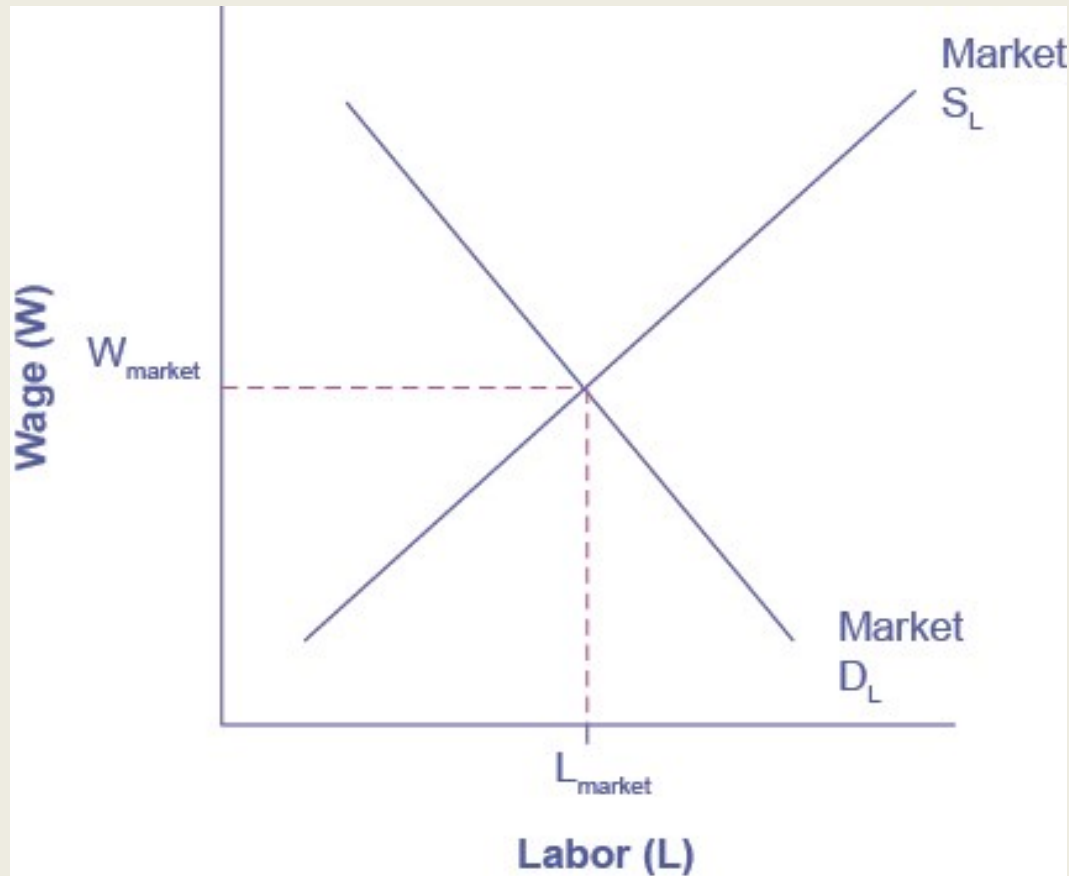
Comparison b/w Monopsony and Competitive Factor Market

This shows exploitation of workers and inefficiency.

The main cause is that if the monopsonist wants to hire more workers, it has to increase wage, but it also has to pay this high wage for all other workers. This causes it to hire less workers.

