# Learning outcome 4 – Factor Markets: Labour, Land, and Capital

Lecture

- Inputs or factors of production – labour,capital, land –used for production of goods and services
- These inputs earn so called factor incomes – wages, profit, interest and rent

# How do we decided in business which combination of inputs to use to have maxmimu profit? – Least cost rule

- In each business we would prefer to have the costs as low as possible and the revenue as high as possible. Choice: buy technology (capital) or employ more workers?
- Firm produces with minimum costs if it uses its' inputs so that the marginal product of the last dollar spent on labor must be equal to the marginal product of the last dollar spent on capital, which must be equal to the marginal product of the last dollar spent on land, and so on.
- The profit-maximizing condition for the perfectly competitive firm is MPL /PL = MPK / PK = MPN /PN
- MPL, MPK i MPN – marginal product of labour, capital and land, PL, PK i PN – prices of inputs

# Least cost rule and substitution

- Decrease in price of input increases its marginal product, which makes it more productive. This will cause the substitution of more expensive and thus less productive input with cheaper one

# Example – should a company buy additional machine or employ extra worker?

PK=10€/day – (leasing per day for renting a capital)

- MPK – 200 – if I buy additional machine, it will produce me 200 extra units of product per day
- 200/10€= per 1 additional € invested 20 extra units are produced
- PL = 20€/day (daily wage)
- MPL = 200 – extra worker will produce extra 200 units per day
- 200/20€ = 10 – per 1 additional euro invested, 10 additional units are produced
- Interpretation – it is more beneficial to buy a new machine than to hire a new worker .

# About supstitution

- Replacing the more expensive input for cheaper one doesn’t only apply for new production factors, but for the existing one as well for which the prices rise.
- E.g. if the price of labour increases which diminishes marginal product of labour compared to capital, the common practice was – fire people, buy machines.
- But, this is only partially true – if machines are getting cheaper, it doesn’t mean you have to fire people. You can also find them another job within the organization!

# Income

- Income refers to the cash inflow of wages, interest payments, dividends, and other things of value to individuals during a given period of time (usually a year).
- Income is comprised of wages (income from labour), rental or rent (e.g. income you receiving for renting  a real-estate or land), interests (e.g. income on money in your savings account), dividend (income from shares), profit (income as a prize for entrepreneurial risk and inovation), transfer payment (payment which does not require exchange of good or service  - social welfare, agricultural subsidies etc.)

# Input - Labour

Income from labour: wage

# Labour

- All human physical and mental abilities that can be used in the production of goods and services
- These  abilities are also known as human capital
- Technology is sometimes considered as labour resources  because it represents a certain type of human capital - It implies  the usage of scientific knowledge and is an important determinant of how much a society can produce with its own available resources

- The income created from usage of labour is called the wage – value of labour force - shorthand expression for wages, salaries, and other forms of compensation.
- Personal income – comprised of wages and transfer payments

# Types of wages

- Nominal wage

–Nominal wage is the labour income expressed in monetary units.

–eg. Nominal wage in Croatia is 700 euros per month.

- Real wage
- represents the purchasing power of an hour's work or money wages divided by cost of living. „What can I buy with my 700 euros per month?
- Nominal wages are expressed in money, real wages are expressed in the quantity of goods which can be bought for nominal wages.

– Real wages depend on level of nominal wages and prices in society. e.g. If you earn 700 eurs per month and each month the price of food you buy goes up by 10%, then your real wage is decreasing.

# AVERAGE MONTHLY NET AND GROSS EARNINGS OF PERSONS IN PAID EMPLOYMENT FOR FEBRUARY 2022

For February 2022, the average monthly paid off net earnings per person in paid employment in legal entities in the Republic of Croatia amounted to 7 452 kuna, which represented a nominal increase of 1.0% and a real one of 0.1%, as compared to January 2022.

For February 2022, the average monthly gross earnings per person in paid employment in legal entities in the Republic of Croatia amounted to 10 109 kuna, which represented a nominal increase of 1.3% and a real one of 0.4%, as compared to January 2022.

