

# Factor market

## Content

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1. Comparing good/service market to factor market
2. Demand for factors of production
3. Supply for factors of production
4. Changes in factor market equilibrium

## Reading list

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Mankiw Ch. 18

└─ 1.1 Definition

## Factor market

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is a context where there is a trade of factors of production.

## Components

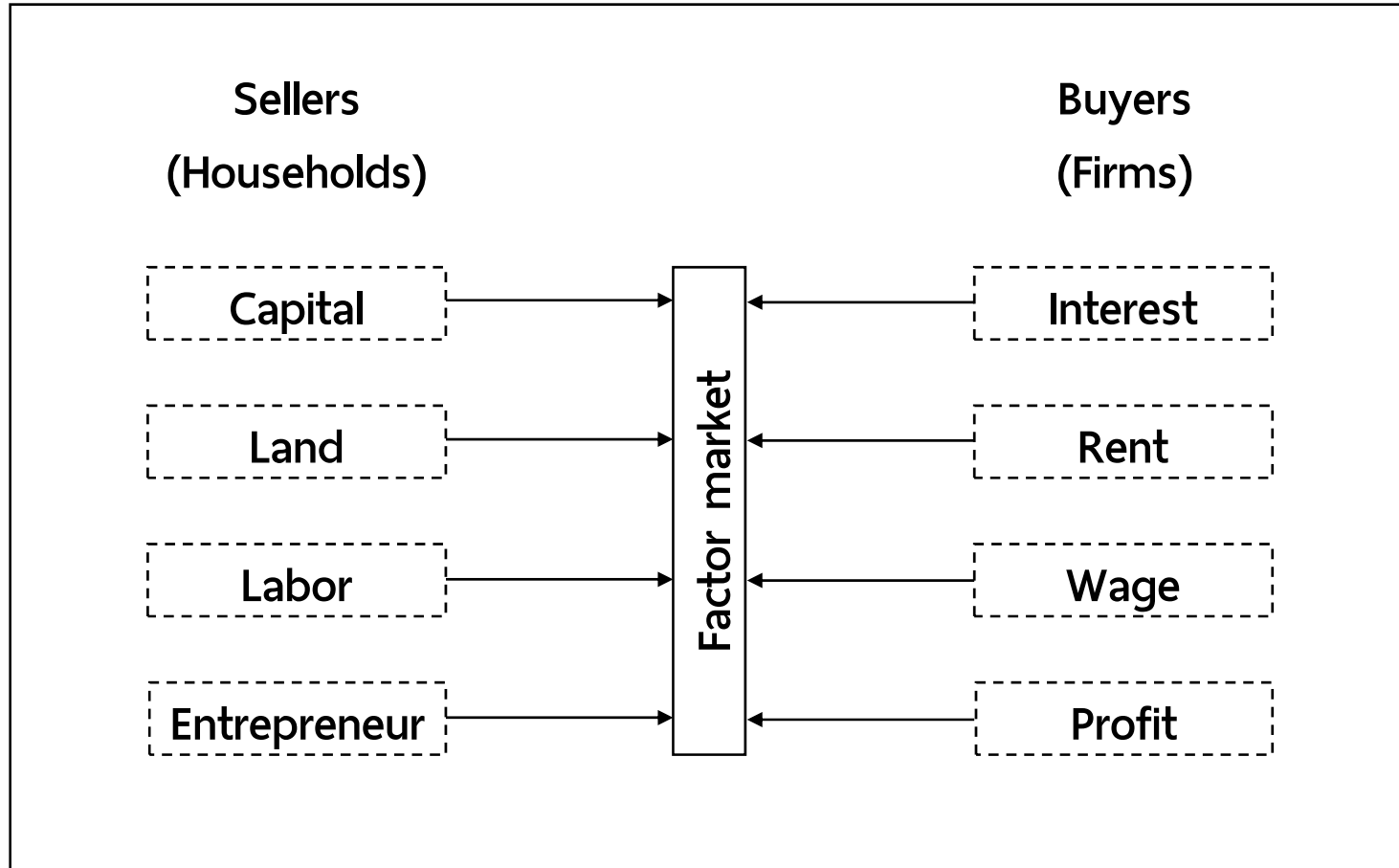
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◎ **Buyers are firms** in this case since firms are agents that gather all factors for productions of goods and services.

◎ **Sellers are households** in this case since households own factors of production.

Both buyers and sellers agree upon price and quantity in a factor of production market as in usual market.

└─ 1.1 Definition



# 1. Comparing good/service market to factor market

## Factor Market

### 1.2 Linkage between two markets

#### Good/service market

#### Factor market

Expansion of the middle class >

Demand for housing increases >

Housing price hikes →

Construction firms want to build more housing >

Workers are more demanded >

Higher wage

Some businesses may be affected >

Excess supply

Minimum wage is raised >

Labor costs more ←

## 1.2 Linkage between two markets

Good/Service market**Buyers  
(Households)**

- ⊙ Maximize utility
- ⊙ Marginal benefit = marginal cost  
(marginal utility = price)

$$\frac{MU_x}{P_x} = \frac{MU_y}{P_y} = \dots = \frac{MU_k}{P_k}$$

**Market demand****Sellers  
(Firms)**

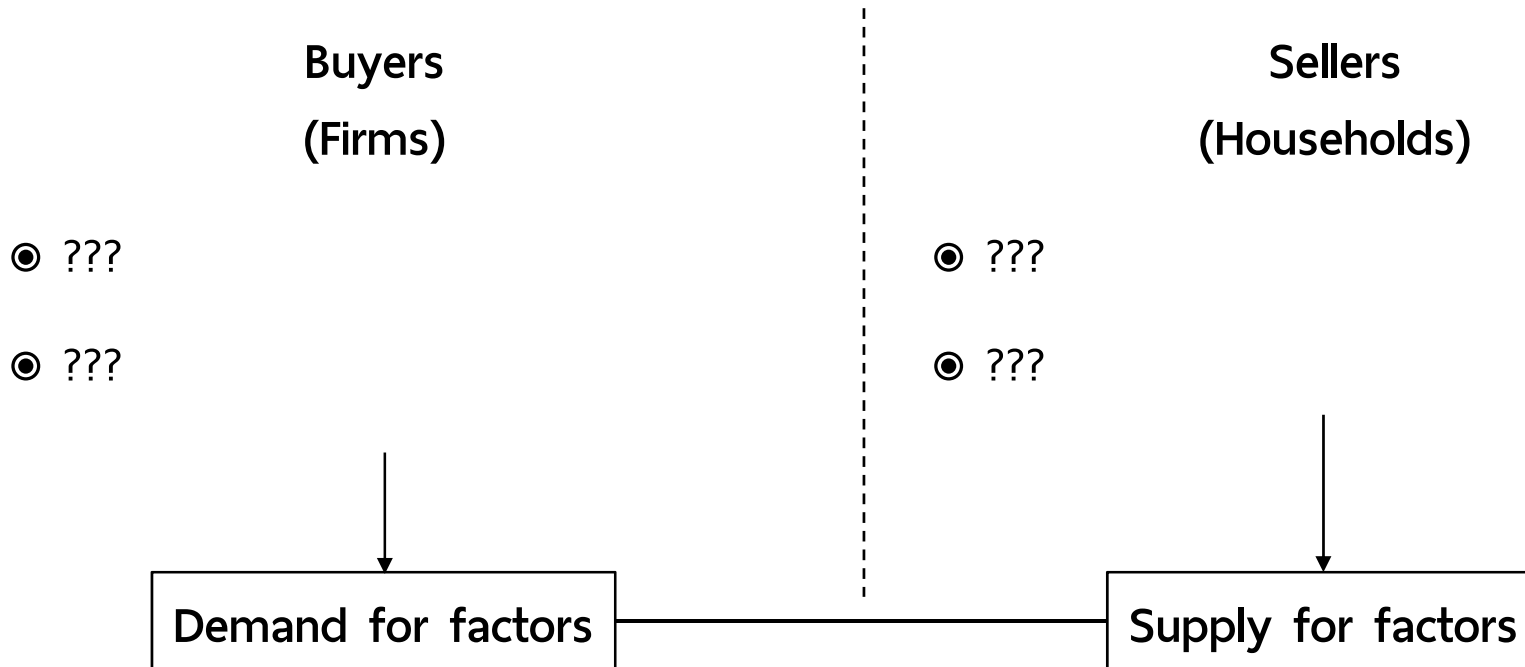
- ⊙ Maximize profit
- ⊙ Marginal benefit = marginal cost  
(marginal revenue = marginal cost)

