



# The Nature and Function of Factor Markets

MICROECONOMICS UNIT 3

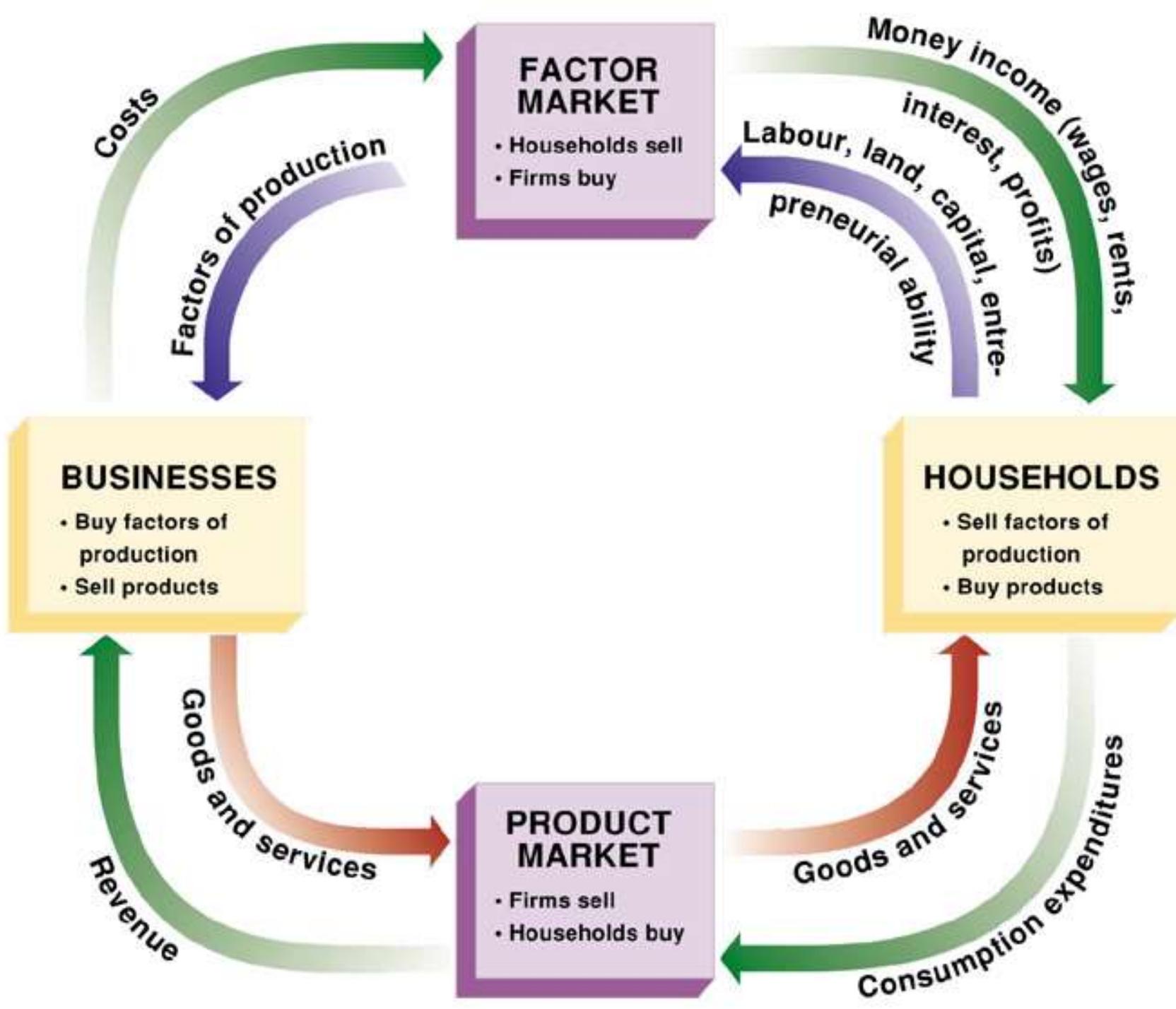


# Introduction to Factor Markets

CH 12: THE DEMAND FOR RESOURCES

# 4 Factors of Production

- ▶ Labor (abbreviation is “L”)
- ▶ Capital (abbreviation is “C” or “K”)
- ▶ Land
- ▶ Entrepreneurship



# Demand for Factors of Production – CH 12 Pg 112

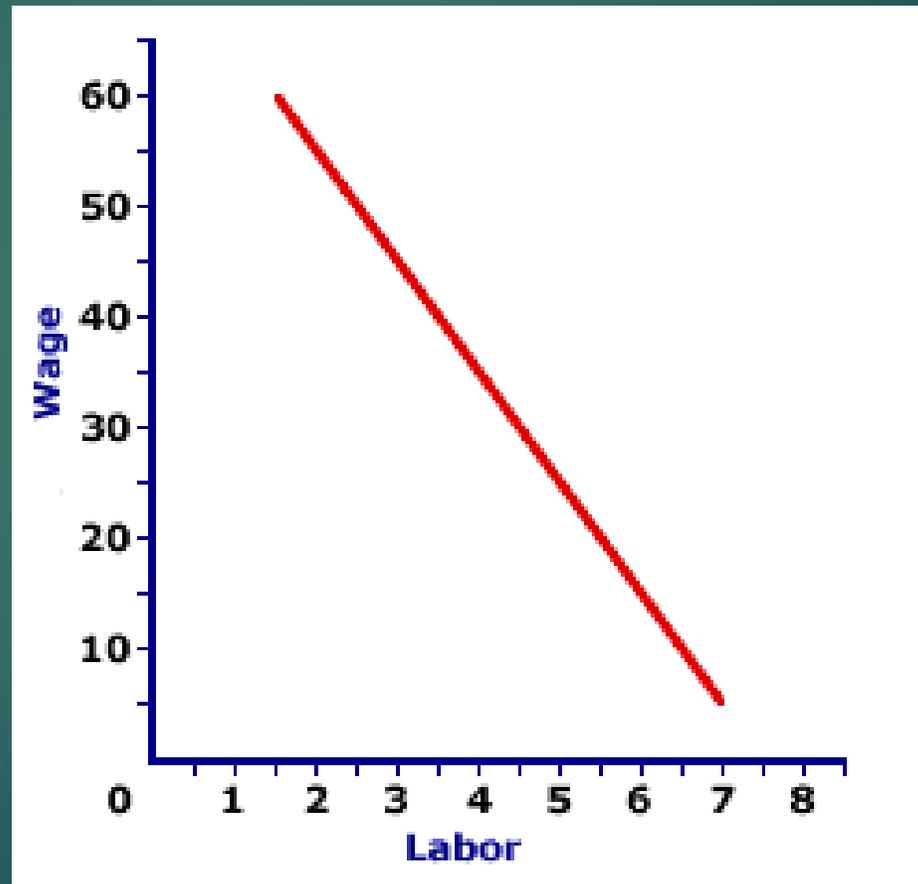
- ▶ The demand for the factors of production is based upon the demand for the goods and/or services the factors are used to produce
- ▶ Thus demand for the factors of production is dependent upon the demand for those goods/services
- ▶ We call this derived demand

