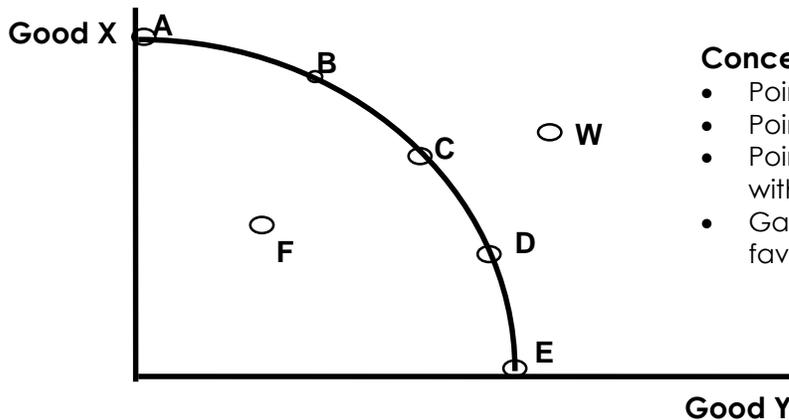


# Essential Graphs for Microeconomics

## Basic Economic Concepts

### ★ Production Possibilities Curve

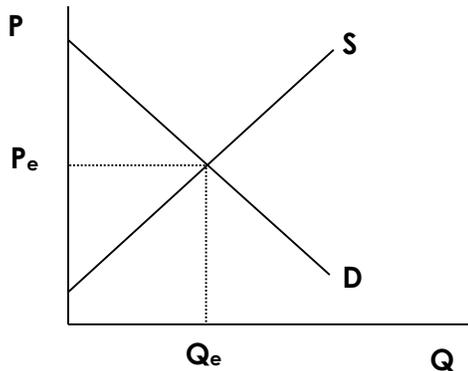


#### Concepts:

- Points on the curve-efficient
- Points inside the curve-inefficient
- Points outside the curve-unattainable with available resources
- Gains in technology or resources favoring one good both not other.

## Nature & Functions of Product Markets

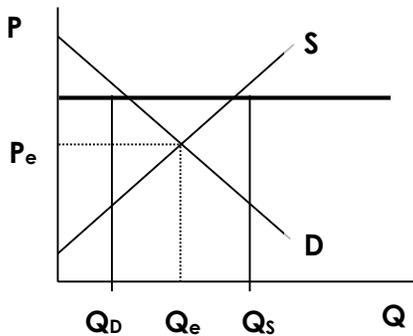
### ★ Demand and Supply: Market clearing equilibrium



#### Variations:

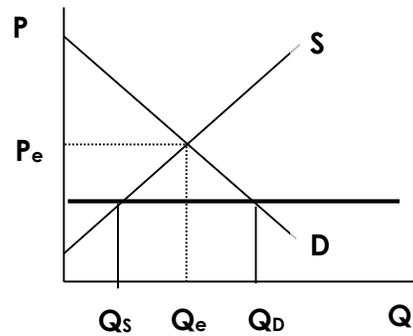
- Shifts in demand and supply caused by changes in determinants
- Changes in slope caused by changes in elasticity
- Effect of Quotas and Tariffs