The highest average monthly paid off net earnings per person in paid employment in legal entities for February 2022 were paid off in the activity Manufacture of basic pharmaceutical products and pharmaceutical preparations and amounted to 16 787 kuna, while the lowest earnings were paid off in the activity Security and investigation activities and amounted to 4 758 kuna.

The highest average monthly gross earnings per person in paid employment in legal entities for February 2022 were paid off in the activity Manufacture of basic pharmaceutical products and pharmaceutical preparations and amounted to 26 052 kuna, while the lowest earnings were paid off in the activity Security and investigation activities and amounted to 6 137 kuna.

The average monthly paid off net earnings per person in paid employment in legal entities in the Republic of Croatia for February 2022 were nominally higher by 5.9% and really lower by 0.4%, as compared to the same month last year.

The average monthly gross earnings per person in paid employment in legal entities in the Republic of Croatia for February 2022 were nominally higher by 6.8% and really by 0.5%, as compared to the same month last year.

In the period from January to February 2022, the average monthly paid off net earnings per person in paid employment in legal entities in the Republic of Croatia amounted to 7 415 kuna, which represented a nominal increase and of 5.8% and a real decrease of 0.2%, as compared to the same period of 2021.

In the period from January to February 2022, the average monthly gross earnings per person in paid employment in legal entities in the Republic of Croatia amounted to 10 046 kuna, which represented a nominal increase of 6.6% and real one of 0.6%, as compared to the same period of 2021.

In February 2022, there were 158 paid hours on average, which means that they decreased by 5.4%, as compared to January 2022. The greatest number of paid hours was recorded in Human health activities (167) and the smallest one in Social work activities without accommodation (143).

The average monthly paid off net earnings per hour for February 2022 amounted to 45.88 kuna, which was 6.3% higher than in January 2022. As compared to the same month last year, they increased by 5.7%.

The average monthly gross earnings per hour for February 2022 amounted to 62.25 kuna, which was 6.6% higher than in January 2022. As compared to the same month last year, they increased by 6.6%.

# Increase of real wages

- Real wages grow if wages grows and market prices of goods and services are not changing.

–Market prices for goods and services remain the same, but salary (wage) grows.

- Real wages grow if market prices are decreasing and wages remains the same.

–Salaries, wages stay the same, but market prices for goods and services are decreasing.

- Real wages grow if prices grow slower than the growth of wages.

–E.g. Wages (salaries) grow by 10% and market prices grow by 5%

# Decrease of real wages

- Real wages drop if wages decrease and market prices remain the same.

–Market prices are the same and salaries (wages) are decreasing.

- Real wages drop is market prices are increasing and the wage remains the same.

–Wages remain the same and market prices for goods and services are growing.

- Real wages drop if prices grow faster than the income.

–Eg. Market prices grow by 5%, and wage (salary) by 2%

# Labour market decisions according to traditional economy

# Labour market – traditional economic view

- factors of production are the inputs used to produce goods and services.
- Labour, land, and capital are the three most important factors of production.
- When a computer firm produces a new software program, it uses programmers' time (labour), the physical space on which its offices sit (land), and an office building and computer equipment (capital).
- The demand for computer programmers is inextricably tied to the supply of computer software

# Labour market

- PERFECTLY COMPETITIVE

1. *Many buyers and sellers:* So many firms demand labour, and so many households supply it, that no decisions by a single firm or worker has a noticeable effect on the labour demanded or supplied in the market.

2. *Standardized labour quality:* To employers, any worker who meets the basic skill requirements for the job is considered just as productive as any other worker.

3. *Easy Entry and Exit:* No artificial barriers prevent workers from entering or leaving a labor market or from acquiring the basic skills needed to work there.

4. *Well-Informed Buyers and Sellers:* Firms and households have all the information they need to make decisions about demanding or supplying labor.