$$MR = MC$$

**Market supply**

└─ 1.2 Linkage between two markets

Factor market



The study of factor market focuses on how both buyers and sellers come up with demand and supply, and also equilibrium.

└─ 1.2 Linkage between two markets

## What to consider?

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- ⦿ Competition in factor market
- ⦿ Competition in good/service market (linked with factor market that we are studying)
- ⦿ Number of factors in a production

### ↳ 2.1 Definition

## Demand for factor of production

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is quantity demanded for a factor of production at different prices within a period of time.

Demand for factor of production is considered **derived demand**.

## └ 2.1 Definition

## Flow of thoughts

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- ⦿ Factors of production are demanded by firms.
- ⦿ Firms tend to maximize profit.
- ⦿ Utilizing more factors increases (or decrease, depending stage of production) total output and cost.
- ⦿ Firms therefore consider marginal benefit and cost in order to choose how many unit of factors to hire/rent.

$$\begin{array}{c} \text{Marginal revenue of factor of production} \\ = \\ \text{Marginal cost of factor of production} \end{array}$$

## └ 2.2 Marginal Revenue Product

## Marginal revenue product (MRP)

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is an incremental amount of **revenue** from adding 1 more unit of factor of production.

$$MRP = MP \times MR$$

- ◎ **MP** – marginal product from additional unit of factor
- ◎ **MR** – marginal revenue from selling additional product

**Example** If product market is perfectly competitive where firm's marginal revenue is 10 baht per unit of product and a firm hires additional labor that can produce 2 more unit of products, this unit of labor can generate  $10 \times 2 = 20$  baht of revenue.

## └ 2.2 Marginal Revenue Product

## Value of marginal product (VMP)

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is an incremental amount of **value** from adding 1 more unit of factor of production.

$$VMP = MP \times P$$

- ◎ **MP** – marginal product from additional unit of factor
- ◎ **P** – price of product

**Example** If product market is perfectly competitive where price is 10 baht per unit of product and a firm hires additional labor that can produce 3 more unit of products, this unit of labor can generate  $10 \times 3 = 30$  baht of value.

## 2. Demand for factor market

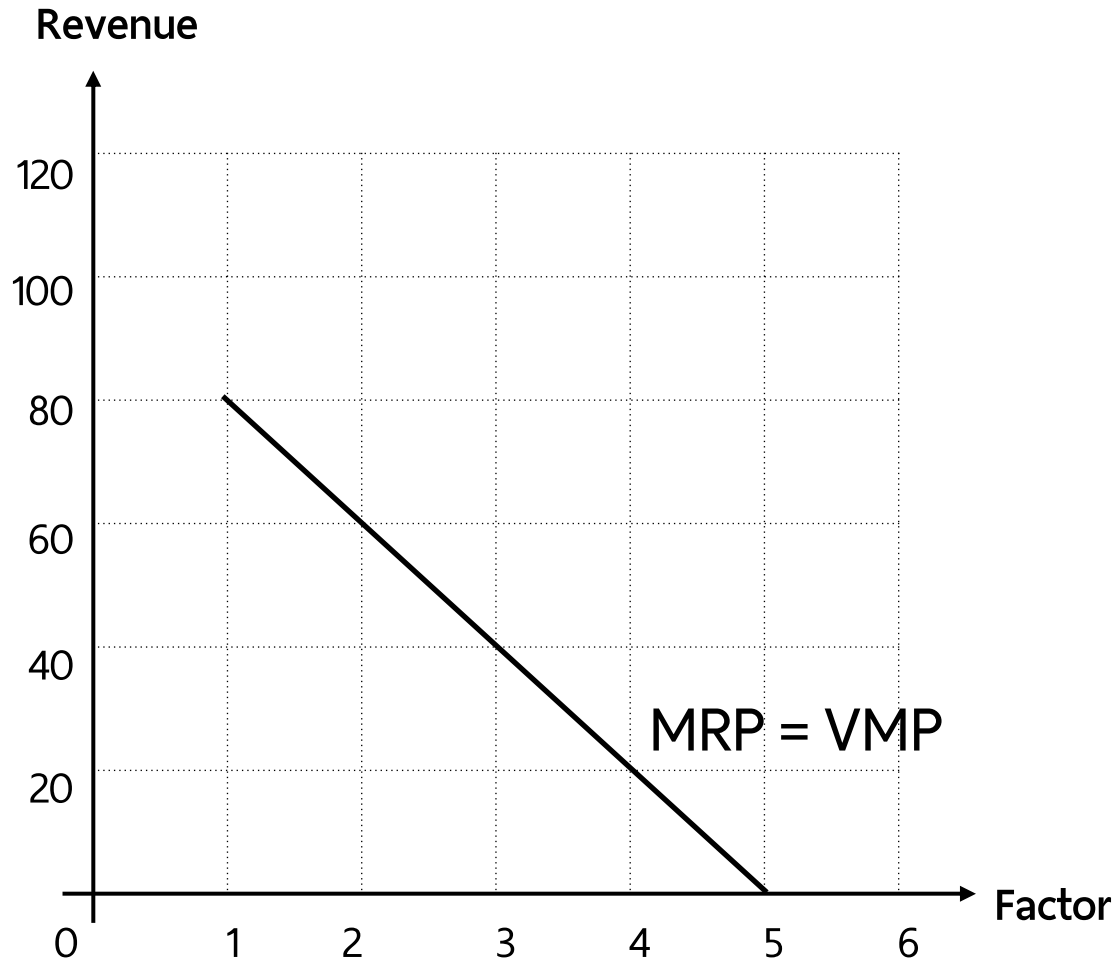
## Factor Market

### 2.2 Marginal Revenue Product

| Variable factor | Total product | Marginal product | Marginal revenue | Marginal revenue product | Value of marginal product |
|-----------------|---------------|------------------|------------------|--------------------------|---------------------------|
| (L)             | (TP / Q)      | (MP)             | (MR)             | (MRP)                    | (VMP)                     |
| 0               | 0             | -                | -                | -                        | -                         |
| 1               | 8             | 8                | 10               |                          |                           |
| 2               | 14            | 6                | 10               |                          |                           |
| 3               | 18            | 4                | 10               |                          |                           |
| 4               | 20            | 2                | 10               |                          |                           |
| 5               | 20            | 0                | 10               |                          |                           |
| 6               | 18            | -2               | 10               |                          |                           |