### ★ Floors and Ceilings



#### Floor

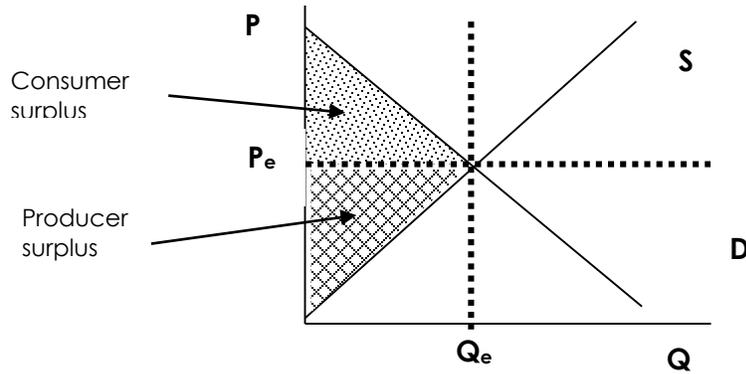
- Creates surplus
- $Q_d < Q_s$



#### Ceiling

- Creates shortage
- $Q_d > Q_s$

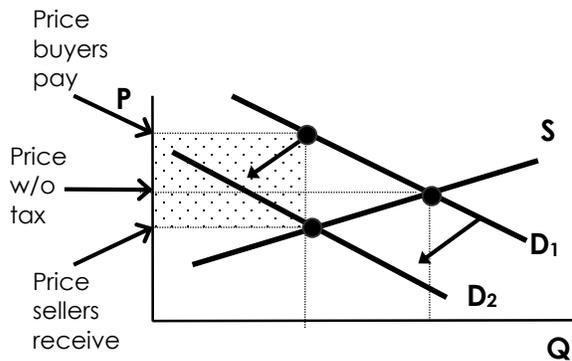
## ★ Consumer and Producer Surplus



## ★ Effect of Taxes

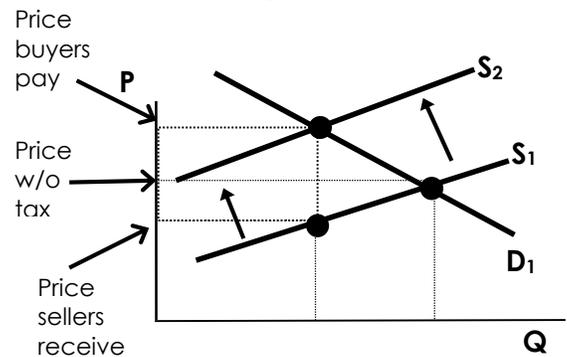
A tax imposed on the **BUYER**-demand curve moves left

- elasticity determines whether buyer or seller bears incidence of tax
- shaded area is amount of tax
- connect the dots to find the triangle of deadweight or efficiency loss.



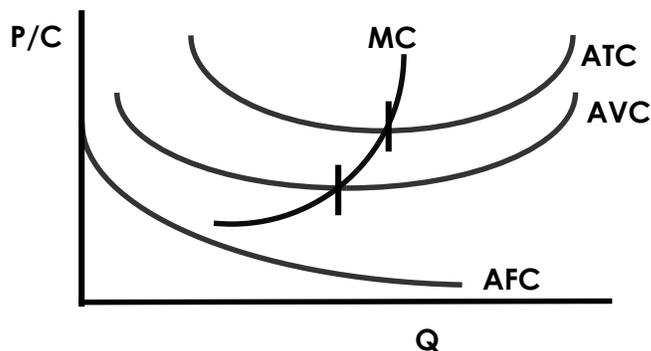
A tax imposed on the **SELLER**-supply curve moves left

- elasticity determines whether buyer or seller bears incidence of tax
- shaded area is amount of tax
- connect the dots to find the triangle of deadweight or efficiency loss.