- IMPERFECTLY COMPETITIVE

Monopoly on the side of the labour supply (unions) and demand (employers' associations) – make pressure on increase or decrease of wages.

# Supply and demand for labour

- Supply and demand for labour happens in the market
- Labour is demanded by employers
- labour is supplied by workers.

- The firm owns an apple orchard and each week must decide how many apple pickers to hire to harvest its crop.
- After the firm makes its hiring decision, the workers pick as many apples as they can. The firm then sells the apples, pays the workers, and keeps what is left as profit

# 2 crucial assumptions

1. our firm is *competitive* both in the market for apples (where the firm is a seller) and in the market for apple pickers (where the firm is a buyer). – THE FIRM IS THE PRICE TAKER

- Because there are many other firms selling apples and hiring apple pickers, a single firm has little influence over the price it gets for apples or the wage it pays apple pickers. The firm takes the price and the wage as given by market conditions. It only has to decide how many workers to hire and how many apples to sell.

# 2 crucial assumptions

2. the firm is *profit-maximizing*

- the firm does not directly care about the number of workers it has or the number of apples it produces.
- It cares only about profit, which equals the total revenue from the sale of apples minus the total cost of producing them.
- The firm's supply of apples and its demand for workers are derived from its primary goal of maximizing profit.

# The production function of the firm

- production function - describes the relationship between the quantity of the inputs used in production and the quantity of output from production.
- Here the “input” is the apple pickers and the “output” is the apples. The other inputs—the trees themselves, the land, the firm’s trucks and tractors, and so on—are held fixed for now.
- This firm’s production function shows that if the firm hires 1 worker, that worker will pick 100 bushels of apples per week. If the firm hires 2 workers, the two workers together will pick 180 bushels per week, and so on.

| Labor | Output | Marginal Product of Labor | Value of the Marginal Product of Labor | Wage | Marginal Profit |
|---|---|---|---|---|---|
| $L$ (number of workers) | $Q$ (bushels per week) | $MPL = \Delta Q/\Delta L$ (bushels per week) | $VMPL = P \times MPL$ | $W$ | $\Delta$Profit = $VMPL - W$ |
| 0 | 0 | | | | |
| | | 100 | $1,000 | $500 | $500 |
| 1 | 100 | 80 | 800 | 500 | 300 |
| 2 | 180 | 60 | 600 | 500 | 100 |
| 3 | 240 | 40 | 400 | 500 | −100 |
| 4 | 280 | 20 | 200 | 500 | −300 |
| 5 | 300 | | | | |