# Derived Demand

## CH 12 Pg 112

- ▶ If the demand for a good or service increases, then the demand for the factors of production used to produce that good or service also increases (and vice versa)
- ▶ However like demand for a good or service:
  - ▶ There is an inverse relationship between the price of a resource (or factor) and the quantity of the resource demanded (i.e. a downward sloping demand curve)

# EX: The Demand for Labor



# Value of Marginal Product

- ▶ To decide the quantity of the factor of production to hire, a firm compares the cost of hiring an additional unit of the factor with its value to the firm.
- ▶ Cost = Price of one more unit of the factor (or **Marginal Resource Cost or MRC**)
  - ▶ MRC = the wage of one more worker
- ▶ Value of marginal product (or **Marginal Revenue Product or MRP**) = the price of a unit of output multiplied by the **marginal product** of the add'l factor of production
  - ▶  $MRP = P_{\text{good}X} \times MP_L$

# Marginal Revenue Product Example

Max's Wash and Wax  
Car wash = \$3

	Quantity of Labor (workers)	Total Product (car washes per hour)	Marginal Product (washes per additional worker)	Value of Marginal Revenue Product (or $\Delta$ in TR) In dollars per add'l worker
A	0	0		
B	1	5	5	\$15
C	2	9	4	\$12
D	3	12	3	\$9
E	4	14	2	\$6
F	5	15	1	\$3

# Demand for a Factor

- ▶ As the value of marginal product (or MRP) decreases (as the quantity of a factor increases), there is a simple rule for maximizing profit:
  - ▶ Hire/buy the factor up to the point at which the value of marginal product (MRP) equals the factor price (MRC)
- ▶ This is known as Marginal Productivity Theory of Resource Demand

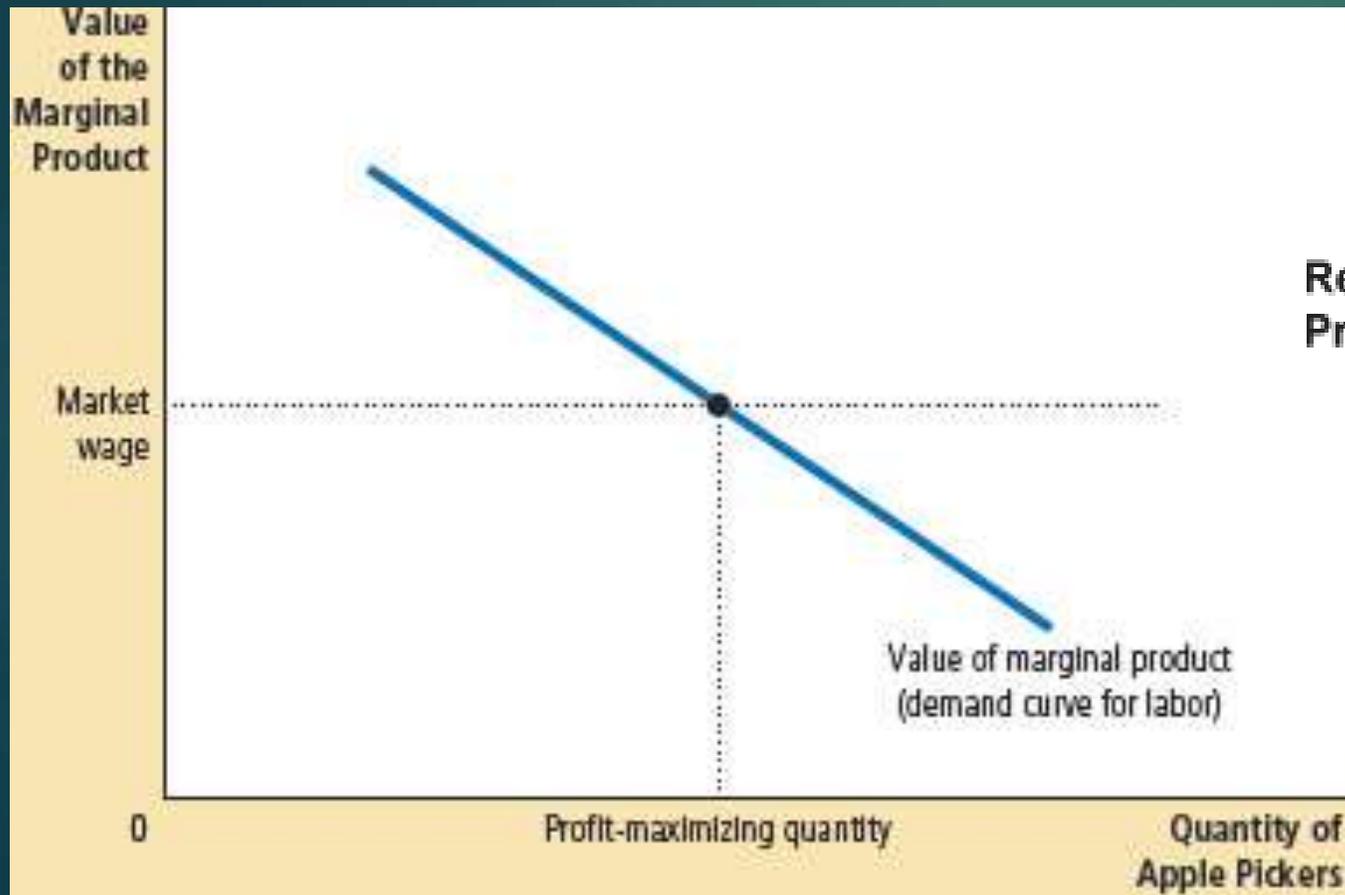
# Marginal Productivity Theory

## CH 12 pgs 112 and 113

- ▶ Law of Diminishing Returns = declining Marginal Productivity
- ▶ Marginal Revenue Product (MRP) =
  - ▶  $\Delta$  in Total Revenue divided by  $\Delta$  in factor quantity
- ▶ Marginal Resource Cost (MRC) =
  - ▶  $\Delta$  in Total Resource Cost divided by  $\Delta$  in factor quantity
- ▶ Hire/Buy a Factor where **MRP = MRC**