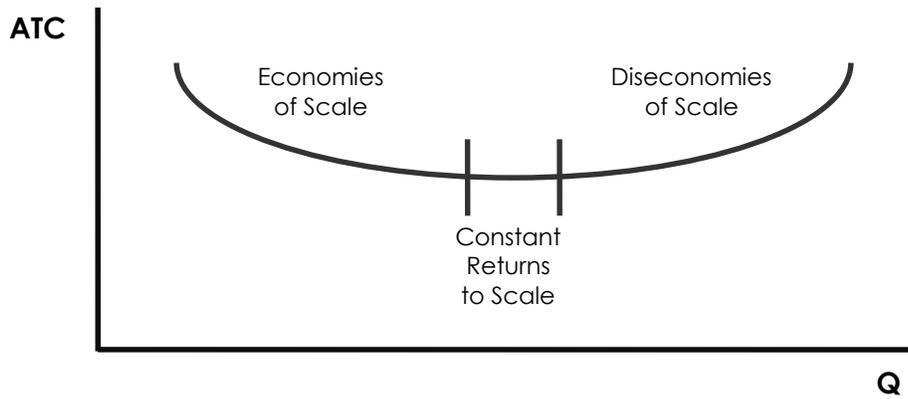
## Theory of the Firm

### ★ Short Run Cost



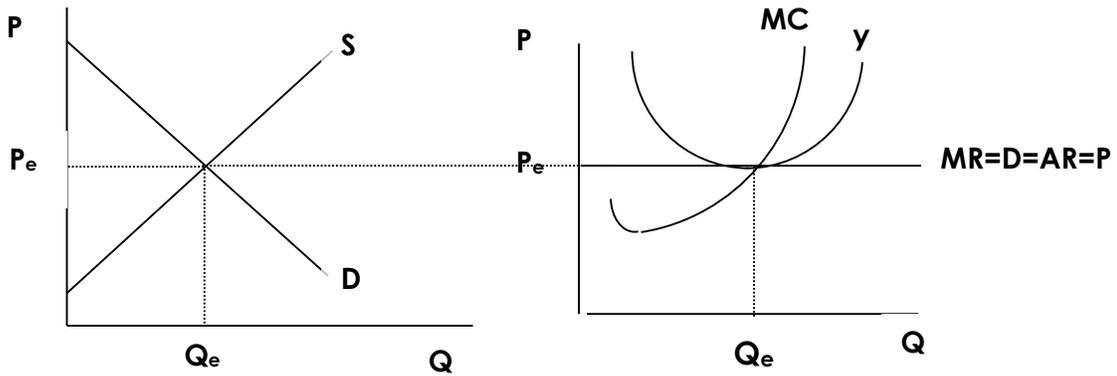
- **AFC** declines as output increases
- **AVC and ATC** declines initially, then reaches a minimum then increases (U-shaped)
- **MC** declines sharply, reaches a minimum, then rises sharply
- **MC intersects with AVC and ATC at minimum points**
  - When  $MC > ATC$ , ATC is falling
  - When  $MC < ATC$ , ATC is rising
- **There is no relationship between MC and AFC**

★ Long Run Cost



★ Perfectly Competitive Product Market Structure

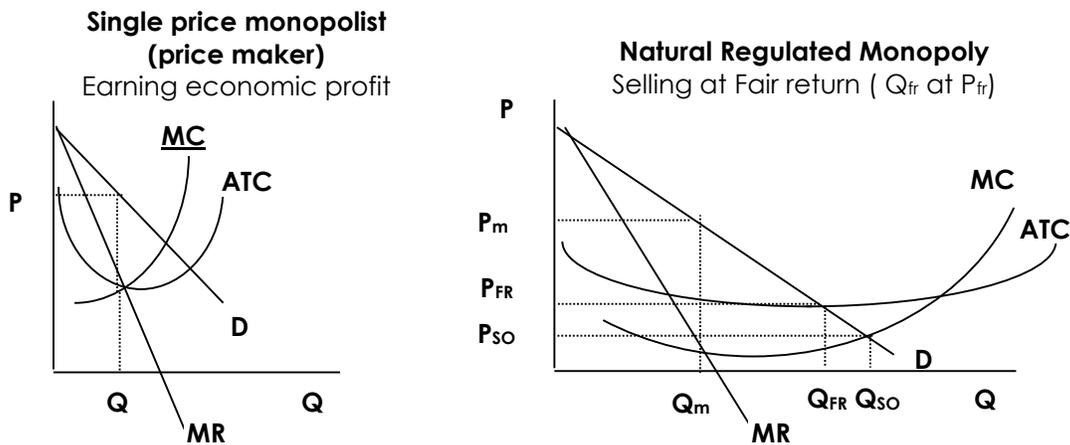
- Long run equilibrium for the market and firm-price takers
- Allocative and productive efficiency at  $P=MR=MC=\min ATC$



**Variations:**

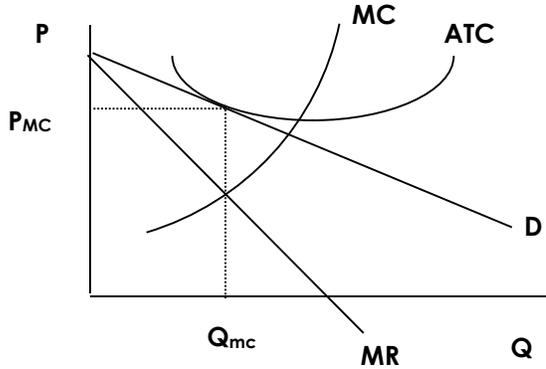
- Short run profits, losses and shutdown cases caused by shifts in market demand and supply.

