

Unit 2.5: Resource Markets (AP only)

Unit Overview

Unit 2.5 Resource Markets (AP only)

- Derived factor demand
- Marginal revenue product
- Labor market and firms' hiring of labor
- Market distribution of income

Blog posts: "Resources"



Blog posts: "Labor Markets"



Blog posts: "Wages"



Resource Markets

Introduction

Review: What are the four productive resources, and what are their "prices"?

Land ●> Rent

Capital ●> Interest

Entrepreneurship ●> Profit

Labor ●> Wages

Draw a supply and demand diagram for a Labor Market

-Who demands labor and other productive resources?

-Who supplies labor and other productive resources?

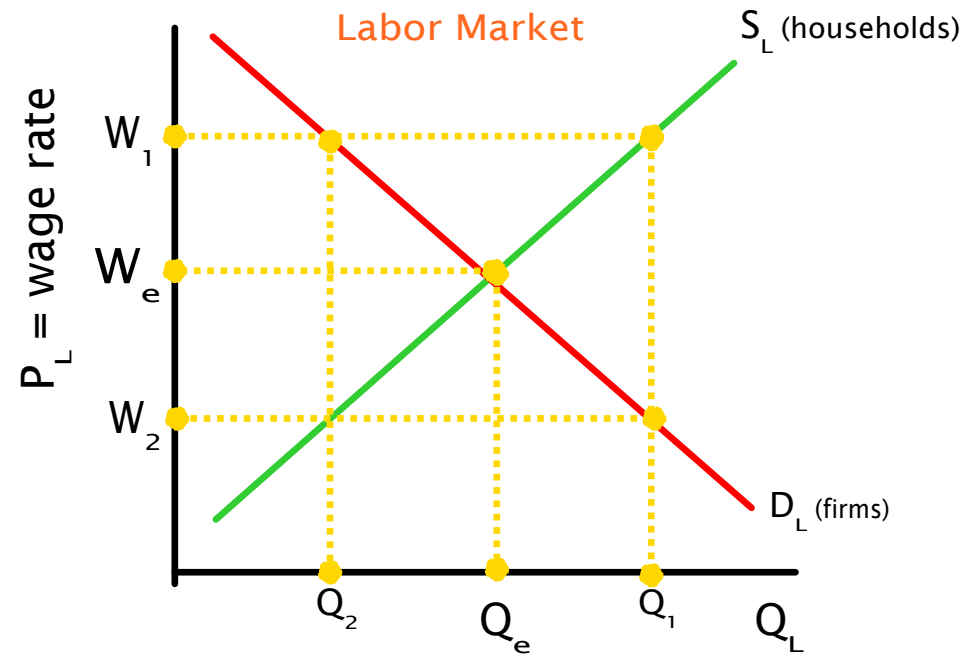
-What makes resource markets different from product markets?

Resource Markets

Labor Market

The Labor Market:

- The "price of labor" is the wage rate
- Firms demand labor
- Households supply labor
- At W_e the labor market is at equilibrium
- At W_1 there is a _____ of labor, otherwise known as _____
- At W_2 there is a _____ of labor



What factors determine the demand for labor (or any other productive resource)

Resource Markets

Marginal Revenue Product

Resource Demand is Derived Demand:

- Demand for a particular resource depends on the demand (and thus the market price) for the product that resource is being used to produce.
- It also depends on the productivity of the resource - the more productive a machine, a worker or a piece of land, the more in demand it will be!

Marginal Revenue Product: the increase in TR that results from the employment of one additional unit of a variable resource.

In other words:

"How much will my firm's revenue increase if I hire one more worker?"

$$\text{MRP} = \frac{\text{Change in Total Revenue}}{\text{Change in Resource Quantity}} = \text{MP} \times \text{Price}$$

MRP depends on:

- the **productivity of the input** (recall that MP of inputs falls beyond some point in production process due to law of diminishing marginal returns). The more output each worker is able to produce the more the worker's MRP
- the **price of product being produced**. The higher the price of the finished product, the higher workers' MRP

Resource Markets

Marginal Resource Cost

How many workers should a firm hire? *To know the optimal level of resource employment, a firm must compare the additional revenue added by one more worker to the additional cost incurred.*

Marginal Resource Cost: *the additional cost or the cost of hiring one more unit of a resource (worker)*

$$\text{MRC} = \frac{\text{Change in Total Resource Cost}}{\text{Change in Resource Quantity}}$$

Purely competitive labor market: A purely competitive labor market is one in which many small firms compete to hire a large number of workers. Each individual firm is a “wage taker,” **the MRC is simply equal to the market wage.**

- *each is so small that their individual demand for labor cannot affect the wage rate.*
- *A firm in a purely competitive labor market can hire as many workers as it wants at the market wage rate.*
- *firms are **WAGE-TAKERS***

$$\text{MRC} = \text{WAGE RATE}$$

Imperfectly Competitive Resource Market: a resource market with a few small firms competing to attract workers.