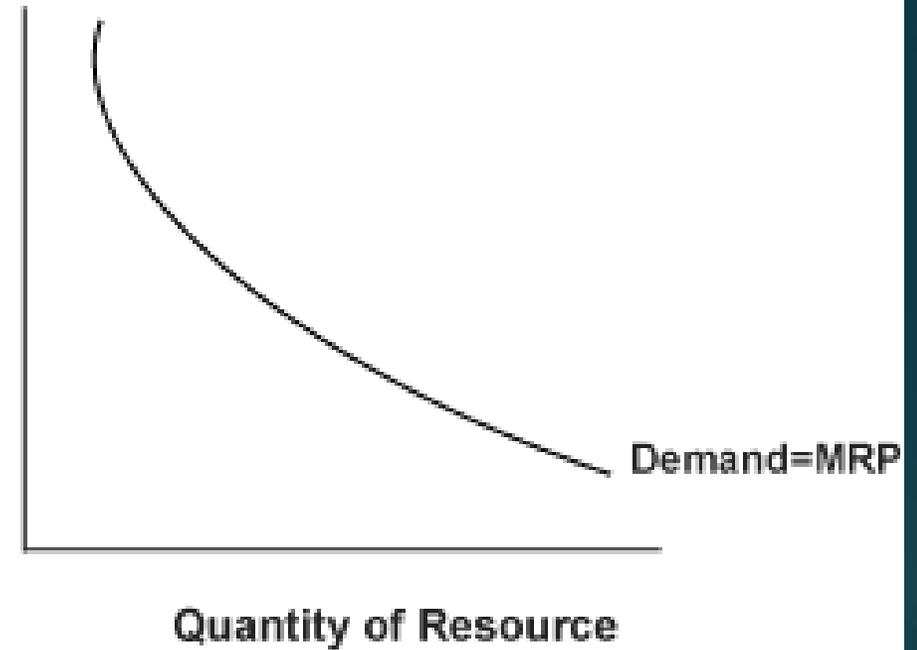
# Demand Curve for a Factor

## Demand for Labor



Demand = MRP

Resource  
Price (Cost)



# Value of Marginal Product Example

Max's Wash and Wax

Car wash = \$3

Worker's Wage = \$9/hr

	Quantity of Labor (workers)	Total Product (car washes per hour)	Marginal Product (washes per additional worker)	Value of Marginal Product (dollars per add'l worker)
A	0	0		
B	1	5	5	\$15
C	2	9	4	\$12
D	3	12	3	\$9
E	4	14	2	\$6
F	5	15	1	\$3

# Changes to Demand of a Factor

CH 12 pg 114/Ch 13 pg 122

1. The Price of the Firm's Output
2. The Prices of other Factors of Production
3. Productivity/Technology

# The Price of the Firm's Output

- ▶ The higher the price of a firm's output, the greater is its demand for a factor
- ▶ A change in the price of a firm's output leads to a shift in the firm's demand for the factor
  - ▶ Price of the output increases, the demand for the factor increases and the demand for the factor curve shifts outward

# Value of Marginal Product Example

Max's Wash and Wax

Car wash = \$5

Worker's Wage = \$9/hr

	Quantity of Labor (workers)	Total Product (car washes per hour)	Marginal Product (washes per additional worker)	Value of Marginal Product (dollars per add'l worker)
A	0	0		
B	1	5	5	\$25
C	2	9	4	\$20
D	3	12	3	\$15
E	4	14	2	\$10
F	5	15	1	\$5

# The Prices of other Factors of Production

- ▶ If the price of using capital decreases relative to the wage rate, a firm will substitute capital for labor and increase the quantity of capital it uses
  - ▶ EX: The price of a car wash machine falls, so Max buys one machine and lays off one worker

# Productivity/Technology

- ▶ An increase in productivity will increase the demand for the resource
- ▶ A decrease in productivity will decrease the demand for the resource
- ▶ Productivity (as we will see in a later section) changes marginal product
- ▶ Changes to Marginal Product causes changes to Marginal Revenue Product
  - ▶ EX: Increase in MP = increase in MRP

# End of Day 1 Notes



# Intro to Factor Markets (Continued)

CH 12: THE DEMAND FOR RESOURCES

# Elasticity of Resource Demand

# Elasticity of Resource Demand

CH 12 pg 115

- ▶ Measures the sensitivity of producers to changes in resource prices

- ▶ 
$$E_{rd} = \frac{\% \Delta \text{ in resource } Q}{\% \Delta \text{ in resource } P}$$

- ▶  $E_{rd} > 1$  = elastic
- ▶  $E_{rd} < 1$  = inelastic
- ▶  $E_{rd} = 1$  = unit elastic

# Least-Cost Rule

# Least-Cost Rule – CH 12 pg 115

## ▶ LEAST-COST RULE =

- ▶ Costs are minimized where the marginal product per dollar's worth of each resource is the same

## ▶ Marginal Product and Price

$$\frac{MP(\text{labor})}{\text{Price}(\text{labor})} = \frac{MP(\text{capital})}{\text{Price}(\text{capital})}$$

A firm can shift resources from labor to capital and vice versa to achieve equilibrium

# Example

Product Price = \$2

Labor = \$8			Capital = \$12		
Qty	Total Product	Marginal Product/\$	Qty	Total Product	Marginal Product/\$
0	0		0	0	
1	12	12/8 = 1.5	1	13	13/12 = 1.08
2	22	10/8 = 1.25	2	22	9/12 = .75
3	28	6/8 = .75	3	28	6/12 = .5
4	33	5/8 = .625	4	32	4/12 = .33
5	37	4/8 = .5	5	35	3/12 = .25
6	40	3/8 = .375	6	37	2/12 = .167
7	42	2/8 = .25	7	38	1/12 = .08

Why not here???

$$\frac{MP(\text{labor})}{\text{Price}(\text{labor})} = \frac{MP(\text{capital})}{\text{Price}(\text{capital})}$$

# Profit-Maximizing Rule

# Profit Maximizing Rule CH 12 pg 116

## ▶ PROFIT MAXIMIZING RULE

▶ In a competitive market, the price of the resource must equal its marginal revenue product. This rule determines level of employment of labor and capital

## ▶ Marginal Revenue Product and Price

$$\frac{\text{MRP (labor)}}{\text{Price (labor)}} = \frac{\text{MRP (capital)}}{\text{Price (capital)}} = 1$$