★ Imperfectly Competitive Product Market Structure: Pure Monopoly



★ Imperfectly Competitive Product Market Structure: Monopolistically Competitive

Long run equilibrium where  $P=AC$  at  $MR=MC$  output



**Variations:**

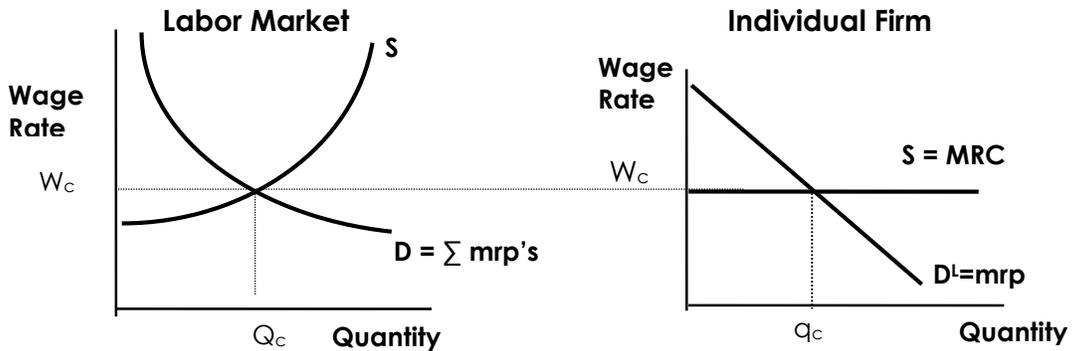
- Short run profits, losses and shutdown cases caused by shifts in market demand and supply.

Factor Market

★ Perfectly Competitive Resource Market Structure

Perfectly Competitive Labor Market – Wage takers

Firm wage comes from market so changes in labor demand do not raise wages.

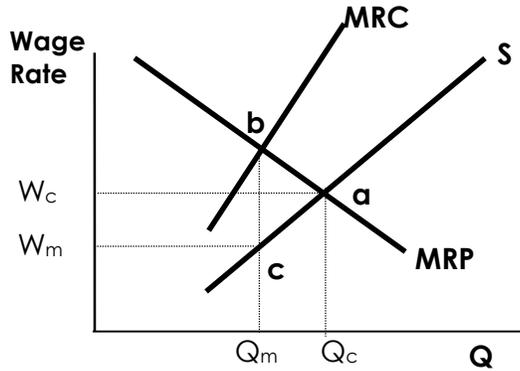


**Variations:**

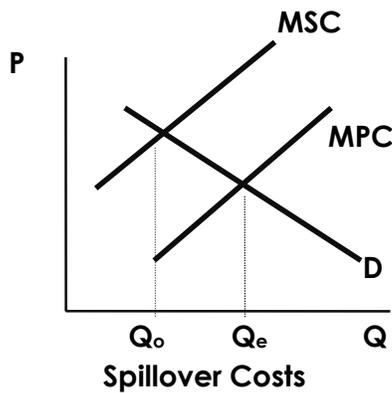
- Changes in market demand and supply factors can influence the firm's wage and number of workers hired.

## ★ Imperfectly Competitive Resource Market Structure

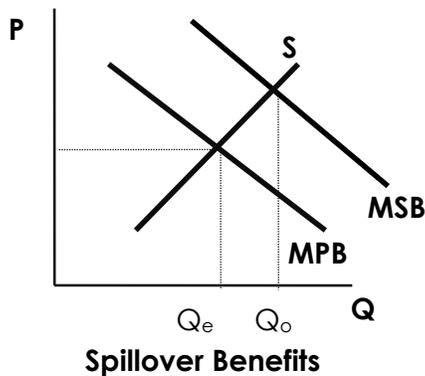
Imperfectly Competitive Labor Market – Wage makers  
 Quantity derived from  $MRC=MRP$  ( $Q_m$ )  
 Wage ( $W_m$ ) comes from that point downward to Supply curve.



## ★ Market Failures - Externalities



**Overallocation** of resources when external costs are present and suppliers are shifting some of their costs onto the community, making their marginal costs lower. The supply does not capture all the costs with the S curve understating total production costs. This means resources are overallocated to the production of this product. By shifting costs to the consumer, the firm enjoys  $S_1$  curve and  $Q_{e_1}$ . (optimum output ).



**Underallocation** of resources when external benefits are present and the market demand curve reflects only the private benefits understating the total benefits. Market demand curve (D) and market supply curve yield  $Q_e$ . This output will be less than  $Q_o$  shown by the intersection of  $D_1$  and S with resources being underallocated to this use.