- *each firm is so large that it employs a significant portion of all the labor in that market.*
- *If a firm in an imperfectly competitive labor market wants to hire more workers, it must raise the wages it pays to all its workers.*
- *firms are **WAGE-MAKERS***

$$\text{MRC} > \text{Wage rate}$$

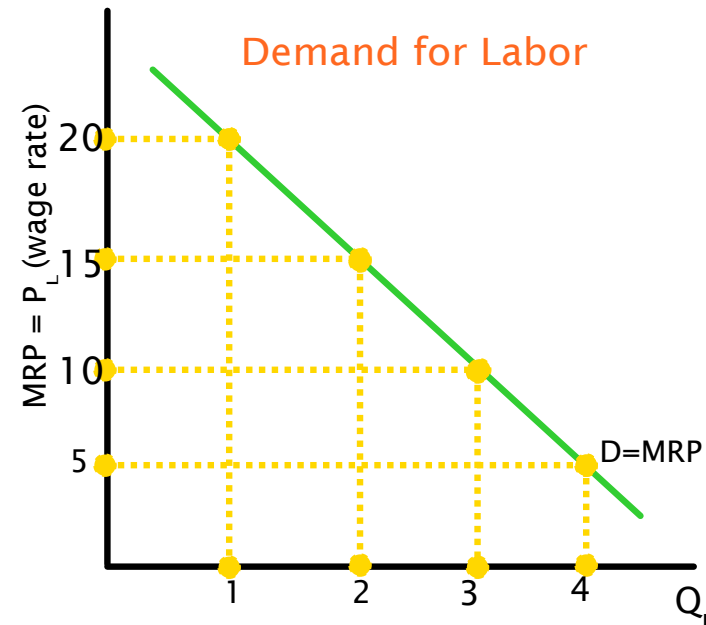
Resource Markets

Demand for Labor

Demand for Labor: *there is an inverse relationship between wage rate and the quantity of labor demanded. As wages fall, firms will demand more workers, as labor becomes preferable to capital (this is why low wage countries employ lots of labor and little capital).*

MRP = Demand for Labor:
 Complete the table for the **perfectly competitive seller** to see why...

Q_L	TP	MP	Price	MRP (MP×P)
1	10	10	2	
2	17.5	7.5	2	
3	22.5	5	2	
4	25	2.5	2	



How much would this firm be willing to pay for each additional worker?

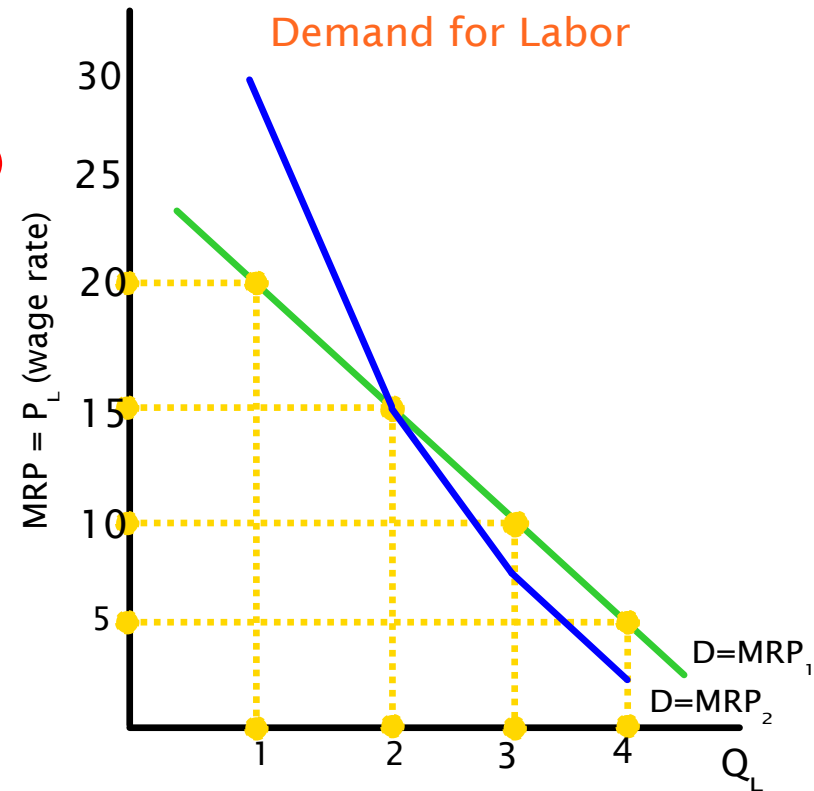
The MRP schedule constitutes the firm's demand for labor, because each additional worker will add a decreasing amount to a firm's revenues, and the firm would be willing to pay up to the amount of the MRP of each worker. Each worker's MRP = the highest wage the firm is willing to pay to hire that worker.