# Example

Product Price = \$2

Labor = \$8.00				Capital = \$12			
Qty	Total Product	Total Revenue (TP x P)	Marginal Revenue Product/ $P_L$	Qty	Total Product	Total Revenue (TP x P)	Marginal Revenue Product/ $P_K$
0	0	0		0	0	0	
1	12	24	$24/8 = 3.0$	1	13	26	$26/12 = 2.17$
2	22	44	$20/8 = 2.5$	2	22	44	$18/12 = 1.5$
3	28	56	$12/8 = 1.5$	3	28	56	$12/12 = 1.0$
4	33	66	$10/8 = 1.25$	4	32	64	$8/12 = .67$
5	37	74	$8/8 = 1.0$	5	35	70	$6/12 = 0.5$
6	40	80	$6/8 = 0.75$	6	37	74	$4/12 = .33$
7	42	84	$4/8 = 0.5$	7	38	76	$2/12 = .167$

# End of Day 2 Notes

# Wage Determination

# Labor, Wages, and Earnings

## CH 13 pg 121

- ▶ Wages = price paid for the use of labor
  - ▶ Can take the form of salaries, commissions, bonuses, etc.
  - ▶ “wages” = wage rate or price paid per unit of labor time (per hour, per day, etc.)
- ▶ Nominal vs. real wages
  - ▶ Nominal = amount of \$ received per period of labor time
  - ▶ Real = purchasing power of the wage (adjusted for inflation for instance)

# Wages and Productivity

## CH 13 pg 121

- ▶ Productivity = a measure of average output or real output per unit of input.
  - ▶ For example: *The productivity of labor is determined by dividing real output by hours of work*
- ▶ Productivity helps to determine wages
- ▶ Real wages and productivity
  - ▶ Real hourly compensation per worker can increase only at about the same rate as output per worker



# (Perfectly) Competitive Labor Markets

# Competitive Labor Market

## CH 12 pg 112

### ▶ Characteristics

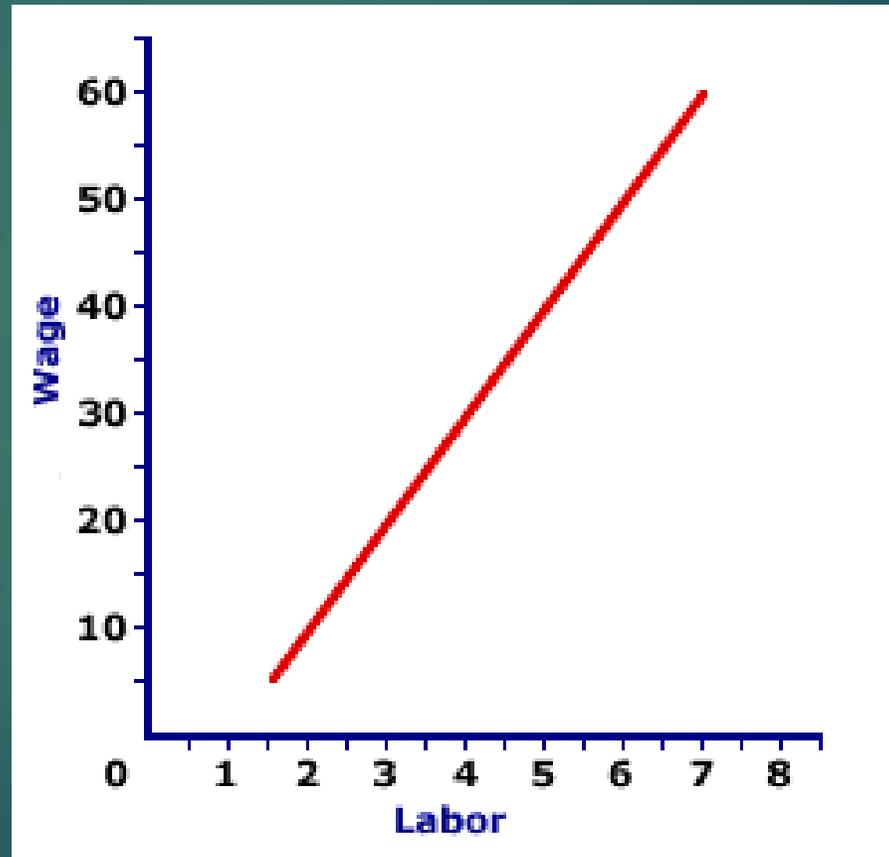
- ▶ Numerous firms competing to hire a specific type of labor
- ▶ Many qualified workers with identical skills available to independently supply this type of labor service
- ▶ “Wage taker” behavior that pertains to both employer and employee (i.e. neither can control the market wage rate)