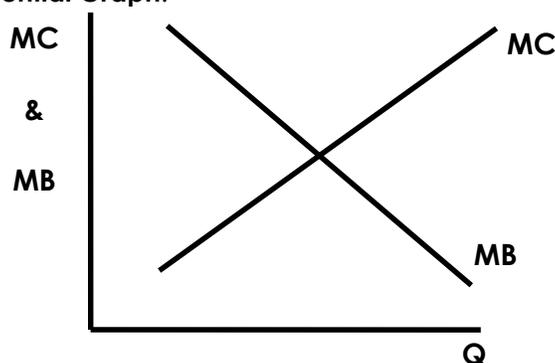
# Thinking on the Margin...

## Allocative Efficiency: Marginal Cost (MC) = Marginal Benefit (MB)

**Definition:** Allocative efficiency means that a good's output is expanded until its marginal benefit and marginal cost are equal. No resources beyond that point should be allocated to production.

**Theory:** Resources are efficiently allocated to any product when the MB and MC are equal.

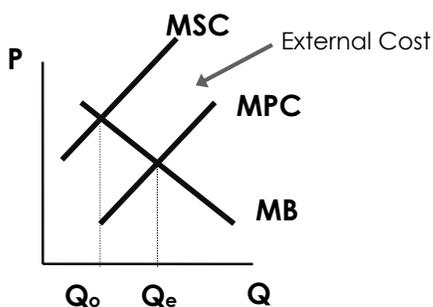
**Essential Graph:**



The point where  $MC=MB$  is allocative efficiency since neither underallocation or overallocation of resources occurs.

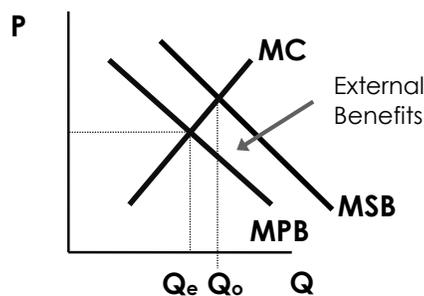
**Application:** External Costs and External Benefits

**External Costs and Benefits** occur when some of the costs or the benefits of the good or service are passed on to parties other than the immediate buyer or seller.



### External costs

- production or consumption costs inflicted on a third party without compensation
- pollution of air, water are examples
- Supply moves to right producing a larger output that is socially desirable—over allocation of resources
- Legislation to stop/limit pollution and specific taxes (fines) are ways to correct



### External benefits

- production or consumption costs conferred on a third party or community at large without their compensating the producer
- education, vaccinations are examples
- Market Demand, reflecting only private benefits moves to left producing a smaller output that society would like—under allocation of resources
- Legislation to subsidize consumers and/or suppliers and direct production by government are ways to correct

## Diminishing Marginal Utility

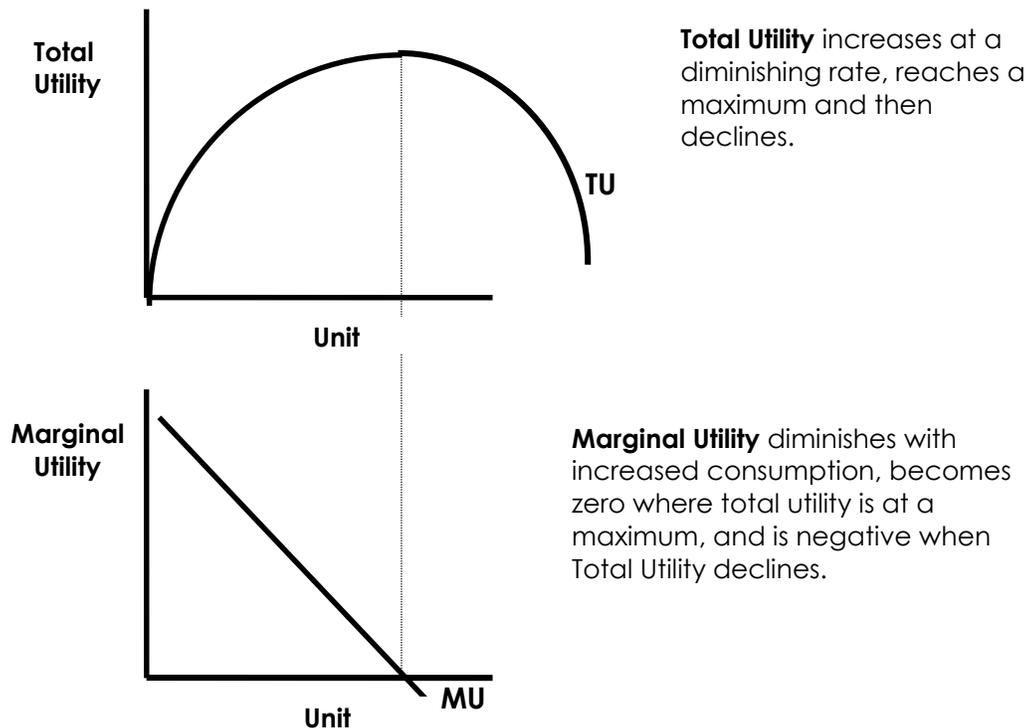
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**Definition:** As a consumer increases consumption of a good or service, the additional usefulness or satisfaction derived from each additional unit of the good or service decreases.