Resource Markets

Demand for Labor

MRP = Demand for Labor:
 Complete the table for the **imperfectly competitive seller** to see why...

Q_L	TP	MP	Price	MRP (MPxP)
1	10	10	3	
2	17.5	7.5	2	
3	22.5	5	1.5	
4	25	2.5	1	



Why is $D=MRP_2$ (the imperfectly competitive seller's demand for labor) more inelastic than the $D=MRP_1$ (the perfectly competitive seller)?

Because both marginal product of labor AND the price the firm can sell its output for fall as quantity increases, imperfectly competitive sellers are less responsive to changes in the wage rate (meaning they're less likely to hire more workers when wages fall)

Resource Markets

Profit Maximization Rule of Resource Employment

To maximize profit, a firm should hire additional units of a specific resource as long as each successive unit adds more to the firm's total revenue than it adds to total cost, up to the point where the marginal revenue product is equal to the marginal resource cost.

WHY??

Simple: If hiring one more unit of labor only costs me \$10/hour (the market wage rate), yet that worker generates \$15/hour of revenue, then I SHOULD HIRE HIM!

However: If hiring one more unit of labor costs me \$10/hour, yet that worker generates only \$7/hour of revenue, clearly, I would be losing money if I hire him.

SO: I should hire workers up to the point where the MRC (the cost of hiring the last worker) = MRP (the additional revenue the last worker generates).

Profit-maximization rule of resource employment:

hire workers until
MRP=MRC

Practice Resource Demand: NCEE Workbook Activities 44, 45, 46

Resource Markets

Quick Quiz

1) Why is the Marginal Revenue Product curve equivalent to an individual firm's labor Demand curve?

1) In pure competition, a firm will hire workers up to the point at which the market wage rate (MRC) is equal to its MRP. Hence, the firm's MRP schedule constitutes the firm's D for labor, because each point on this curve indicates the number of workers the firm would hire at each possible wage rate.

2) Why does a purely competitive firm's D for labor tend to be more elastic than an imperfect competitor's?

2) Perfect competitors face a downward sloping D curve because marginal productivity diminishes as more workers are hired. Imperfect competitors face diminishing marginal productivity AND product price falls as output increases. Therefore, imperfectly competitive firms are LESS responsive to changes in the wage rate than perfect competitors. (i.e. less elastic resource D)

3) What makes resource demand "derived demand"?

3) Demand for resources is derived from the productivity of the resource as well as the price of the good or service the resource is used to produce

Resource Markets

Determinants of Resource Demand

The following factors can cause a change in demand for a resource:

Changes in product demand: If demand for a product increases, then demand for the resources used to make that product will increase. Vis versa.

- *Higher product price will increase the MRP of resources*

Changes in Productivity: If a resource becomes more productive, demand for it will increase.

Factors that could increase productivity:

- *Quantities of other resources: give a worker more tools, the worker will become more productive*
- *Technological advance: give a worker better technology, the worker will become more productive*
- *Quality of variable resource: give the workers better education and skills, the workers will become more productive*

Changes in the Prices of Other Resources:

- **Substitutes:** if robots can be used instead of labor and robots become cheaper, demand for labor will fall. *There is a direct relationship between the price of substitute resources and demand for a resource.*
- **Complements:** As desktop computers become cheaper, demand for labor will go up, because each desktop computer computer needs a worker sitting at it. *They are complementary resources! There is an inverse relationship between the price of a complementary resource and demand for a resource.*

Q_L	TP	MP	Price	MRP (MPxP)
1	10	10	2	
2	17.5	7.5	2	
3	22.5	5	2	
4	25	2.5	2	

What happens to MRP if demand for the good increases?
What happens to MRP if worker productivity improves?