# Competitive Labor Market

## CH 13 pg 121

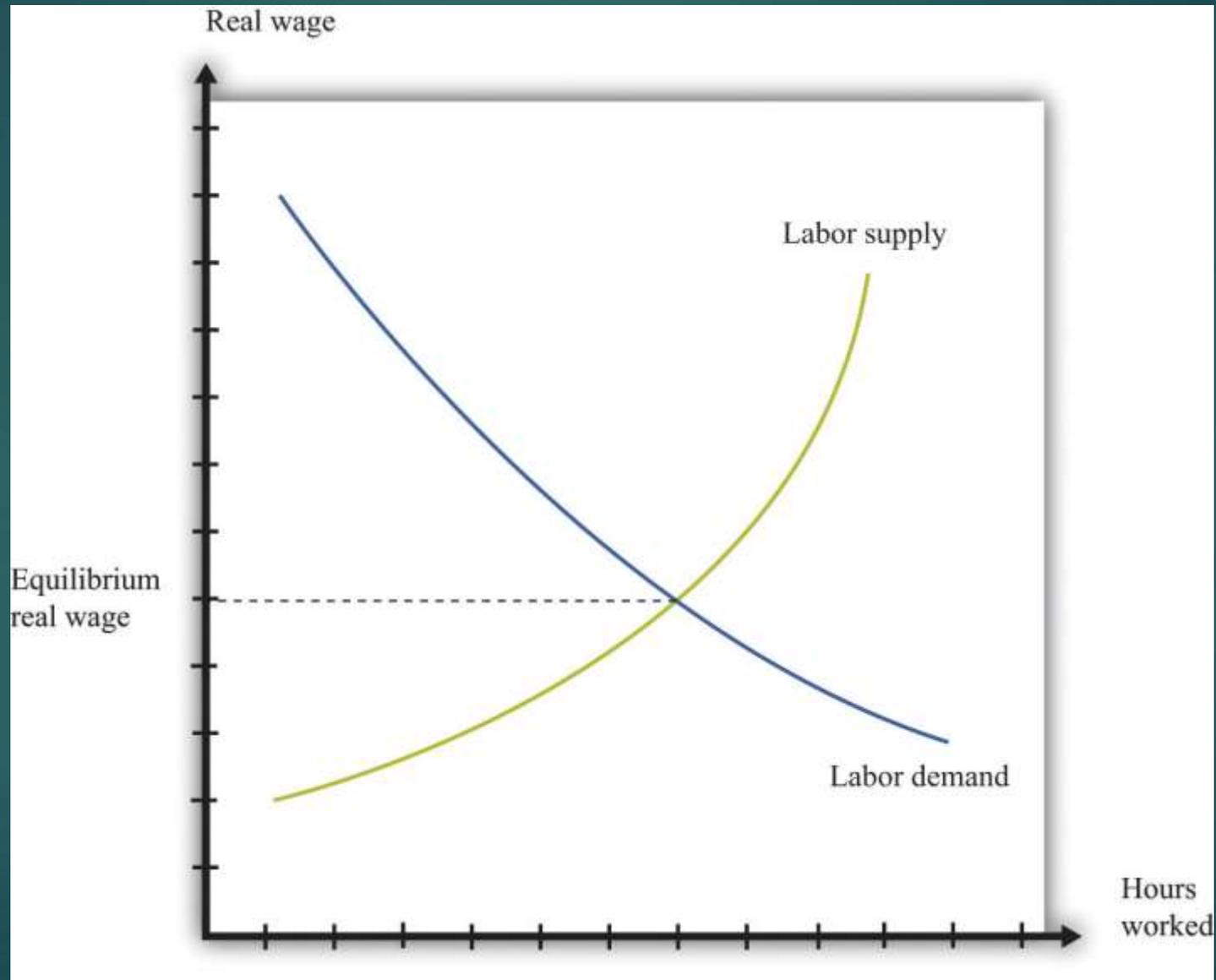
- ▶ The market supply of labor = the amount of labor offered at different wage rates
  - ▶ More labor will be supplied at higher wages (due to opportunity costs)
  - ▶ Upward sloping
- ▶ Market equilibrium = where labor demand and supply intersect
  - ▶ Where wage and quantity of labor is equal

# The Supply Curve of Labor



This relationship between price and quantity supplied holds true for all types of factors EXCEPT land.

# Labor Market

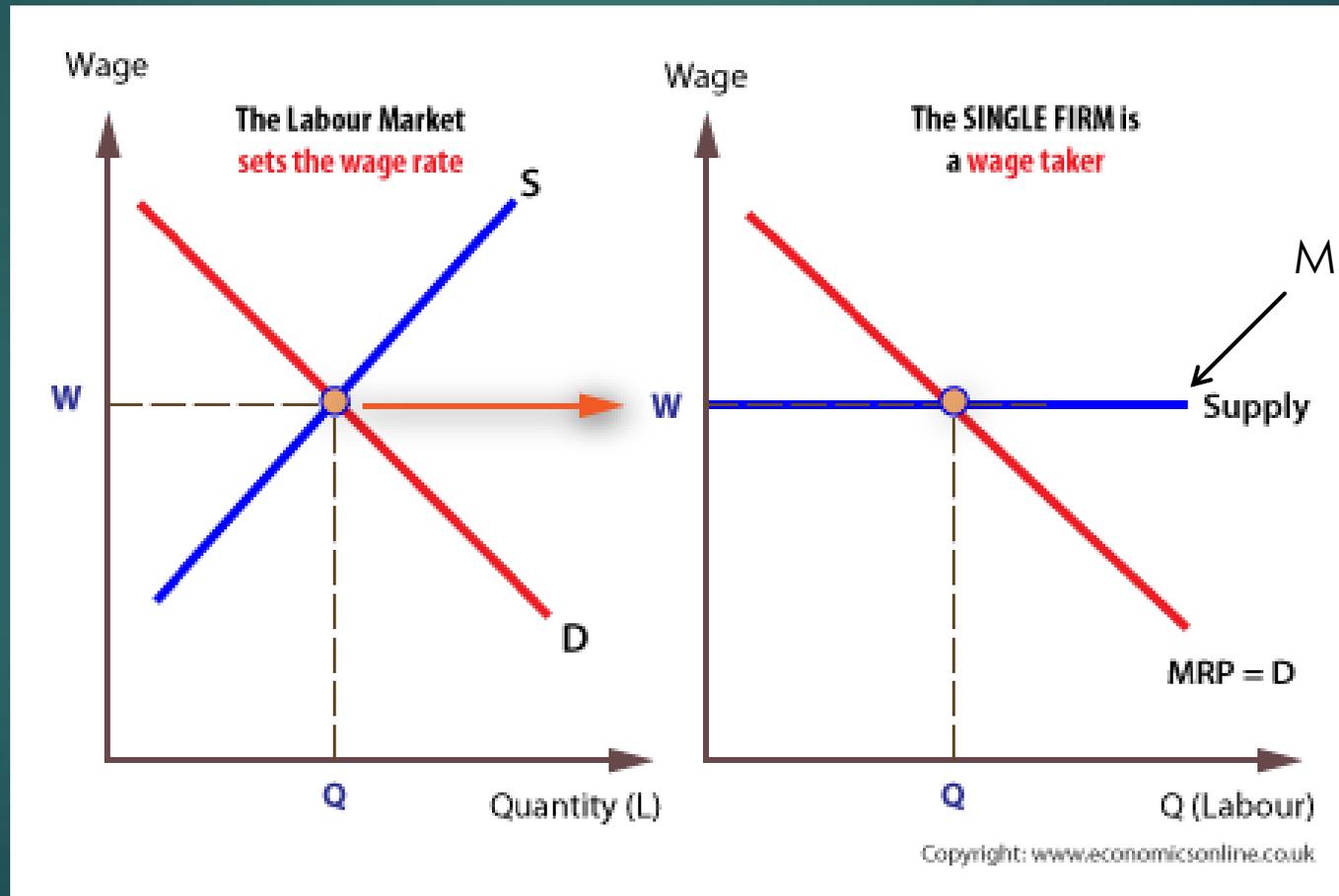


# The Firm and Individual in a Competitive Labor Market

CH 12 pg 113

- ▶ Qty of workers hired =
  - ▶ where  $MRP = MRC$
- ▶ MRC is constant because firm and labor are “wage takers”
  - ▶ (i.e.  $MRC = P$  of labor or wages)

# The Firm and Individual in a Competitive Labor Market



# Another Perspective

NOT IN YOUR CHAPTER PACKETS!!!!