Product market: Perfect competition | Factor market: -

2.2 Marginal Revenue Product



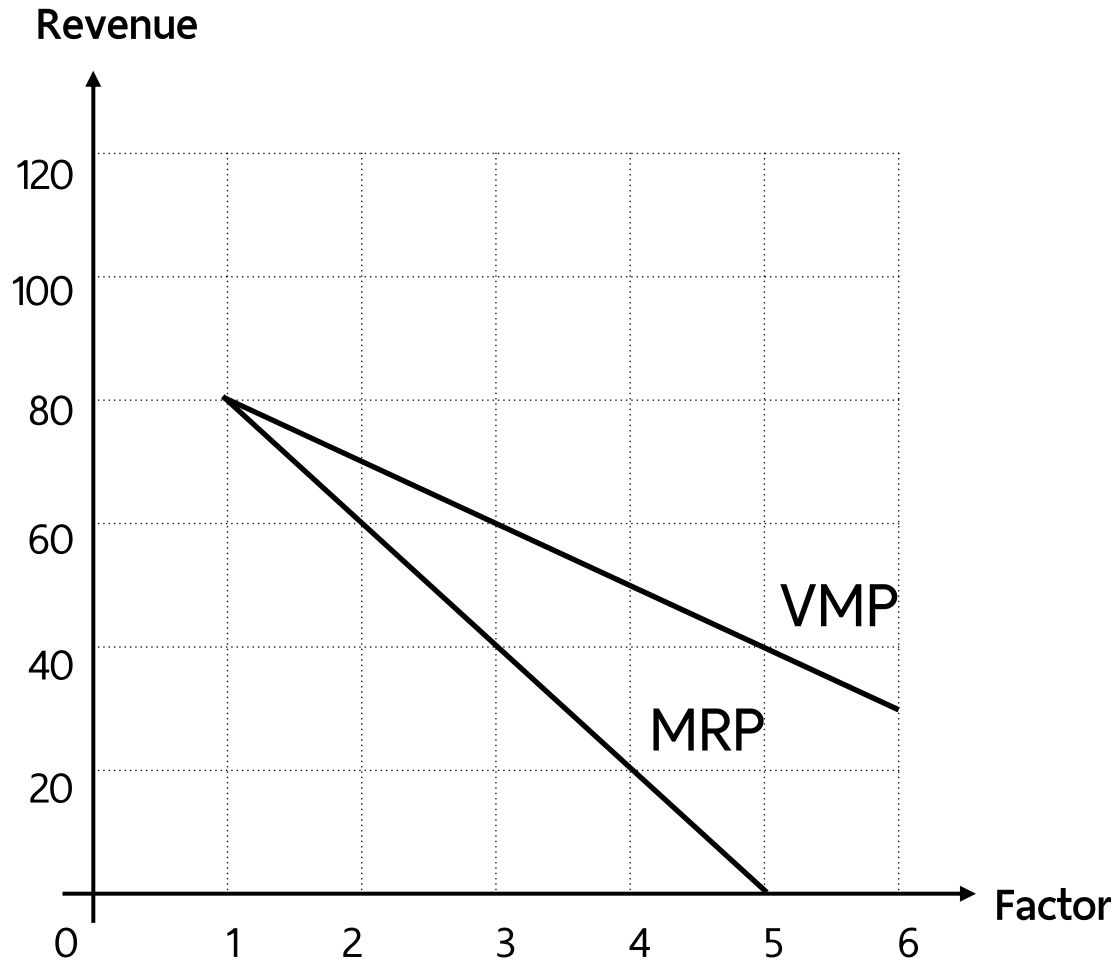
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Product market: Perfect competition | Factor market: -

## 2. Demand for factor market

## Factor Market

### 2.2 Marginal Revenue Product



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Product market: Monopoly | Factor market: -

## └ 2.3 Marginal Factor Cost

## Marginal factor cost (MFC)

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is an incremental amount of cost that a firm bears when increase one more unit of factor into a production.

$$MFC = \frac{\Delta TFC}{\Delta L}$$

- ◎ TFC – Total factor cost
- ◎ L – Number of factor (assumed to be only labor in this case)

**Example** A firm decides to hire one more labor, while keeping other factor constant. If labor market is perfectly competitive and wage is 20 baht daily, the marginal factor cost is  $20/1 = 20$  baht.