**Table 18-1** How the Competitive Firm Decides How Much Labor to Hire

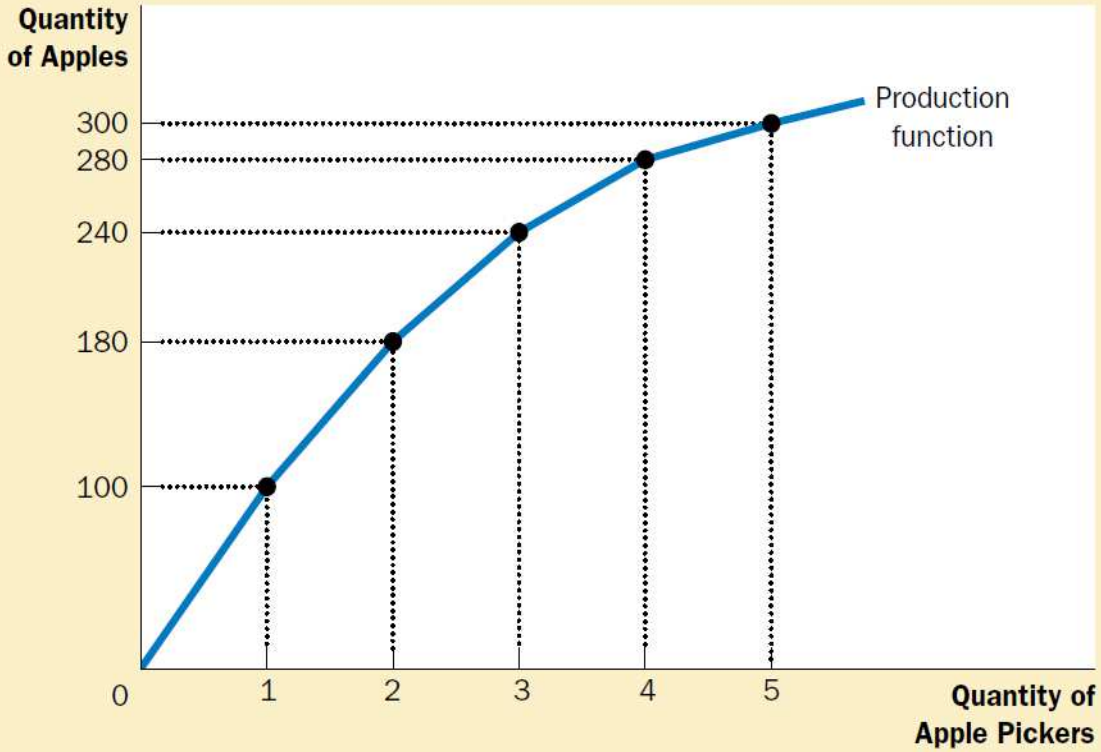



**Figure 18-2**

THE PRODUCTION FUNCTION. The production function is the relationship between the inputs into production (apple pickers) and the output from production (apples). As the quantity of the input increases, the production function gets flatter, reflecting the property of diminishing marginal product.

- marginal product of labour = the increase in the amount of output from an additional unit of labour.
- When the firm increases the number of workers from 1 to 2, the amount of apples produced rises from 100 to 180 bushels. Therefore, the marginal product of the second worker is 80 bushels.
- as the number of workers increases, the marginal product of labour declines. – diminishing marginal product.
- At first, when only a few workers are hired, they pick apples from the best trees in the orchard. As the number of workers increases, additional workers have to pick from the trees with fewer apples. As more and more workers are hired, each additional worker contributes less to the production of apples.
- For this reason, the production function in Figure 18-2 becomes flatter as the number of workers rises.