- Utility is want-satisfying power— it is the satisfaction or pleasure one gets from consuming a good or service. This is subjective notion.
- Total Utility is the total amount of satisfaction or pleasure a person derives from consuming some quantity.
- Marginal Utility is the extra satisfaction a consumer realizes from an additional unit of that product.

**Theory:** Law of Diminishing Marginal Utility can be stated as the more a specific product consumer obtain, the less they will want more units of the same product. It helps to explain the downward-sloping demand curve.

**Essential Graph:**



**When Total Utility is at its peak, Marginal Utility becomes zero.** Marginal Utility reflects the change in total utility so it is negative when Total Utility declines.

**Teaching Suggestion:** begin lesson with a quick "starter" by tempting a student with how many candy bars (or whatever) he/she can eat before negative marginal utility sets in when he/she gets sick!

# Law of Diminishing Returns

## Definitions:

**Total Product:** total quantity or total output of a good produced

**Marginal Product:** extra output or added product associated with adding a unit of a variable resource

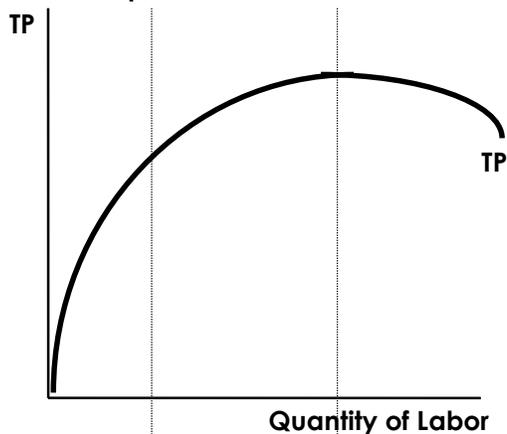
$$MP = \frac{\text{change in total product}}{\text{change in labor input}} = \frac{\Delta TP}{\Delta L_{\text{input}}}$$

**Average Product:** the output per unit of input, also called labor productivity

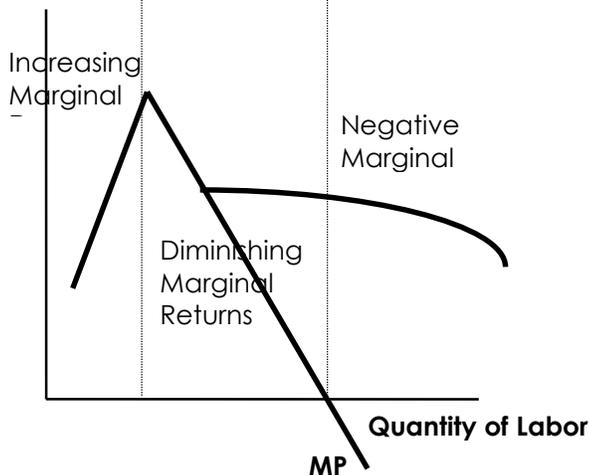
$$AP = \frac{\text{total product}}{\text{units of labor}} = \frac{TP}{L}$$

**Theory: Diminishing Marginal Product** ...as successive units of a variable resource are added to a fixed resource beyond some point the extra or the marginal product will decline; if more workers are added to a constant amount of capital equipment, output will eventually rise by smaller and smaller amount.

## Essential Graph:



Note that the marginal product intersects the average product at its maximum average product.



When the TP has reached its maximum, the MP is at zero. As TP declines, MP is negative.

**Teaching Suggestion:** Use a game by creating a production factory (square off some desks). Start with a stapler, paper and one student. Add students and record the "marginal product". Comment on the constant level of capital and the variable students workers.