## 2. Demand for factor market

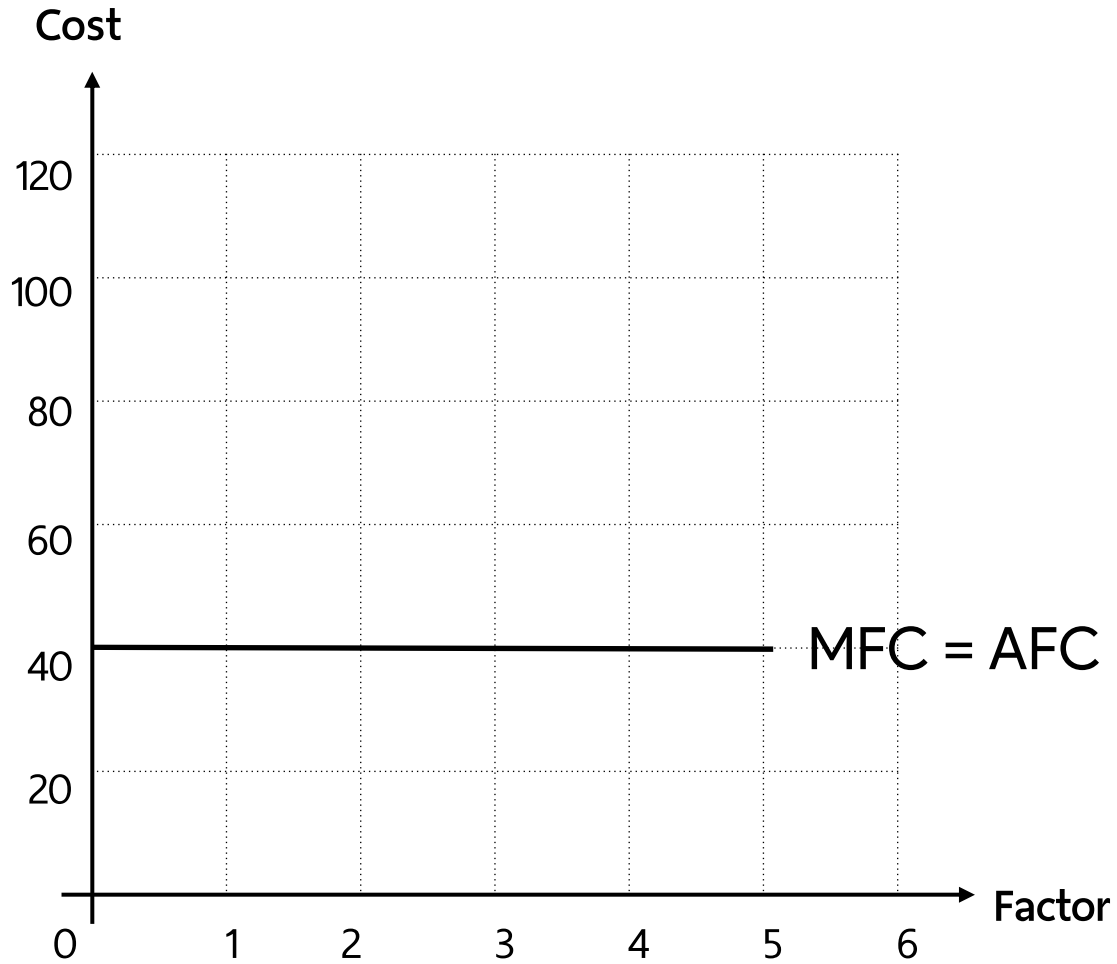
## Factor Market

### 2.3 Marginal Factor Cost

| Factor | Wage or<br>average factor cost | Total factor cost | Marginal factor cost |
|--------|--------------------------------|-------------------|----------------------|
| (L)    | (w or AFC)                     | (TFC)             | (MFC)                |
| 1      | 40                             |                   |                      |
| 2      | 40                             |                   |                      |
| 3      | 40                             |                   |                      |
| 4      | 40                             |                   |                      |
| 5      | 40                             |                   |                      |
| 6      | 40                             |                   |                      |

Product market: - | Factor market: Perfect competition

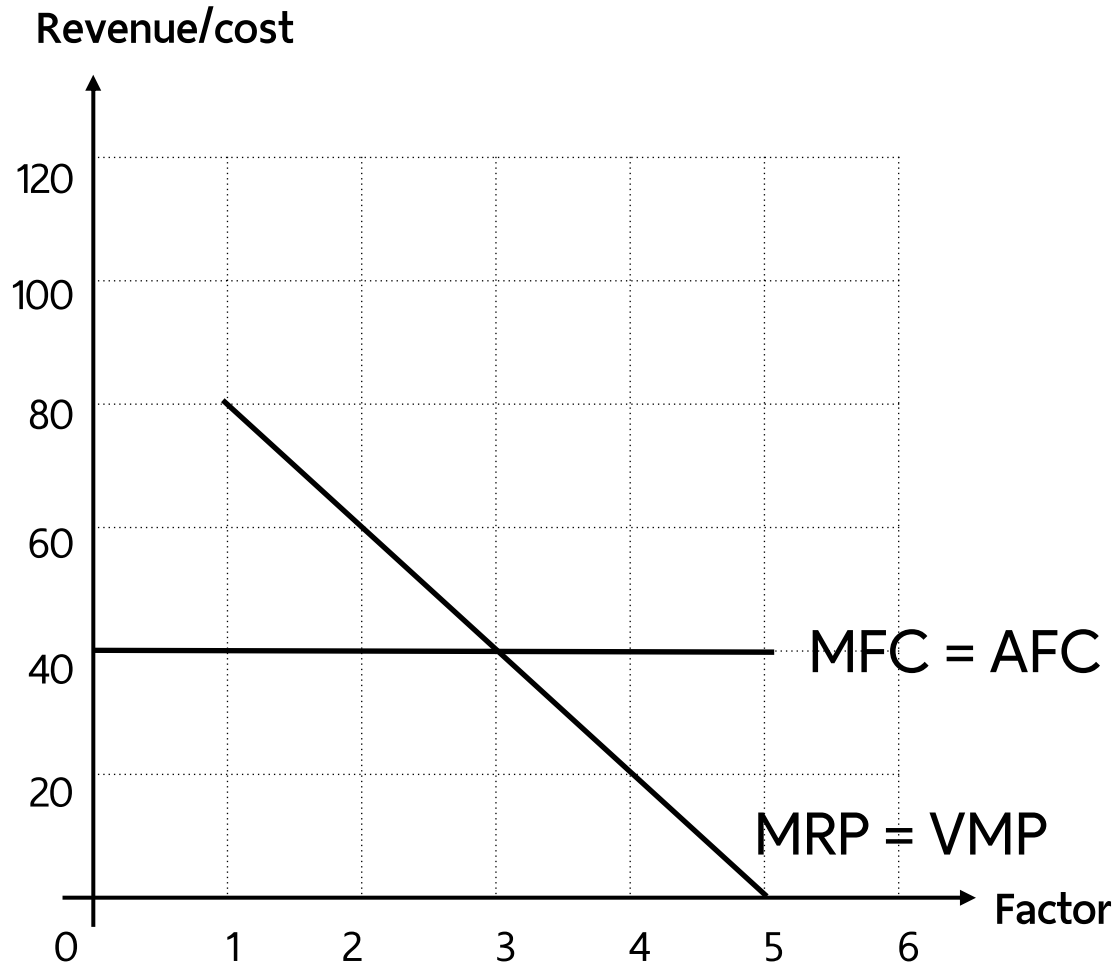
2.3 Marginal Factor Cost



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Product market: - | Factor market: Perfect competition