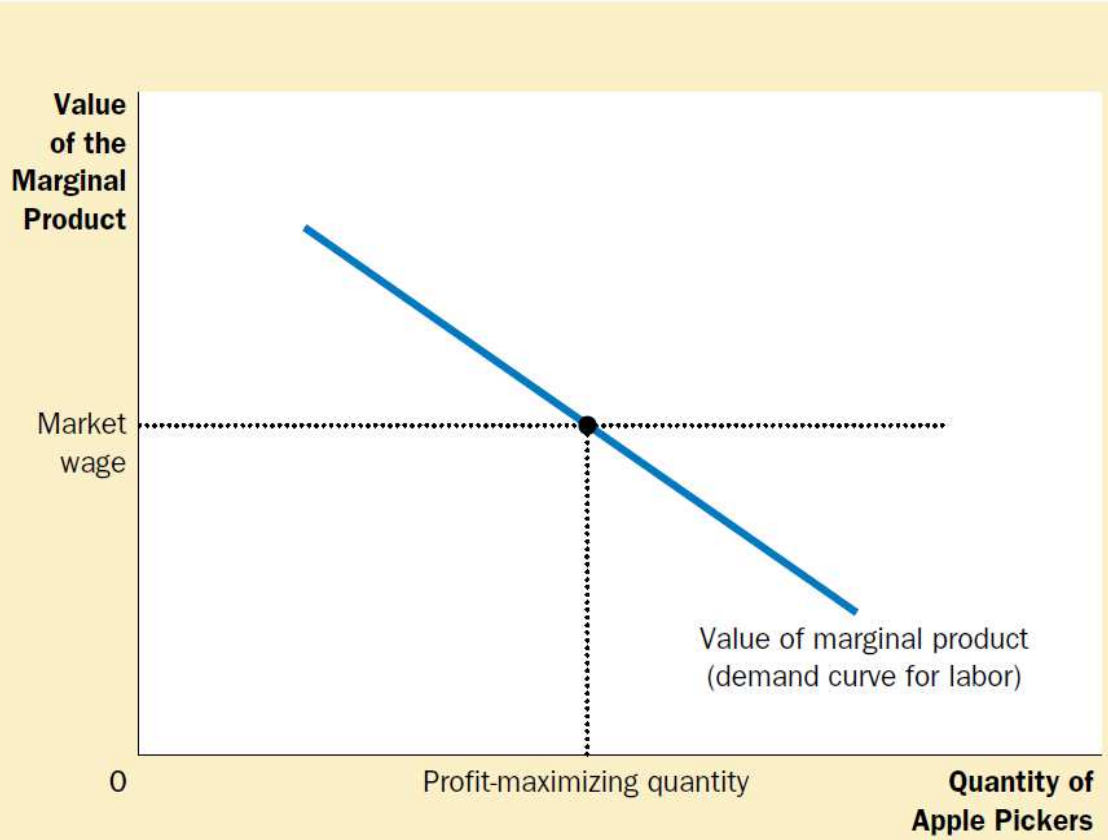
- Our profit-maximizing firm is concerned more with money than with apples. As a result, when deciding how many workers to hire, the firm considers how much profit each worker would bring in.
- Profit is total revenue minus total cost, the profit from an additional worker is the worker's contribution to revenue minus the worker's wage.
- To find the worker's contribution to revenue, we must convert the marginal product of labour (which is measured in bushels of apples) into the *value* of the marginal product (which is measured in dollars). We do this using the price of apples.

- if a bushel of apples sells for $10 and if an additional worker produces 80 bushels of apples, then the worker produces $800 of revenue
- value of the marginal product of any input = marginal product of input x product market price
- The fourth column in Table 18-1 shows the value of the marginal product of labor in our example, assuming the price of apples is $10 per bushel.

- how many workers the firm will hire?
- Suppose that the market wage for apple pickers is $500 per week.
- the first worker that the firm hires is profitable: The first worker yields $1,000 in revenue, or $500 in profit.
- the second worker yields $800 in additional revenue, or $300 in profit.
- The third worker produces $600 in additional revenue, or $100 in profit.
- After the third worker, hiring workers is unprofitable. The fourth worker would yield only $400 of additional revenue. Because the worker's wage is $500, hiring the fourth worker would mean a $100 reduction in profit.
- Thus, the firm hires only three workers.

## Figure 18-3

THE VALUE OF THE MARGINAL PRODUCT OF LABOR. This figure shows how the value of the marginal product (the marginal product times the price of the output) depends on the number of workers. The curve slopes downward because of diminishing marginal product. For a competitive, profit-maximizing firm, this value-of-marginal-product curve is also the firm's labor demand curve.



- Figure 18-3 graphs the value of the marginal product. This curve slopes downward because the marginal product of labour diminishes as the number of workers rises. The figure also includes a horizontal line at the market wage. To maximize profit, the firm hires workers up to the point where these two curves cross.
- Above this level of employment, the value of the marginal product exceeds the wage, so hiring another worker would increase profit.
- Below this level of employment, the value of the marginal product is less than the wage, so the marginal worker is unprofitable.
- Thus, *a competitive, profit-maximizing firm hires workers up to the point where the value of the marginal product of labour equals the wage.*

# Demand for labour

- Demand for labour depends upon:

–Technology – with better technology people get more productive and more can be produced (the productivity of a ditchdigger using a bulldozer is higher with that of a similar digger using a hand shovel)

- Quality of work – better trained and educated workers are more productive than those less trained and educated. As the labour force increase its skills, knowledge and education, the productivity of labour in the country increases