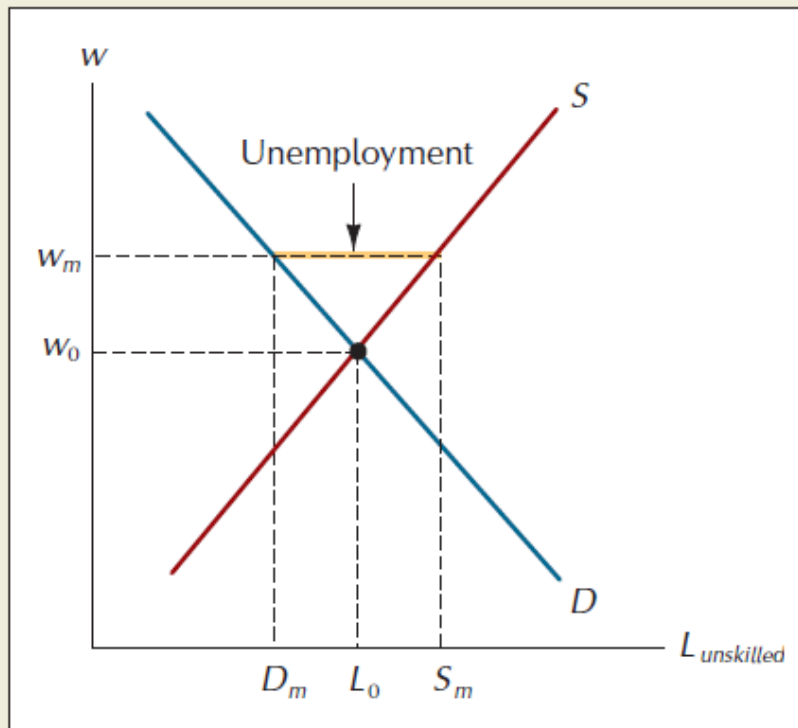
In the competitive factor markets, one firm hiring more workers does not raise the market wage, so all firms can hire more.

Welfare in Monopsonistic Labor Market



Monopsony – Minimum Wage

Standard Model for Minimum Wage Law

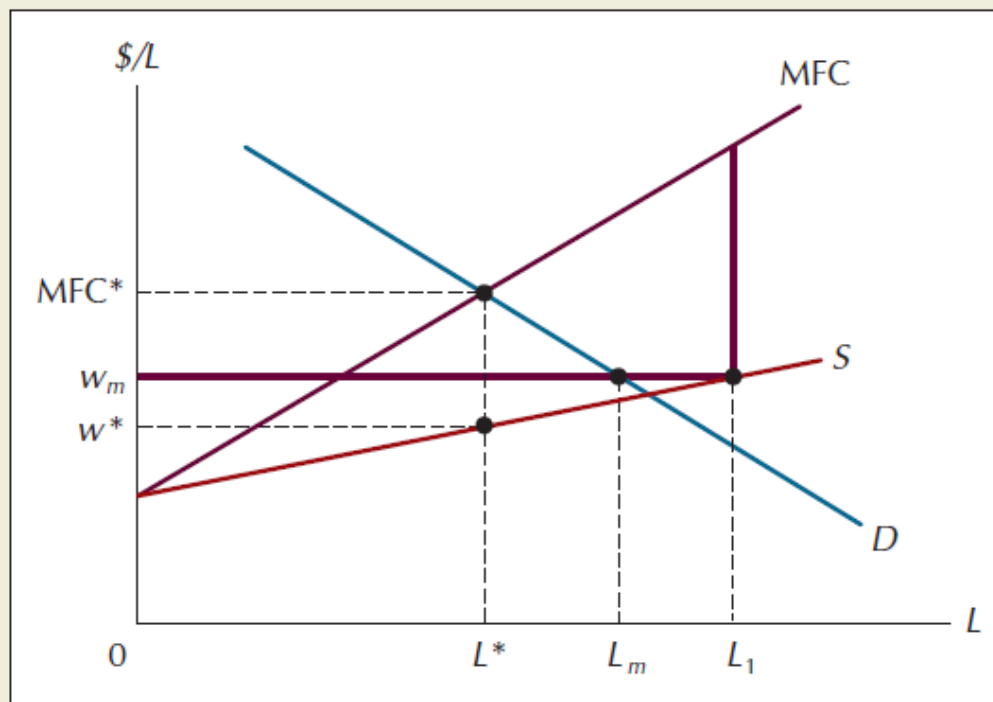


A Statutory Minimum Wage

The effect of the minimum wage is to reduce employment of unskilled labor from L_0 to D_m , while increasing supply from L_0 to S_m . The resulting difference, $S_m - D_m$, is the unemployment attributable to the minimum wage.

Monopsony – Minimum Wage

Monopsonist Model for Minimum Wage Law



The Minimum Wage Law in the Case of Monopsony

The effect of a minimum wage at w_m is to make the monopsonist's MFC curve horizontal in the region from 0 to L_1 , which increases employment from L^* to L_m .