### 2.4 Equilibrium for demand



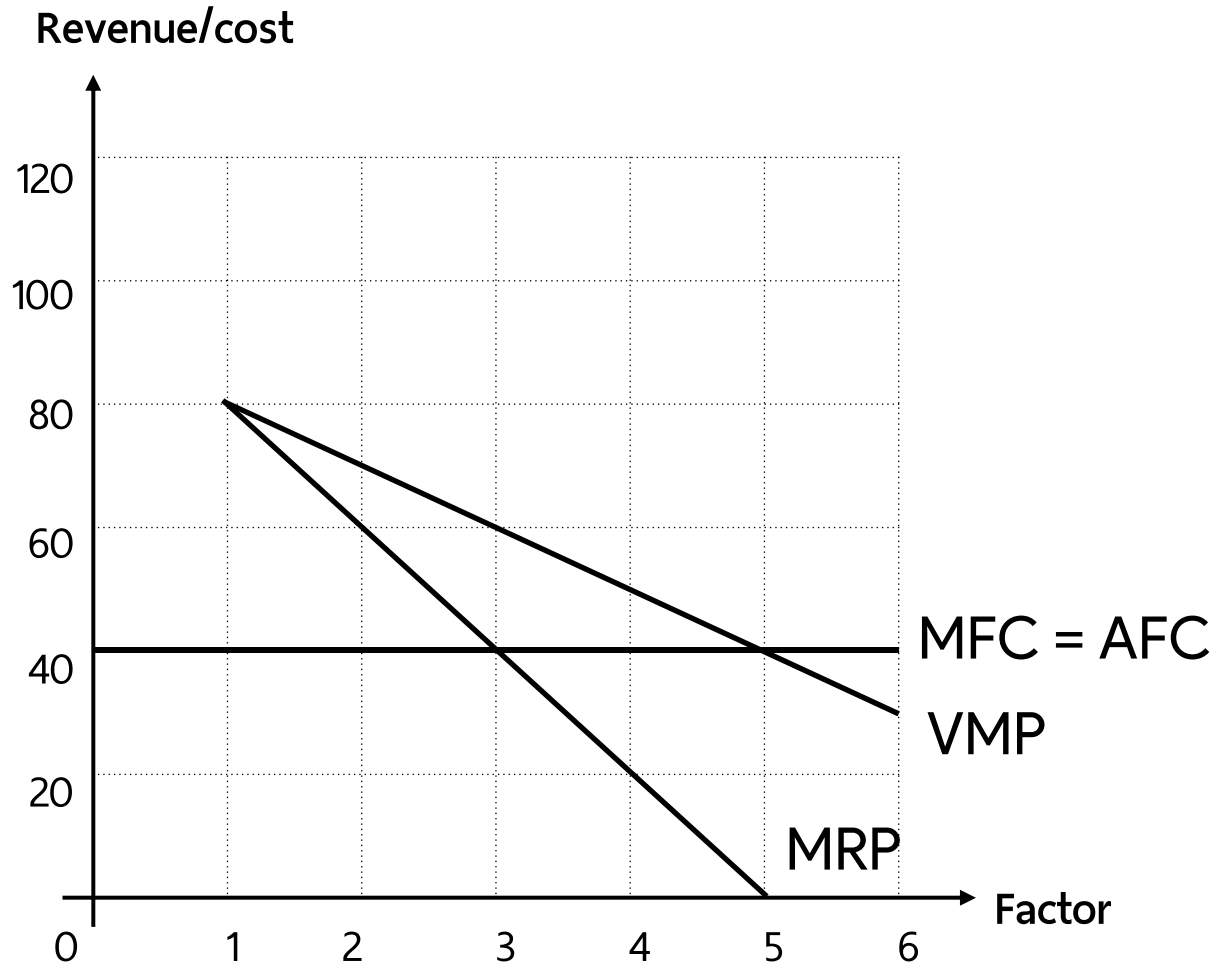
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**Product market:** Perfect competition | **Factor market:** Perfect competition

## 2. Demand for factor market

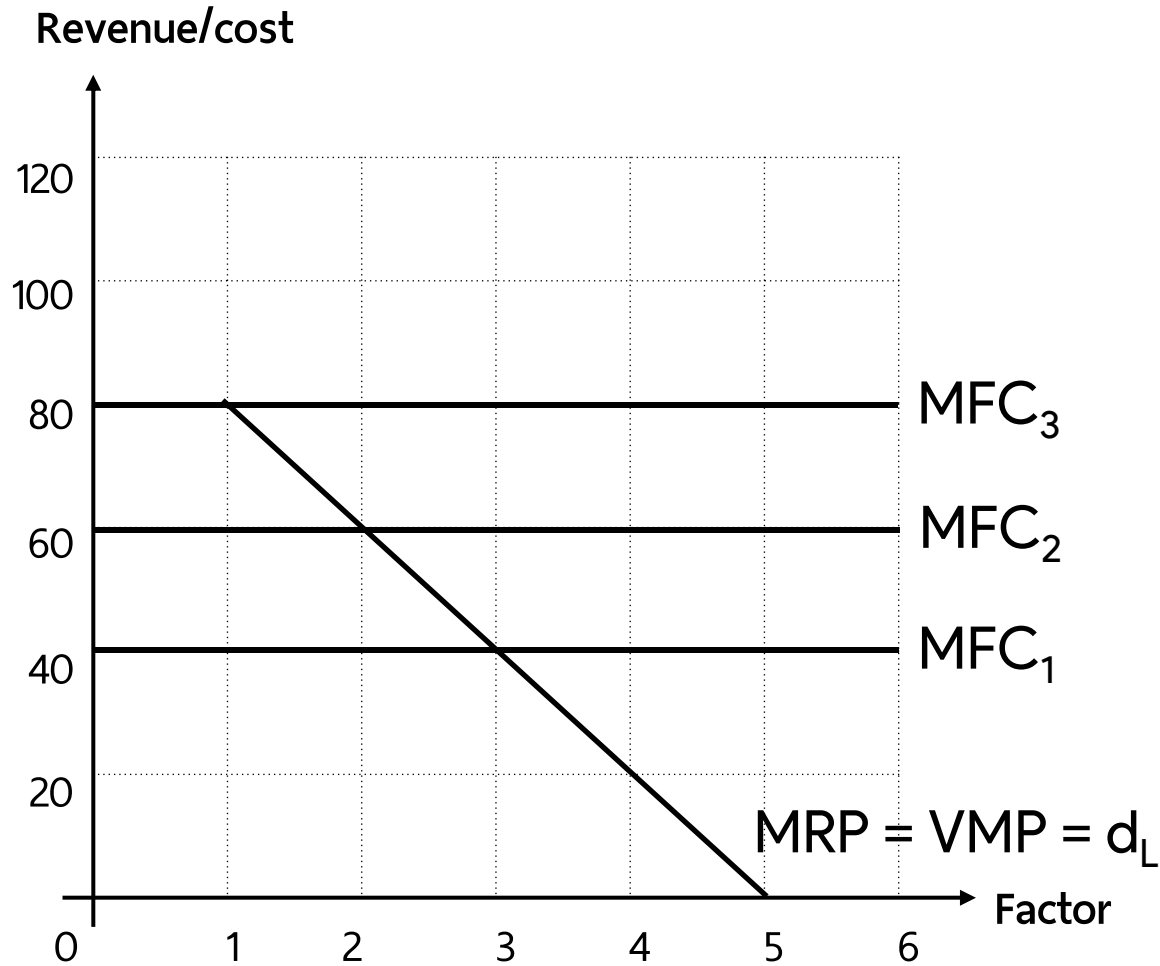
## Factor Market

### 2.4 Equilibrium for demand



Product market: Monopoly | Factor market: Perfect competition

## 2.4 Equilibrium for demand



### └─ 3.1 Definition

# Supply for factor of production

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is quantity supplied at different price (of that factor) within a period of time.