– Input prices - labour in Mexico is cheaper than labour in the US (supply of labour is larger, workers are less educated, equipment is older, infrastructure in general (roads, electricity etc.) are less readily available)

# Supply of labour

- Expressed in numbers of working hours the population is willing to work in jobs bringing wage. (aka gainful activities)
- Depends upon:

–hours worked– opportunity cost of chosing whether to work more or to have more free time. If the wages grow at first you will perhaps work more but with time, you decide to work less because you have enough money but want to have more free time

–labour-force participation– e.g. increase of participation of women in labour force increase the supply of labour

–immigration – labour migrations from country to country is vast source of change in supply of labour. Large immigration to the country increases the supply of labour (but it can lead to decrease in wages, depend on the type of job)

# Substitution and income effect

What happens when wages increase?

- With substitution effect, workers replace free time with working time.

–Due to increase in wages, workers are willing to replace their free time with more work (they will earn more)

–Increase in wages cause the increase in supply of labour force – more people want to work.

- With income effect, workers are replacing more work with free time.

–At the certain income (wage) level, worker is no longer willing to replace his/her free time with more work – you have enough money you want to now enjoy your free time

–Increase in wages causes drop in supply of labour

# What happens when wages increase?

**Substitution effect**

- Workers want to work more because each hour is paid more (each hour of free time is costly, it is more lucrative to go to work)

**Income effect**

- Opposite of substitution effect
- When wages increase (ceteris paribus), individual can buy more of everything but he/she also demands more free time and is not motivated to work more. He/she has enough money but now wants to use that money for leisure.

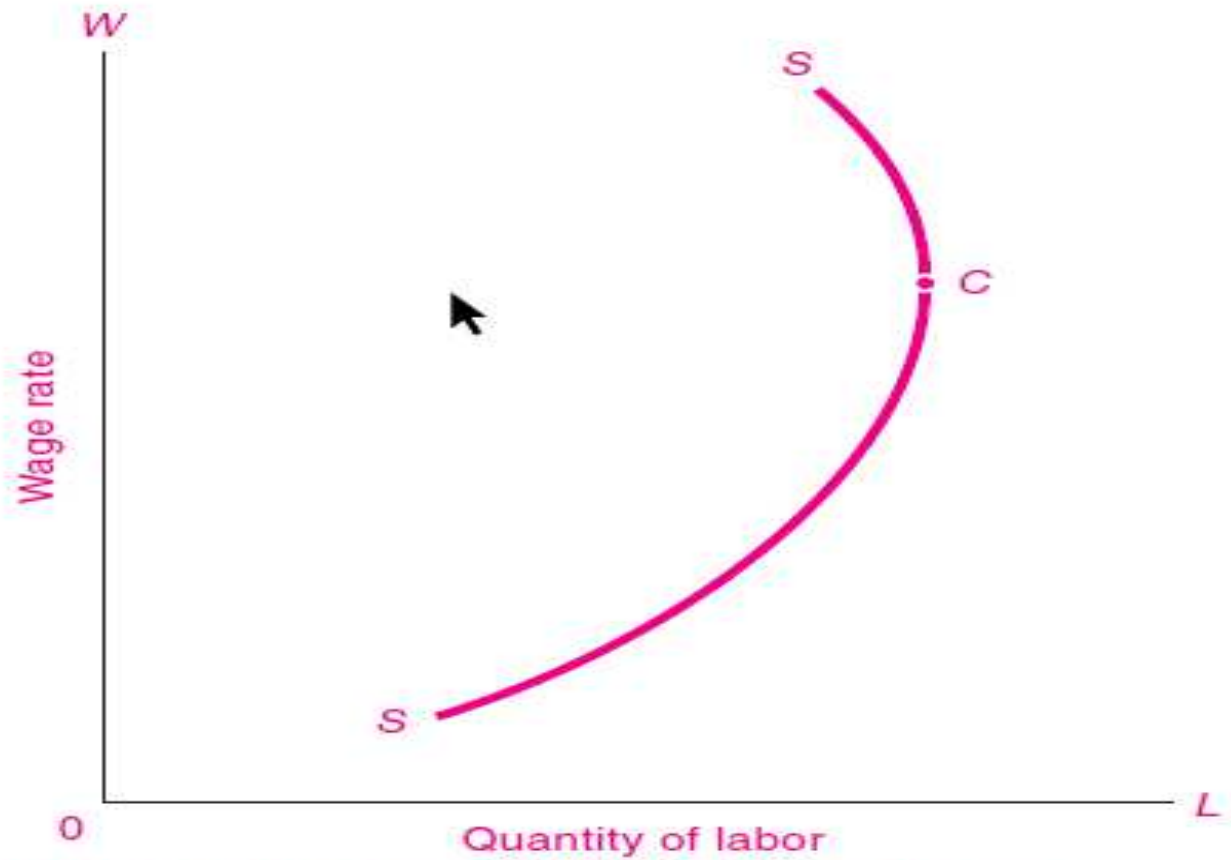
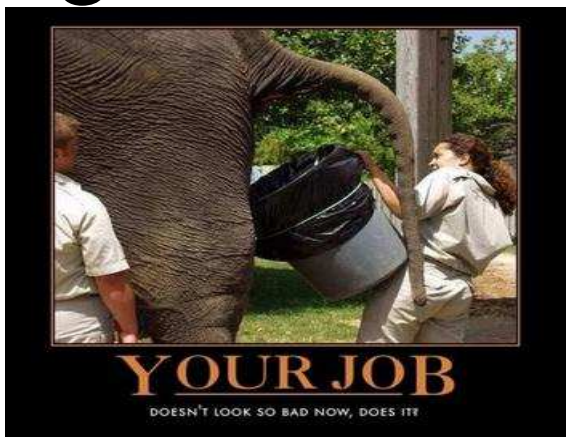