Resource Markets

Optimal Combination of Resources

In the long-run, all resources are variable, not just labor! *How should firms decide how much labor AND capital to employ?*

Two questions are considered when firms decides how much labor and capital to employ:

1. What is the least-cost combination of resources to use in producing any given output?
2. What combination of resources (and output) will maximize a firm's profits?

The least-cost rule states that costs are minimized where the marginal product per dollar's worth of each resource used is the same.

MP of labor/labor price = MP of capital/capital price.

Least-cost combination of Labor and Capital: hire L and C up until the point when...

$$\frac{MP_L}{P_L} = \frac{MP_C}{P_C} \quad \text{---} \rightarrow \quad \text{Similar to the Utility Maximization Rule}$$

Rationale: The last dollar spent on each resource yields the same marginal product.

Resource Markets

Optimal Combination of Resources

The **profit-maximizing rule** states that 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:

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

Remember: $\text{MRP} = \text{MRC}$ is the profit maximization rule for a single resource.

- *In a purely competitive resource market* $\text{MRC} = \text{Price}$ (wages, interest, rent).
- therefore, to maximize profits in the long-run, when all resources are variable: $\text{MRP}_L = P_L$ and $\text{MRP}_C = P_C$

To maximize its profits in the long-run, a firm should employ capital and labor up to the point where marginal revenue product is equal to its marginal resource cost of all resources.

$$\frac{\text{MRP}_L}{\text{MRC}_L} = \frac{\text{MRP}_C}{\text{MRC}_C} = 1$$

Resource Markets

Optimal Combination of Resources

A firm wishes to maximize its profits. It employs two resources, capital and labor. What should the following firm do to maximize its profits?

- The last worker the firm hired added \$15 to its TR, at a wage of \$5.
- The last machine the firm employed added \$9 to its TR, and it cost the firm \$3.

What should this firm do to maximize profits?

$$\begin{aligned} \text{MRP}_L &= 15 \\ \text{MPR}_C &= 9 \end{aligned}$$

$$\begin{aligned} P &= 5 \\ P_C &= 3 \end{aligned} \quad \dashrightarrow$$

Is this the profit maximizing combination of resources??

$$\frac{15}{5} = \frac{9}{3} \neq 1$$

The firm should hire more of both labor and capital, until $\text{MRP}_L = \$5$ and $\text{MRP}_C = \$3$.

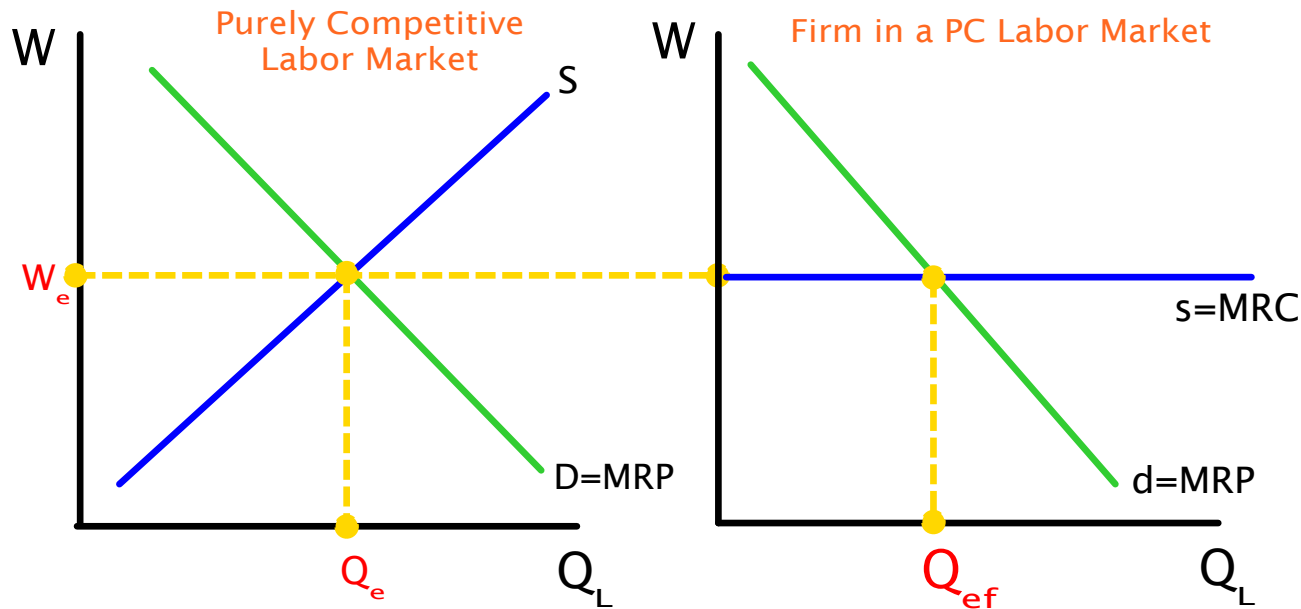
- As the firm hires more workers and capital, the marginal product will decline due to diminishing returns.
- If the firm is an imperfect competitor, it will have to lower the product price as it increases output.
- Lower MP and lower Price mean MRP will fall as output increases.