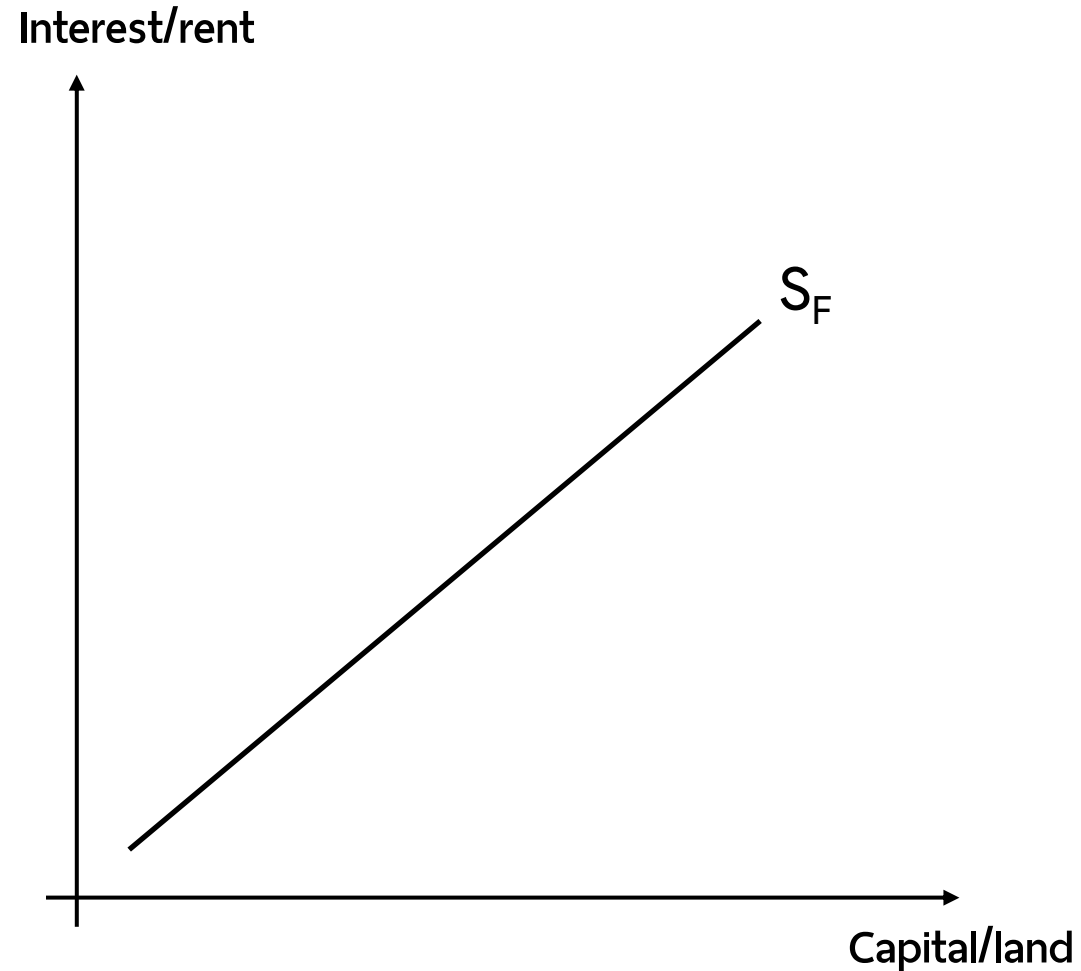
- ◎ Supply for factors of production that **are not** human. (capital/land)
- ◎ Supply for factors of production that **are** human. (labor/entrepreneur)

## 3. Supply for factor market

## 3.2 Non-human factor supply

• Interest rate and rent are opportunity cost for capital and land respectively. Therefore, the more interest rate and rent increase, the more quantity is supplied.

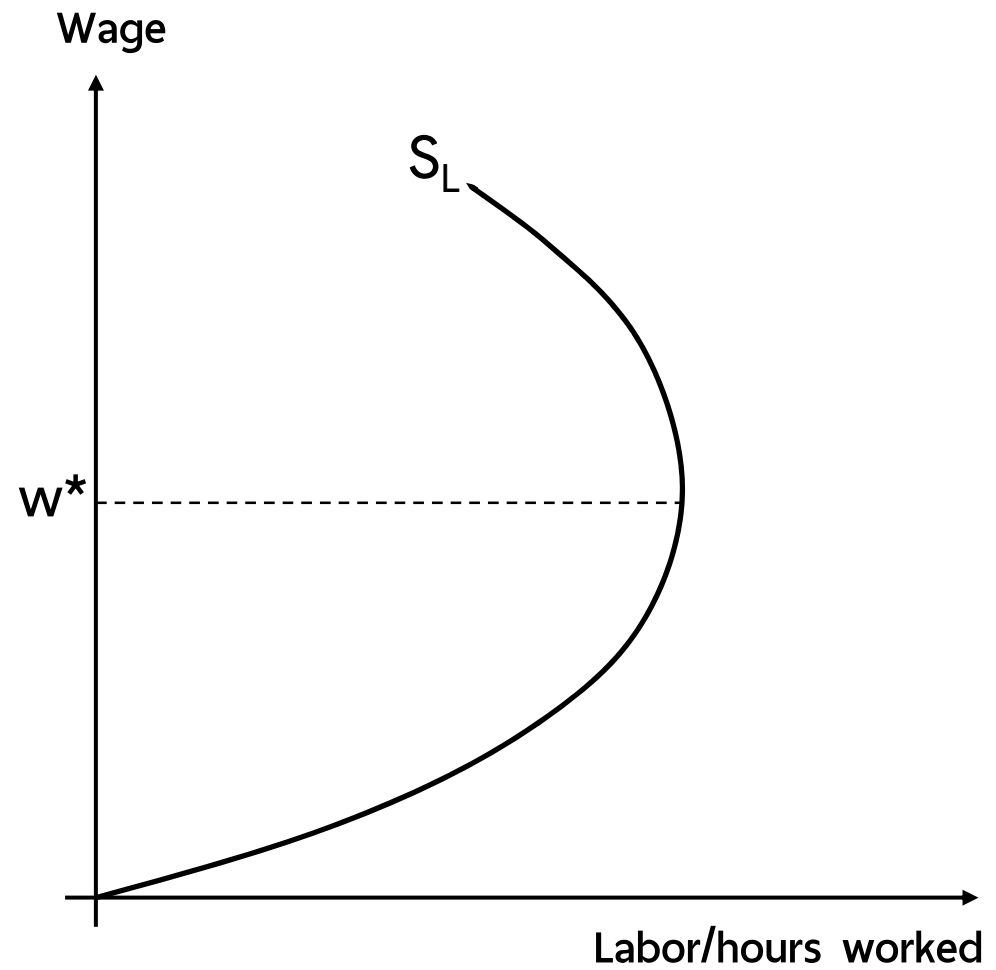
• If total supply of land is limited in the long-run, how would the supply look like?