## Short Run Costs

### Definitions:

**Fixed Cost:** costs which in total do not vary with changes in the output; costs which must be paid regardless of output; constant over the output

**examples**—interest, rent, depreciation, insurance, management salary

**Variable Cost:** costs which change with the level of output; increases in variable costs are not consistent with unit increase in output; law of diminishing returns will mean more output from additional inputs at first, then more and more additional inputs are needed to add to output; easier to control these types of costs

**examples**—material, fuel, power, transport services, most labor

**Total Cost:** are the sum of fixed and variable. Most opportunity costs will be fixed costs.

**Average Costs (Per Unit Cost):** can be used to compare to product price

$$AFC = \frac{TFC}{Q}$$

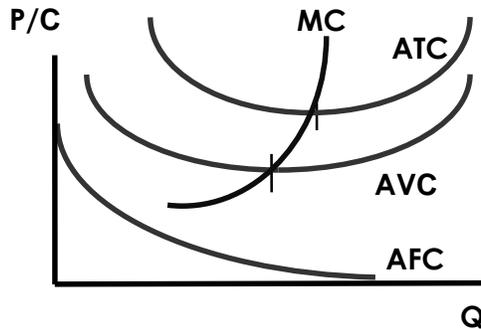
$$AVC = \frac{TVC}{Q}$$

$$ATC = \frac{TC}{Q} \text{ (or } AFC + AVC)$$

**Marginal Costs:** the extra or additional cost of producing one more unit of output; these are the costs in which the firm exercises the most control

$$MC = \frac{\Delta TC}{\Delta Q}$$

### Essential Graph:



- **AFC** declines as output increases
- **AVC** declines initially then reaches a minimum, then increases (a U-shaped curve)
- **ATC** will be U-shaped as well
- **MC** declines sharply reaches a minimum, and then rises sharply.
- **MC intersects with AVC and ATC at minimum points**  
When  $MC < ATC$ , ATC is falling  
When  $MC > ATC$ , ATC is rising

**There is no relationship between MC and AFC**

**Teaching Suggestion:** Let students draw this diagram many times. Pay attention to the position of the ATC and AVC and the minimum point of each. Reinforce that the MC passes through these minimums, but observe that the minimum position of ATC is to the right of AVC.

# Marginal Revenue = Marginal Cost

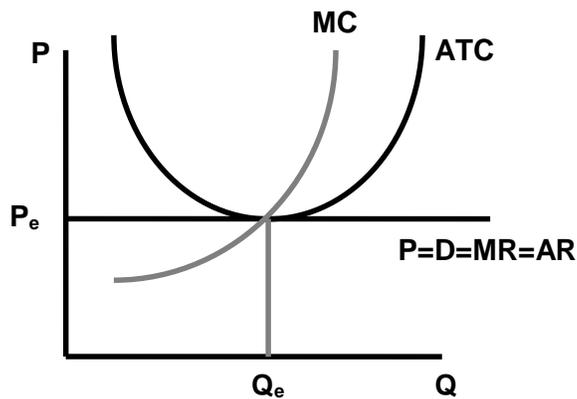
## Definitions:

**Marginal Revenue** is the change in total revenue from an additional unit sold.

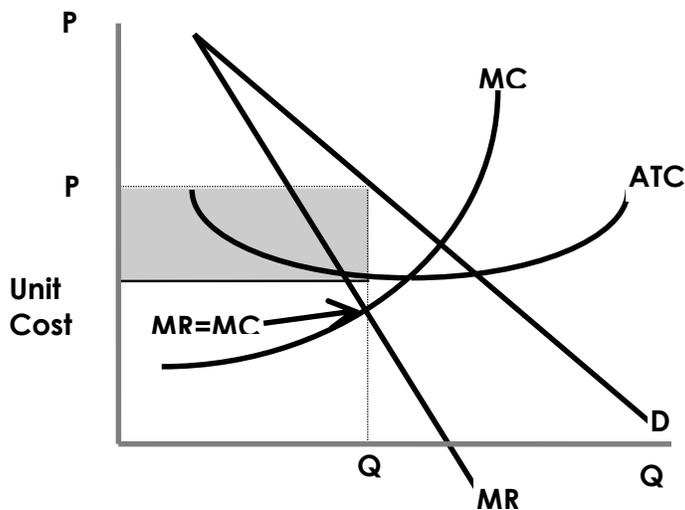
**Marginal Cost** is the change in total costs from the production of another unit.