- ▶ We know that any firm will produce at the profit-maximization price and quantity.
- ▶ MR = MC rule
- ▶ So how can we determine if the number of workers we hire is productive enough to maximize profits?

# Another Perspective

- ▶ REVIEW: Firms have two types of costs:
  - ▶ Fixed Costs
  - ▶ Variable Costs
- ▶ Fixed costs usually are comprised of capital (K)
- ▶ Variable Costs are usually comprised of labor (L)

WHY?

# Another Perspective

- ▶ A competitive firm's Marginal Costs tend to be made up of variable costs (labor)
- ▶ How do we determine the firm's marginal costs associated with the hiring of more workers?
- ▶ We have to find the **Productivity of Labor!**

# Productivity and Labor

- ▶ To find productivity of labor we have to know the wage rate of labor and the Marginal Product of labor
- ▶ How do we then use this information to find out how productive one more worker will be?

# Productivity of Labor

- ▶ We take the wage of the worker and divide it by the workers marginal product:

$$\frac{W}{MPL}$$

- ▶ What does this number tell us?

# Productivity of Labor



- ▶ This number will tell us what the cost of one more product is (or the *Marginal Cost!*) when we hire one more worker
- ▶ Or our Marginal Productivity of Labor
- ▶ We keep hiring workers until our Marginal Productivity of Labor is equal to our Marginal Cost

# Productivity and Labor

So if we want to hire the number of workers where we our marginal cost equals our marginal productivity then our formula looks like this:

$$MC = \frac{W}{MPL}$$

# Profit Maximizing Number of Workers

At what point would a perfectly competitive firm produce to maximize its profits?

$$MC = MR$$

$$\text{If } MC = \frac{W}{MPL}$$

... then a competitive firm would hire workers where:

$$MR = \frac{W}{MPL}$$

Marginal  
Productivity of  
Labor



# End of Day 3 Notes



# Monopsony Model of Labor Market

# Monopsony Model of Labor Market

## ▶ Characteristics

- ▶ Firm's employment is a large portion of the total employment of a particular kind of labor
- ▶ The type of labor is relatively immobile, either geographically or because workers can't easily acquire new skills to allow them to work elsewhere
- ▶ The firm is a "wage maker"
  - ▶ Wage rate varies directly with the # of workers it employs

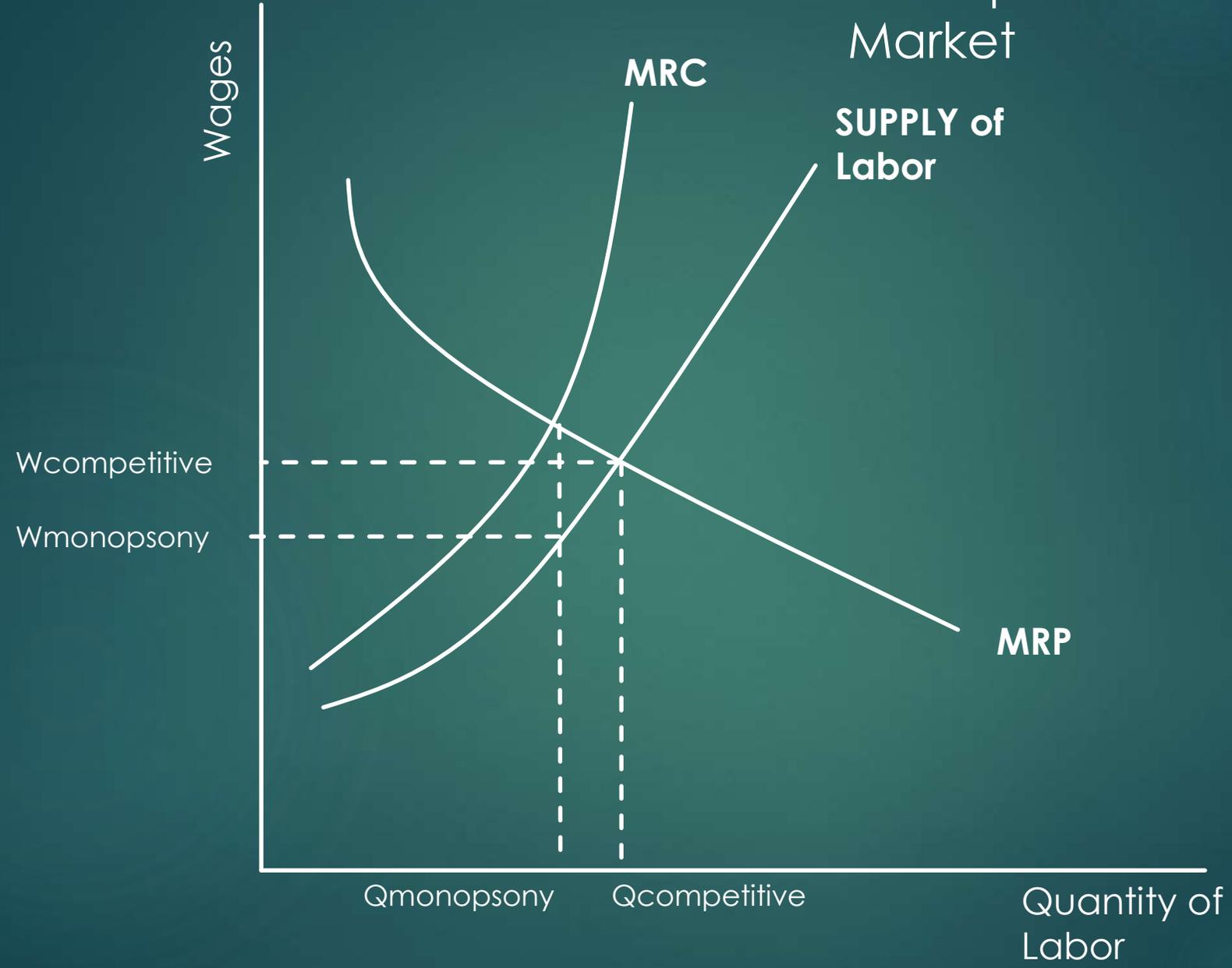
# Variations of the Monopsony Labor Market

- ▶ Complete Monopsony
  - ▶ Only one major employer in a labor market
- ▶ Oligopsony
  - ▶ Only a few major employers in a labor market