CONCEPT CHECK 14.9

A monopsonist's demand curve for labor is given by $w = 12 - L$. If she originally faced an AFC curve given by $w = 2 + 2L$, with corresponding $MFC = 2 + 4L$, how will her wage and employment offers be affected by the passage of a law requiring $w \geq 8$? A law requiring $w \geq 10$?

Monopoly

A monopolist is the “sole seller” in the factor market.

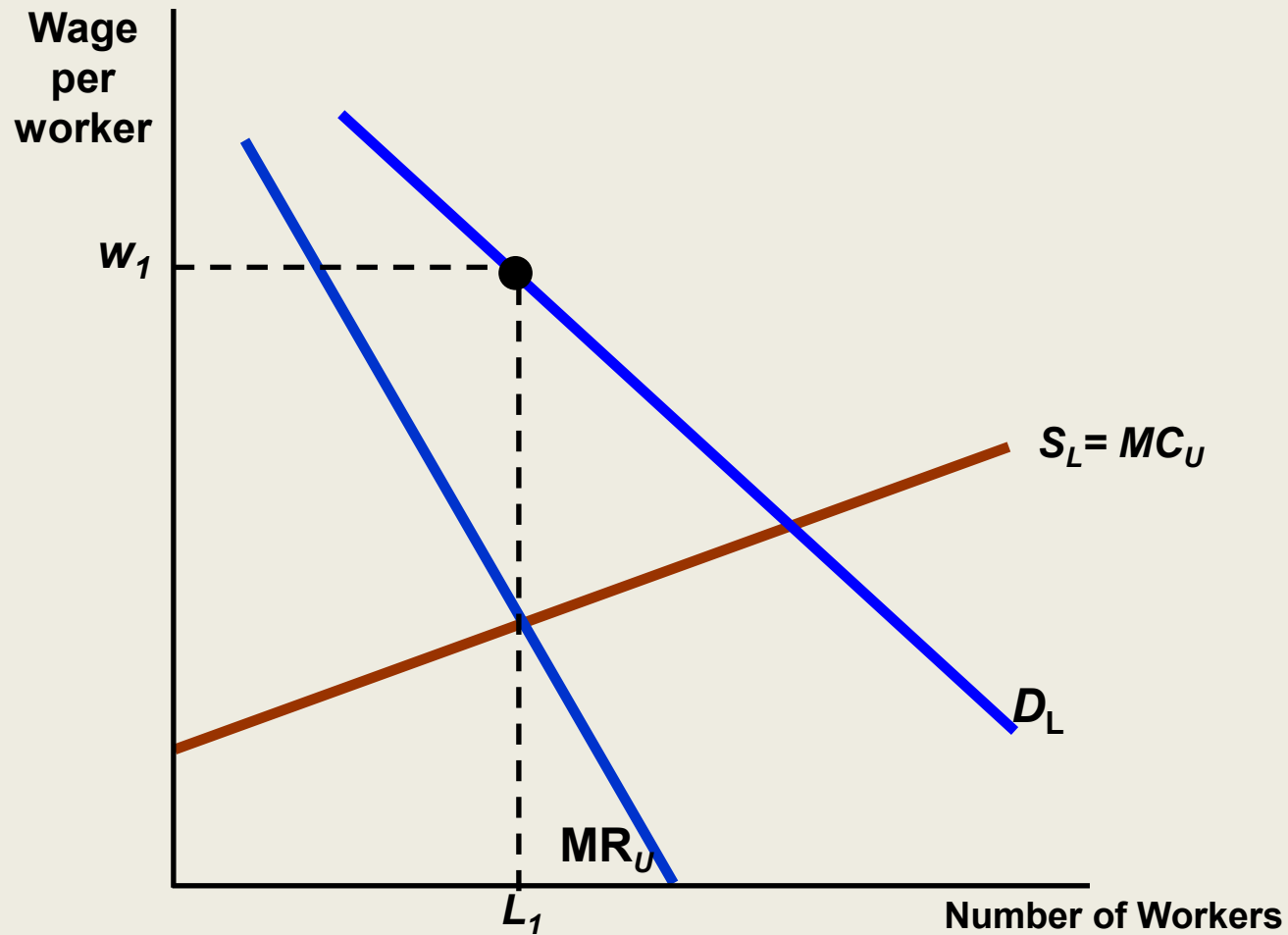
An example is the labor union. One can think of labor union as a firm selling labor.