Resource Markets

Graphing Labor Markets

Perfectly competitive labor market diagram:

- Supply of labor is upward sloping since at higher wages households supply more labor.
- Demand is downward sloping because at lower wages, firms want to employ more labor.



- Supply as seen by the individual firm is perfectly elastic at the equilibrium wage rate. The firm is a "wage-taker", meaning it can employ as few or as many workers it wants at the market wage rate.
- The profit maximizing firm will employ workers up the point at which the MRP=the MRC (up to Q_{ef})

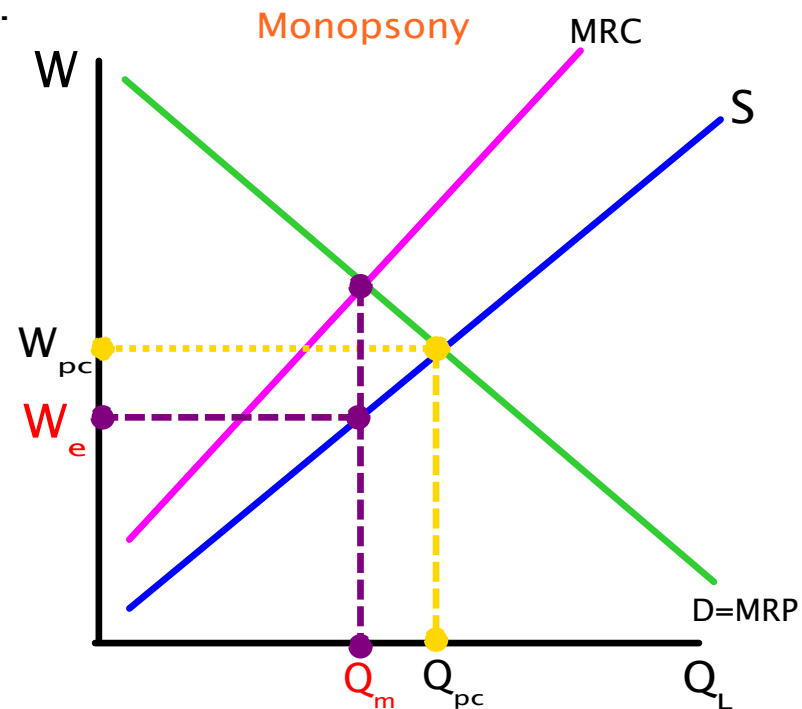
Resource Markets

Graphing Labor Markets

Imperfectly competitive labor market diagram:

Monopsony: an imperfectly competitive labor market in which there is ONE BIG FIRM employs nearly all the labor.

- *A monopsonist is a "wage-maker" meaning that in order to attract additional workers it must raise the wage for all its workers. MRC increases faster than the wage rate.*
- *Since the monopsonist only hires up to where $MRC=MRP$ and MRC is above the wage, the monopsonist will employ fewer workers and pay a lower wage than would prevail in a perfectly competitive labor market.*



Observations of monopsonistic labor market:

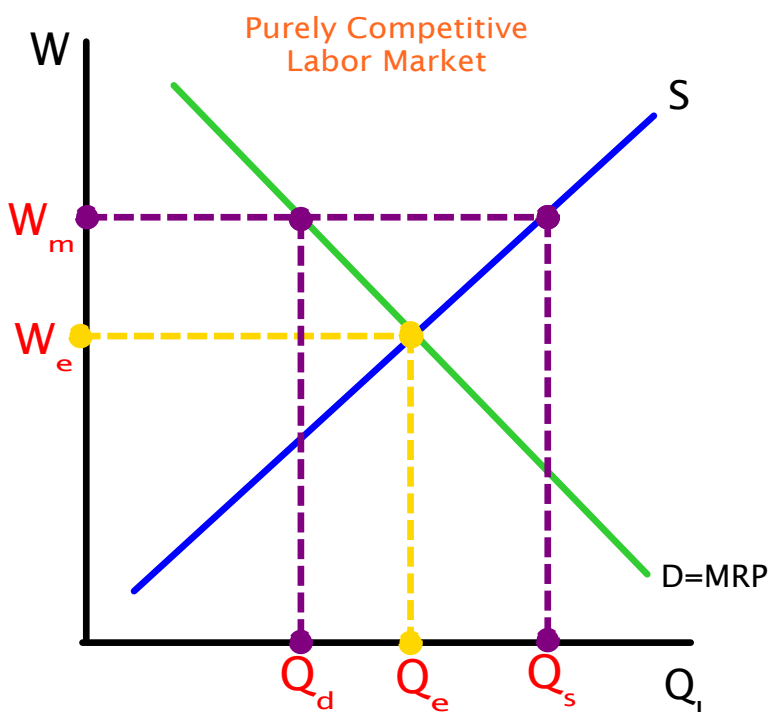
- Wage is lower than in purely competitive labor markets,
- and the level of employment is also lower.

A monopsonist will hire fewer workers and pay them lower wages than would be hired by firms in a more competitive labor market

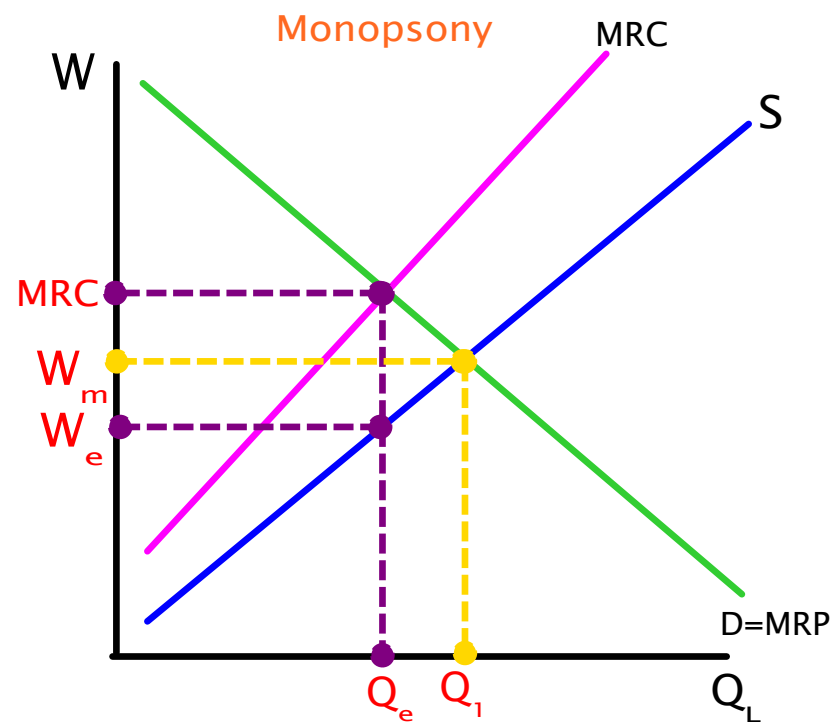
Resource Markets

Evaluating Minimum Wage

Evaluate the impact of a minimum wage on employment in the two labor markets below:



Minimum wage in PC labor market leads to excess supply of labor (unemployment)



Minimum wage in a Monopsonistic labor market could actually cause the firm to hire MORE workers, since $MRC \text{ now} = W_m$, a minimum wage could cause a monopsonistic firm to employ closer to the level employed in PC labor market.

Resource Markets

Review Questions

Review Questions:

- What determines demand for labor?
- What determines the supply of labor?
- How is the wage rate determined?
- Why are wages higher in the US and Western Europe than in countries like India and China?
- What is the difference between nominal wage and real wage?
- What determines the level of employment and the wage rate in a purely competitive labor market and a representative firm? (include a diagram)
- What determines the level of employment and the wage rate in an imperfectly competitive labor market? (include a diagram)
- What are the effects of a minimum wage? Is a minimum wage good or bad for society? (include a diagram)