# Monopsonistic Market (Graphical Analysis)

- ▶ The labor supply curve will be upward sloping
  - ▶ If the firm is large, it will have to pay higher wages to attract more workers
- ▶ MRC will exceed the wage rate in monopsony
  - ▶ Each additional worker will be hired at a higher wage which means all workers already hired will also be paid this higher wage
- ▶ Equilibrium =  $MRC = MRP$  but MRC is above the wage rate
  - ▶ Wage rate is lower than it would be if the market was competitive
  - ▶ Firm will hire fewer workers than under competitive conditions

# Monopsonistic Labor Market





# Other Influences on the Labor Market

# Marginal Productivity Theory of Income Distribution

- ▶ Every factor of production that is sold in the factor market is paid its equilibrium value of the marginal product (a.k.a. MRP) or the additional value of employing the last unit of that factor
  - ▶ Example: All workers are paid the value of the final worker and not based on their own individual value
- ▶ Two concerns about this theory:
  - ▶ Inequality – workers who produce more value of the marginal product are paid the same as people who bring less value of the marginal product
  - ▶ Market imperfections – the most skilled/productive factors of production are not always utilized.

# Minimum Wage

## CH 13 pg 125

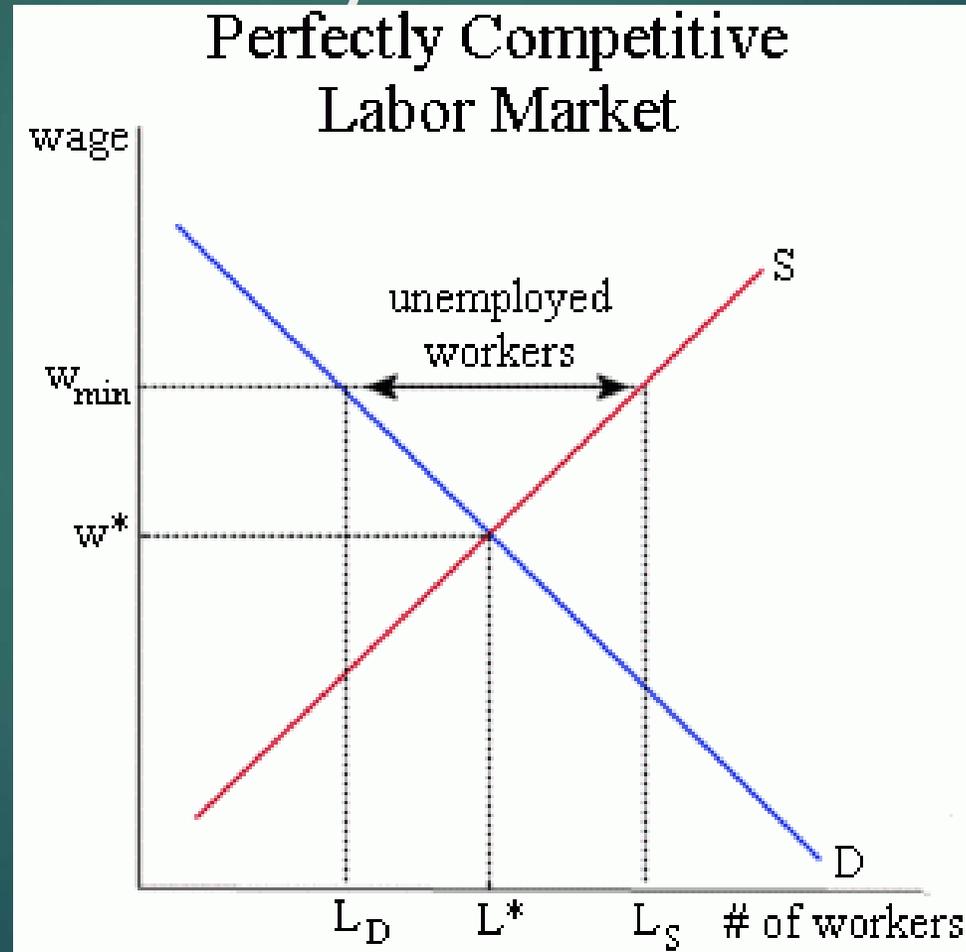
### ▶ Case against:

1. Forces employers to pay a wage higher than equilibrium.
2. Does not effectively fight poverty

### ▶ Case for:

1. In monopolistic market, minimum wage have minimal effects on employment
2. Increasing minimum wage may increase productivity
  - ▶ Workers will be used more efficiently
  - ▶ Reduces labor turnover and training costs
3. Gives assurances that employers are not taking advantage of their workers

# Labor Market with a Minimum Wage (Price Floor)



# Wage Differentials

CH 13 pg 125

- ▶ Workers who are in strong demand will received higher wages
- ▶ Workers who are in short supply will receive higher wages
- ▶ Other factors:
  - ▶ Differences in workers' abilities
  - ▶ Education and training differences (“human capital”)
  - ▶ “Compensating differences” – working conditions, work hours, locations, etc.

# Wage Differentials

- ▶ Labor markets are not perfectly competitive
  - ▶ Ignorance about alternative job opportunities
  - ▶ Reluctance to move geographical locations
  - ▶ Artificial restraints on job mobility
  - ▶ Discrimination