**Theory:** Competitive Firms determine their profit-maximizing (or loss-minimizing) output by equating the marginal revenue and the marginal cost. The  $MR=MC$  rule will determine the profit maximizing output.

## Essential Graph:



In the **long run for a perfectly competitive firm**, after all the changes in the market (more demand for the product, firms entering in search of profit, and then firms exiting because economic profits are gone), long run equilibrium is established. In the long run, a purely competitive firm earns only normal profit since  $MR=P=D=MC$  at the lowest ATC. This condition is both Allocative and Productive Efficient.



**For a single price monopolist**, the output is determined at the  $MR=MC$  intersection and the price is determined where that output meets the demand curve.

**Teaching Suggestion:** Be sure to allow students to practice the drawing of the short-run graphs as the lead in to the understanding of the long-run equilibrium in competitive firms and its meaning. Always begin with this lesson by showing why the Demand curve and the MR curve are the same since a perfectly competitive seller earns the price each time another unit is sold.

# Marginal Revenue Product = Marginal Resource Cost

## Definition:

**MRP** is the increase in total revenue resulting from the use of each additional variable input (like labor). The MRP curve is the resource demand curve. Location of curve depends on the productivity and the price of the product.

$$MRP = MP \times P$$

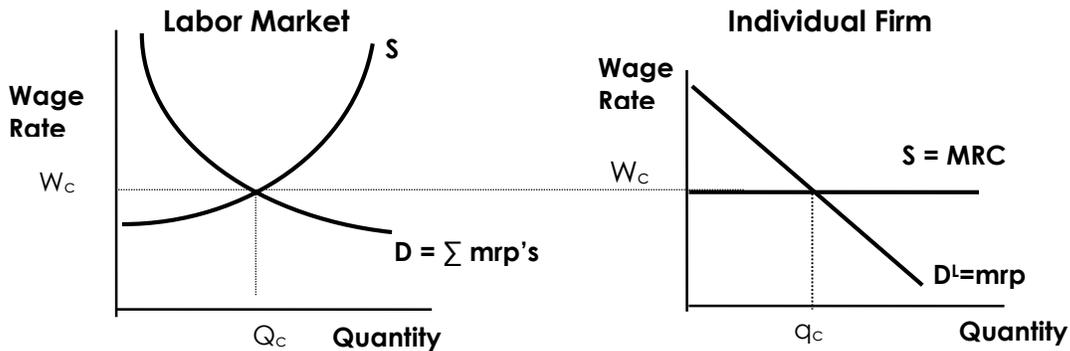
**MRC** is the increase in total cost resulting from the employment of each additional unit of a resource; so for labor, the MRC is the wage rate.

**Theory:** It will be profitable for a firm to hire additional units of a resource up to the point at which that resource's MRP is equal to its MRC.

## Essential Graphs:

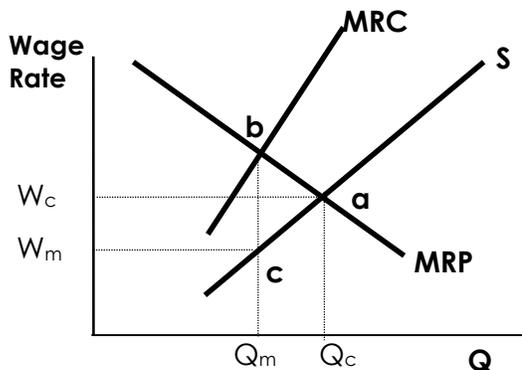
### In a purely competitive market:

- large number of firms hiring a specific type of labor
- numerous qualified, independent workers with identical skills
- Wage taker behavior—no ability to control wage on either side
- In a perfectly competitive resource market like labor, the resource price is given to the firm by the market for labor, so their MRC is constant and is equal to the wage rate. Each new worker adds his wage rate to the total wage cost. Finding  $MRC = MRP$  for the firm will determine how many workers the firm will hire.



**In a monopsonistic market**, an employer of resources has monopolistic buying (hiring) power. One major employer or several acting like a single monopsonist in a labor market. In this market:

- single buyer of a specific type of labor
- labor is relatively immobile—geography or skill-wise
- firm is “wage maker” —wage rate paid varies directly with the # of workers hired



The employer's MRC curve lies above the labor S curve since it must pay all workers the higher wage when it hires the next worker the high rate to obtain his services. **Equating MRC with MRP** at point b, the monopsonist will hire  $Q_m$  workers and pay wage rate  $W_m$ .