**FIGURE 13-4. As Wages Rise, Workers May Work Fewer Hours**

Above the critical point *C*, raising the wage rate reduces the amount of labor supplied as the income effect outweighs the substitution effect. Why? Because at higher wages workers can afford more leisure even though each extra hour of leisure costs more in wages forgone.

# Wage differentials




- Differences in wages are caused by:

-compensating differentials: Jobs differ in their attractiveness, levels of safety, risk hazard etc. Companies pay more for hazardous and lonely jobs on oil rigs than safe and cosy office jobs.

- -labour quality : “human capital” refers to the stock of useful and valuable skills and knowledge accumulated by people in the process of their education and training. Doctors, lawyers, and engineers invest many years in their formal education and on the- job training. They spend large sums on tuition and wages forgone and often work long hours. Part of the high salaries of these professionals should be viewed as a return on their investment in human capital—a return on the education that makes these highly trained workers a very special kind of labour.-
- Differences in People: The “Rents” of Unique Individuals: people with special talent (top sports people, top musicians) – possession of particular type of talent which causes wage differencies
- Segmented Markets and Noncompeting Groups– miners, doctors, librarians - highly specialized and hard to employ in other industries
- Discrimination of various kind: ethnic, racial, gender-based, age-based etc.

# Input - Land

Type of land income: rent (pure economic rent)

# Land

- Fertile, non-fertile ground, all other surfaces and materials obtained from nature
- The unusual feature of land is that its quantity is fixed and completely unresponsive to price (perfectly inelastic in supply)
- Renewable resources (ones whose services are replenished regularly – e.g. forests, rivers) and non-renewable resource (one whose supply is essentially fixed – e.g. fossil fuels)

# Rent – income from using the land

- Income from using the land is called rent or pure economic rent
- In general, rent (or pure economic rent) is payment for the use of factors of production that are fixed in supply. (e.g. salary of 10 million euros for  footbal player Luka Modrić is also considered a pure economic rent for the usage of unique resource – Luka Modrić)
- Supply curve for land is perfectly inelastic (there is fixed amount of land within the borders of particular country) – regardless of the price, the quantites of land can’t be changed.