# End of Day 4 Notes

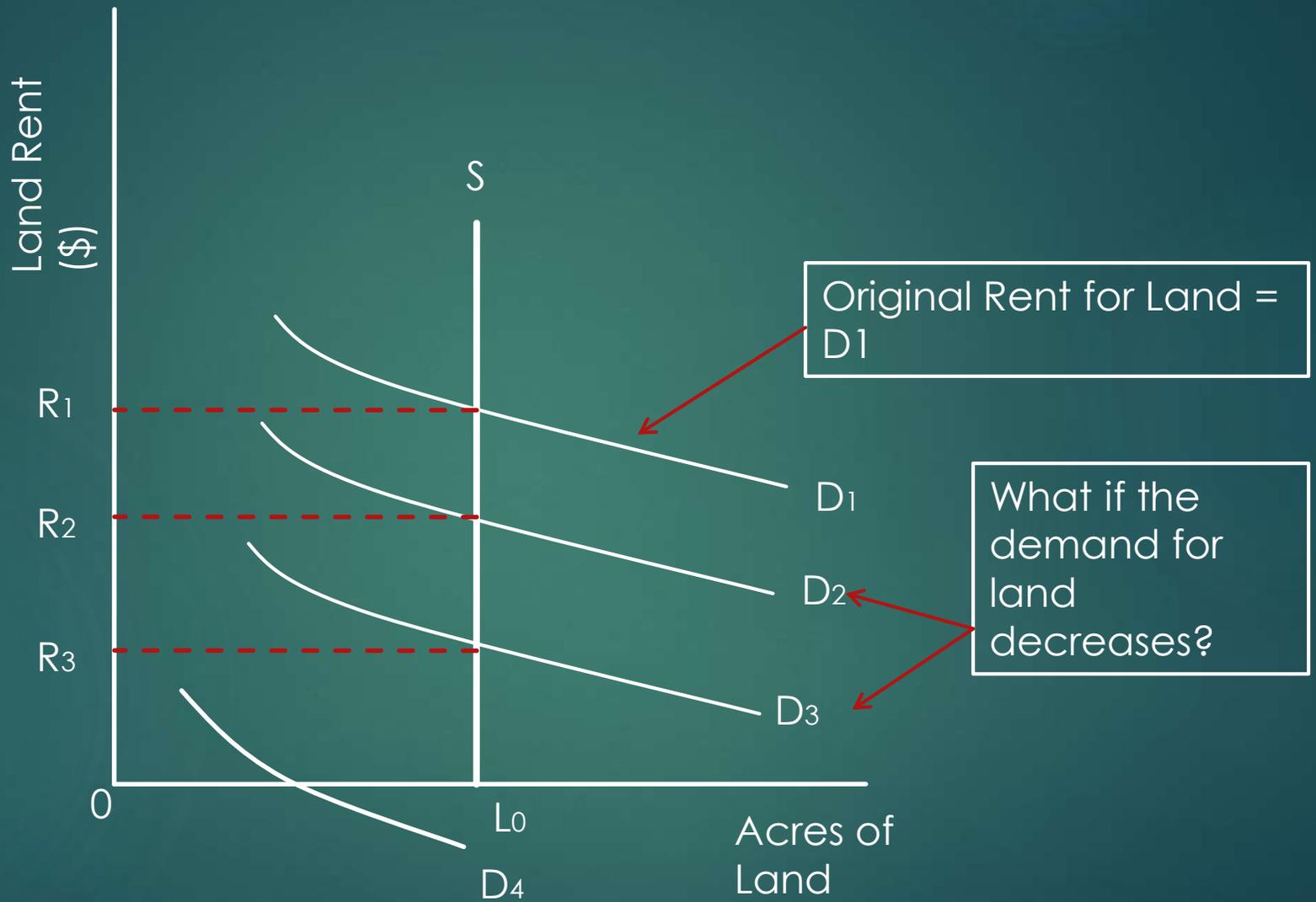
# Rent, Interest, and Profit

# Economic Rent – CH 14 pg 130

- ▶ Rent is the price paid for use of land and other natural resources that are **fixed in supply**
- ▶ Demand for land is downward sloping because of diminishing returns
- ▶ Producers must lower the price of land/natural resources to sell additional units of output

# Demand for Land

- ▶ Changes in demand determine the amount of rent paid for land
- ▶ Rent determined by:
  1. The price of the product grown/produced on the land
  2. The productivity of the land
  3. The prices of other resources combined with the land for production



# Interest

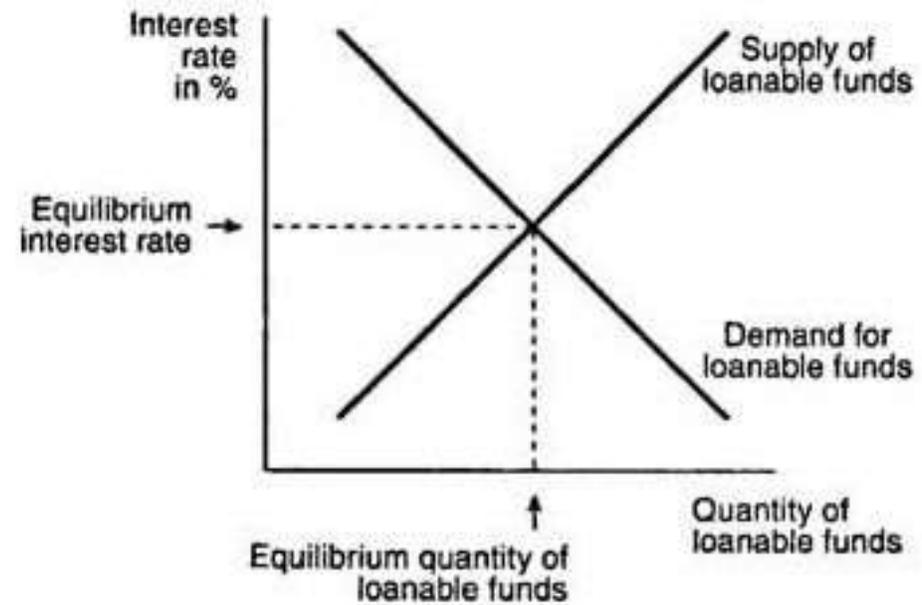
CH 14 pg 131

- ▶ The price paid for the use of money
  - ▶ Or money that must be paid for the use of one dollar per year
- ▶ Interest
  - ▶ Stated as a percentage
  - ▶ Money itself is not an economic resource but is used to acquire capital goods

# Loanable Funds Theory of Interest

- ▶ The supply of loanable funds is an upward sloping curve
  - ▶ A large qty. of funds will be made available at high interest rates than at low interest rates
- ▶ The demand for loanable funds is inversely related to the rate of interest
  - ▶ At higher interest rates demand for loans will be lower than at lower interest rates

# Loanable Funds Market



**Figure 1** Determination of the equilibrium interest rate

# Nominal vs. Real Interest Rates

- ▶ Nominal rates

  - ▶ Stated in terms of current dollars

- ▶ Real rates

  - ▶ The rate of interest expressed in terms of dollars of constant or inflation-adjusted value

  - ▶ ***The real interest rate is the nominal interest rate minus the rate of inflation***

- ▶  $R_r = R_n - I$

# Economic Profits

CH 14 pg 132

- ▶ EP = what remains of a firm's total revenue after it has paid individuals and other firms for materials, capital, and labor supplied to the firm (EXPLICIT COSTS) and allowed for payment to self-employed resources (IMPLICIT COSTS)
- ▶ Economic Profits = the incentive for entrepreneurship

# Functions of Economic Profit

- ▶ The expectation of profit encourages firms to innovate (= new investment, expanded output, increased employment)
- ▶ Profits allocate resources among alternative (more efficient? More socially optimum?) lines of production

# End of Day 6 Notes