## 3. Supply for factor market

## 3.3 Human factor supply

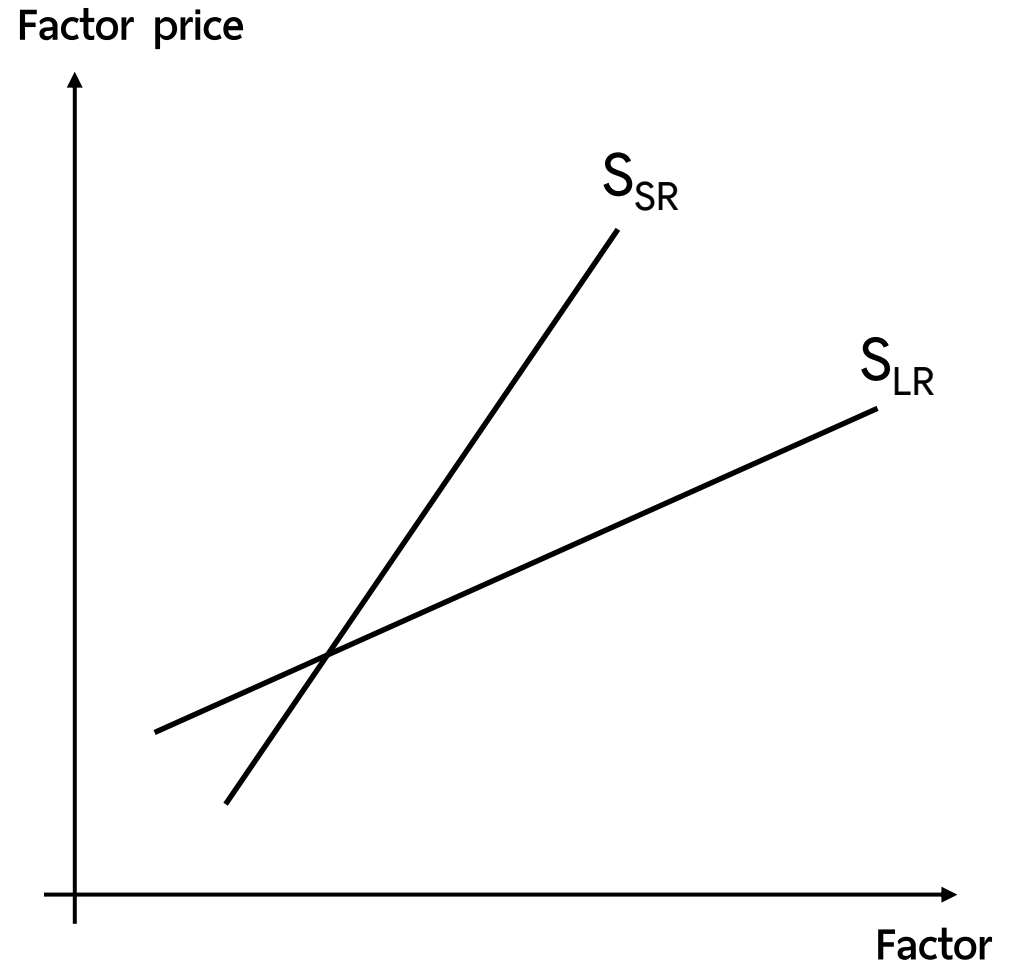
- ⦿ Labor decides their optimal hour worked by weighting consumption and leisure.
- ⦿ At low wage, price of leisure is relatively expensive, substitution effect is stronger than income effect. When wage increases within this range, hours worked also increases.
- ⦿ At certain point, income effect become stronger. When wage increase within this range, labor decides to increase their leisure.



### 3. Supply for factor market

#### 3.4 Short-run versus long-run

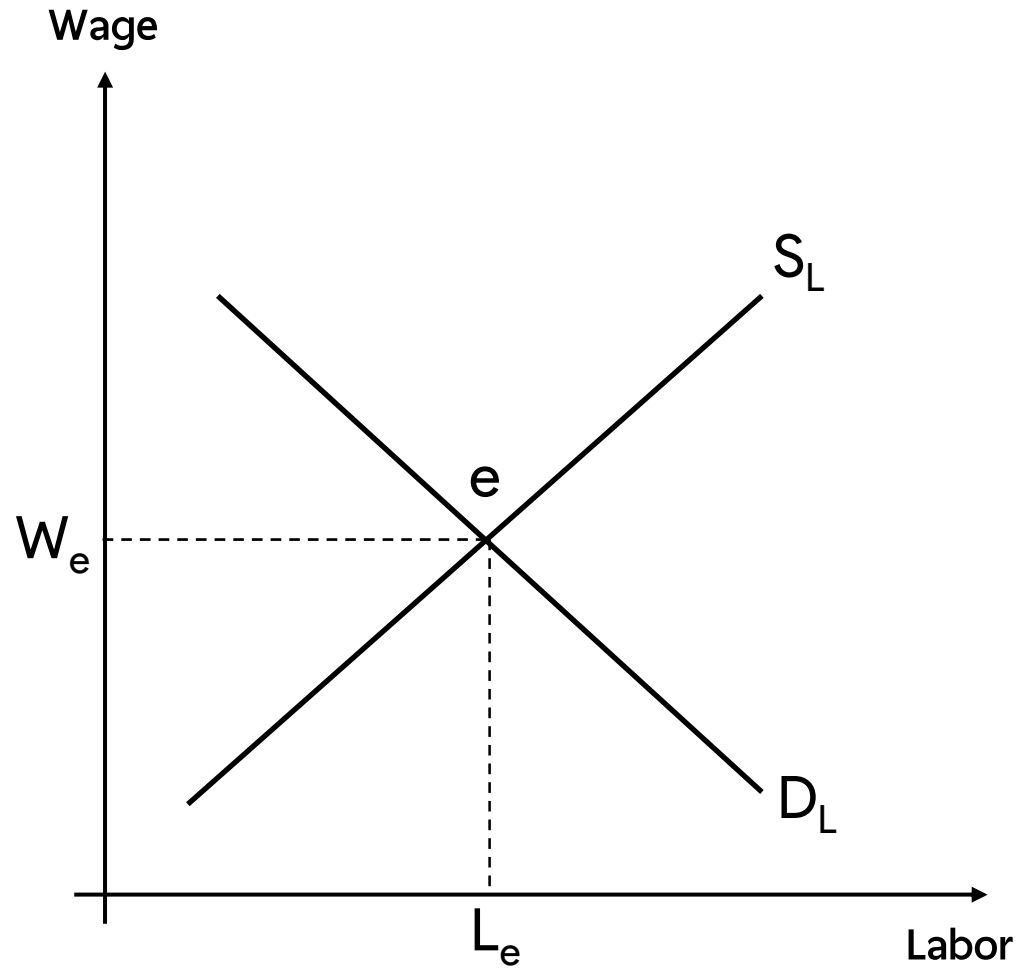
- In the short-run, factor supply is less elastic because it usually takes time to adjust quantity.
- In the long-run, factor supply tends to be more elastic.