The labor union faces the downward-sloping market labor demand curve because all firms need to buy labor from it.

**Here, the monopolist no longer takes W^* as given.
How many workers it hire will affect the wage it faces.**

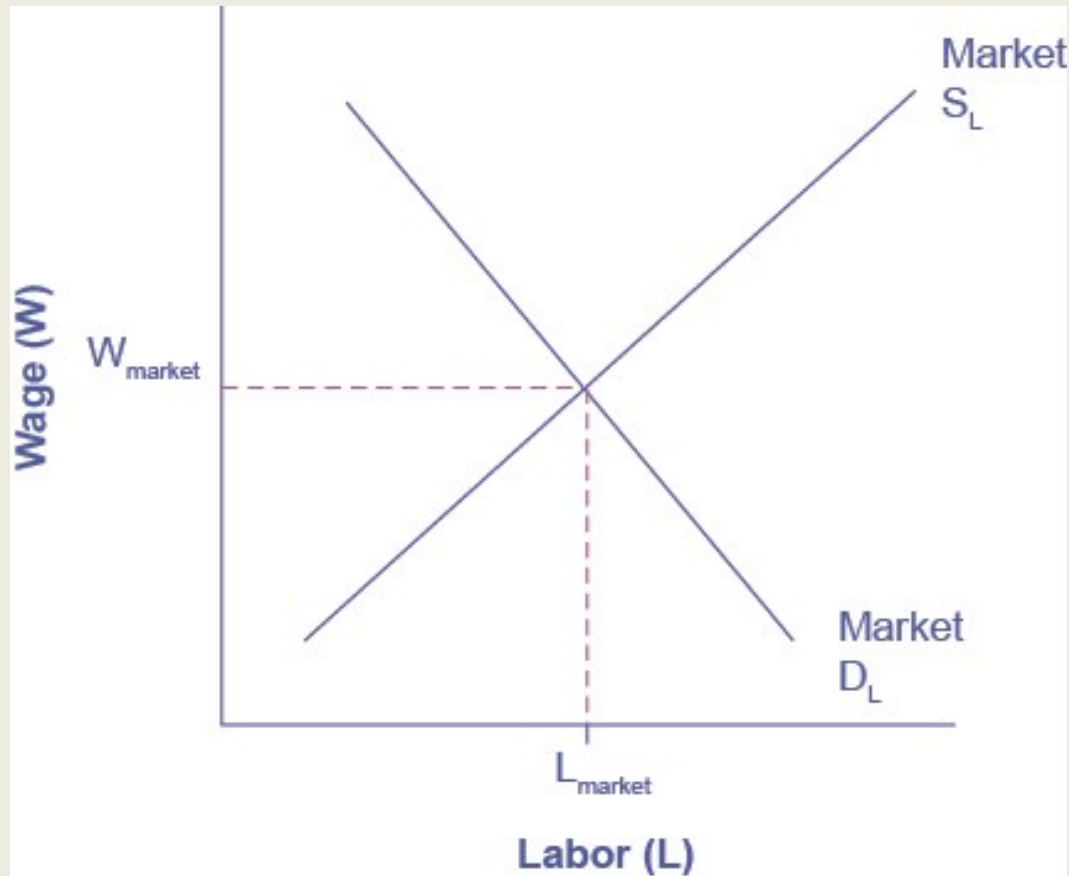
It can restrict the labor it will sell to maintain a high wage.

Monopoly



Source: Prof. Chayun's note

Welfare in Monopolistic Labor Market



Bilateral Monopoly

Suppose there is one seller and one buyer in the labor market. This is the case of bilateral monopoly, e.g.

**One company in a small town hiring labor
VS the labor union in the same town.**

The outcome of such market will depend on the bargaining power of both sides.

**If the buyer (the firm) has more power, wage will be lower.
If the seller (the union) has more power, wage will be higher.**

Bilateral Monopoly