- The price of corn land is high because the price of corn is high. This is a fine example of *derived demand,* which signifies that the demand for the factor is derived from the demand for the product produced by the factor.
- the value of the land derives entirely from the value of the product, and not vice versa

# Input - Capital

Types of capital income: Interest, Rent(Rental), Dividend, Profit

# Capital

- Durable goods which are in turn used to produce other goods and services
- Some capital might last for only a few years, while others might last for a century or more.
- the essential property of capital is that it is both an input and an output. (Robot Roomba used for end consumption in households, industrial robot used in production of cars)

# Types of capital

1. **Tangible capital (tangible assets)**

- Buildings (factories, warehouses, offices, homes…)
- Equipment (machines, trucks, cars, computers …)
- Inventories (cars in dealers' lots, raw materials on stock etc. …)

2. **Intantible capital (intangible assets)** – patens, licences, softwares, brand names (eg. Coca-Cola)

- **3. Financial capital (financial assets) – investment in shares, bonds, bank loans – partially used to buy capital (e.g. you raise a loan to buy a server or a truck)**
- **Money in itself is not capital since it is not a production resource, we use the money to obtain the production resource.**

- Capital is bought and sold in capital markets. For example, Boeing sells aircraft to airlines; the airlines then use these specialized capital goods along with software, skilled labour, land, and other inputs to produce and sell air travel.
- Our decision to buy capital is influenced by the rate of return on capital goods – how much can I get in return per euro invested
- E.g. we buy land for 100.000 euros and year later we sell it for 110.000 euros. If there are no other costs, the rate of return on this investment is 10.000 euros per year/100.000 euros = 10%

# Types of capital income

- Rent or rental – income on durable factors (An apartment that is owned by Ms. Landlord might be rented out for a year to a student, and the monthly payment of $800 per month would constitute a rental)
- Interest – e.g. for a loan companies raise to buy a machine – you borrow the money to buy capital – this money is mostly household savings which bank use to give credits (which in the end is basically paying the interest rate to households – on their savings)
- Dividend – income to shareholders (owners) of the companies
- Profit – income to entrepreneurs for innovativeness and risk-taking – also indirectly used for new capital investment in companies, which leads to increase in company's revenue and dividends for shareholders

FYI

## What Is Capital Income?

Labor income is an easy concept to understand: It is the paycheck that workers get from their employers. The income earned by capital, however, is less obvious.

In our analysis, we have been implicitly assuming that households own the economy's stock of capital—ladders, drill presses, warehouses, and so on—and rent it to the firms that use it. Capital income, in this case, is the rent that households receive for the use of their capital. This assumption simplified our analysis of how capital owners are compensated, but it is not entirely realistic. In fact, firms usually own the capital they use, and therefore, they receive the earnings from this capital.

These earnings from capital, however, are paid to households eventually in a variety of forms. Some of the earnings are paid in the form of interest to those households that have lent money to firms. Bondholders and bank depositors are two examples of recipients of interest. Thus, when you receive interest on your bank account, that income is part of the economy's capital income.

In addition, some of the earnings from capital are paid to households in the form of dividends. Dividends are payments by a firm to the firm's stockholders. A stockholder is a person who has bought a share in the ownership of the firm and, therefore, is entitled to a portion of the firm's profits.

A firm does not have to pay out all its earnings to households in the form of interest and dividends. Instead, it can retain some earnings within the firm and use these earnings to buy additional capital. Unlike dividends, these retained earnings do not yield a direct cash payment to the firm's stockholders, but the stockholders benefit from them nonetheless. Because retained earnings increase the amount of capital the firm owns, they tend to increase future earnings and, thereby, the value of the firm's stock.

These institutional details are interesting and important, but they do not alter our conclusion about the income earned by the owners of capital. Capital is paid according to the value of its marginal product, regardless of whether this income is transmitted to households in the form of interest or dividends or whether it is kept within firms as retained earnings. ■