### 3. Supply for factor market

### Factor Market

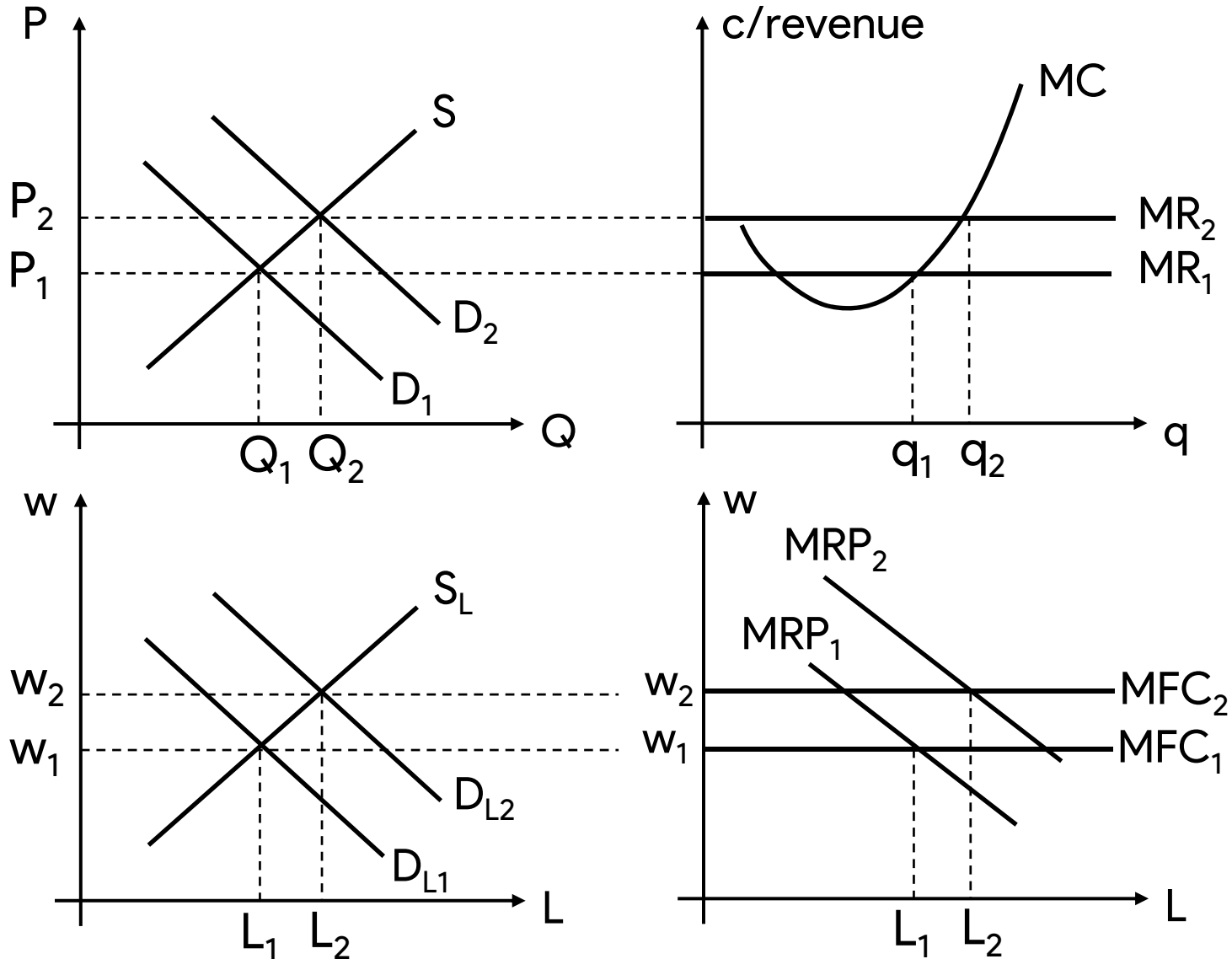
#### 3.5 Equilibrium in labor market



### 3. Supply for factor market

#### 3.5 Equilibrium in labor market

- Supposed that there is a shift in demand for a product,



#### └─ 3.5 Equilibrium in labor market

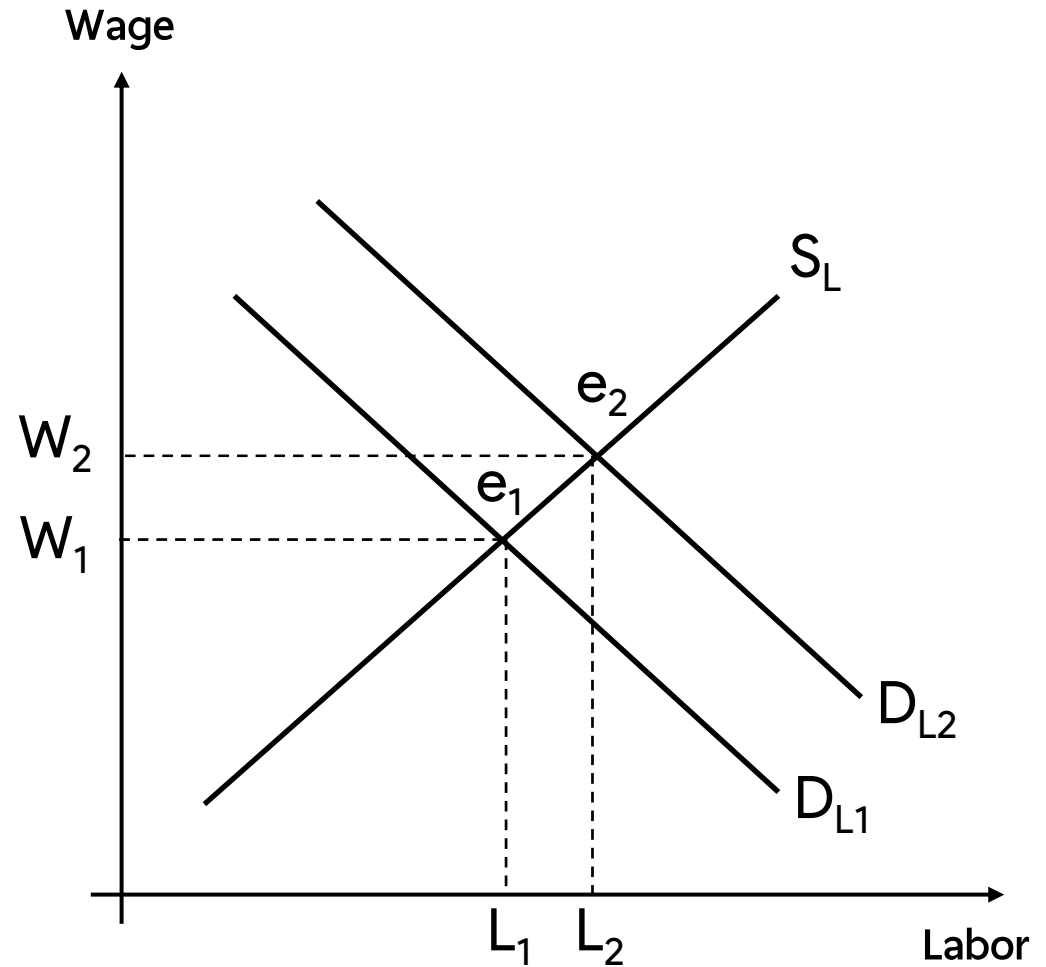
##### Flow of thoughts

- ◉ Demand shift raises price and quantity demanded in product market (1), pushes price up to  $P_2$ .
- ◉ Marginal revenue for firm raises to  $MR_2$ , intersecting with higher point of MC hence optimal quantity is raised (2).
- ◉ Demand for labor increases, shifting  $D_{L1}$  to  $D_{L2}$ . Wage goes up (3).
- ◉ Marginal revenue product shifts upward from marginal revenue in product market from  $MRP_1$  to  $MRP_2$ . Marginal factor cost also increases from wage from  $MFC_1$  to  $MFC_2$ , shifting the equilibrium to the right and upward (4).

## 3. Supply for factor market

## └─ 3.6 Demand and supply shifts in labor market

- Increase in labor productivity
- Change in relative price of substituting factor



## 3. Supply for factor market

## 3.6 Demand and supply shifts in labor market

- Change in taste for leisure and consumption
- Preference for career
- Structure of population

