COMM 220 MIDTERM NOTES: CH 1-5

CHAPTER 1

Microeconomics: deals with the behavior of individual economic units (consumers, workers, investors, owners of land, business firms). Explains how and why these units make economic decisions
- Is about limits (limited income, budgets, etc)
- Ways to make most of these limits; allocation of scarce resources

Themes of microeconomics
1. **Trade-offs:** that consumers, workers and firms face and how these trade-offs are best made
   a. Consumers: have limited incomes that can be spent on wide variety of goods and services
      i. *Consumer theory:* describes how consumers, based on preferences, maximize their well-being by trading off the purchase of more of some goods for the purchase of less of others
   b. Workers: face constraints and trade-offs too: 1) deciding whether and when to enter workforce & 2) choice of employment
   c. Firms: trade-offs in terms of the kinds of products that they can produce and resources available to produce them
2. **Prices and markets:** role of prices
3. **Theories and models:** concerned with explanation of observed phenomena
4. **Positive vs. normative analysis:**
   a. Positive: statements that describe relationships of cause and effect
   b. Normative: analysis examining questions of what **ought** to be. Often supplemented by value judgements

Macroeconomics: aggregate economic quantities, such as level and growth rate of national output, interest rates, unemployment and inflation. Involves the analysis of markets

Market: the collection of buyers and sellers that, through their actual or potential interactions, determine the price of a product or set of products
- Market definition: determination of the buyers, sellers and range of products that should be included in a particular market. Important for 2 reasons:
  - Company must understand who its actual/potential competitors are for products it sells or might sell in future
  - For public policy decisions
- Arbitrage: practice of buying at a low price at one location and selling at a higher price in another

- Market price: price prevailing in a competitive market
- Extent of a market: boundaries of a market, both geographical and in terms of range of products produced and sold within it

Competitive vs. non-competitive markets:
1. Perfectly competitive market: market with many buyers and sellers, so that no single buyer or seller has a significant impact on price
2. Non-competitive markets: individual firms can jointly affect the price (oil market)

Real vs nominal price:
- Real: price of a good relative to aggregate measure of prices & is adjusted for inflation (also known as constant-dollar price)
- Nominal: absolute price of good & is unadjusted for inflation
- Consumer price index (CPI): measure of the aggregate price level
- Produce price index (PPI): measure of the aggregate price level of intermediate products and wholesale goods

Example: find the real 2015 price of butter in terms of 1970 dollars knowing that
- CPI 1970 = 38.8
- CPI 2015 = 237.0
- Nominal price 2015 = $3.48

$$\frac{CPI\ 1970}{CPI\ 2015} x\ price\ 2015\ =\ \frac{38.8}{237.0} x 3.48\ =\ \$0.57$$

Percentage change in real price:

$$\frac{real\ price\ in\ 2015\ -\ real\ price\ in\ 1970}{real\ price\ in\ 1970}\ =\ \frac{1.34 - 2.05}{2.05} =-\ 0.34\ =\ -34\%$$

CHAPTER 2

Supply and demand:

Supply curve: relationship between the quantity of a good that producers are willing to sell and price of the good
- *supply curve* : $Q_S = Q_S(P)$
- The higher the price, the more firms are able and willing to produce and sell
- Other variables that affect supply:
  - Production costs, wages, interest charges, costs of raw materials

Demand curve: shows how much of a good consumers are willing to buy as the price/unit changes
- *demand curve* : $Q_D = Q_D(P)$
- Other variables that affect demand curve: income

Substitutes and complementary goods:
- Substitutes: 2 goods for which an increase in the price of one leads to an increase in the quantity demanded of the other
- Complements: two goods for which an increase in the price of one leads to a decrease in the quantity demanded of the other

Normal vs. inferior goods:
- Normal: positive relationship with income; as income increases, so does demand for normal good
- Inferior: demand declines as level of income increases

The market mechanism:

Equilibrium: price that equates the quantity supplied to the quantity demanded

Market mechanism: tendency in a free market for price to change until the market clears

Surplus: situation in which the quantity supplied exceeds the quantity demanded

Shortage: situation in which the quantity demanded exceeds the quantity supplied

Elasticities of supply and demand:

Elasticity: percentage change in one variable resulting from a 1-percent increase in another

Price elasticity of demand: % change in quantity demanded of a good resulting from a 1-percent increase in its price.
- Usually a **negative** value → e.g.: -2, we say that elasticity is **2 in magnitude**
- Price elastic: when price elasticity is greater than 1 in magnitude
- Price inelastic: when price elasticity is less than 1 in magnitude

price elasticity of demand : $E_P = \frac{(\%\Delta Q)}{(\%\Delta P)} = \frac{\Delta Q/Q}{\Delta P/P} = \frac{P\Delta Q}{Q\Delta P}$

Linear demand curve: demand curve that is a straight line
linear demand curve : $Q = a - bP$

Infinitely vs. completely inelastic demand:
- Infinitely inelastic demand: consumers will buy as much of a good as they can get at a single price, but for any higher price the quantity demanded drops to 0, while for any lower price the quantity demanded increase without limit
- Completely inelastic demand: principle that consumers will buy a fixed quantity of a good regardless of its price

Income elasticity of demand: % change in the quantity demanded resulting from a 1-percent increase in income

$$E_I = \frac{\Delta Q/Q}{\Delta I/I} = \frac{I}{Q}\frac{\Delta Q}{\Delta I}$$

Cross-price elasticity of demand: % change in the quantity demanded of one good resulting from a 1-percent increase in the price of another
- *Substitutes:* cross-price elasticity of demand = positive
  - Rise in the price of a product makes demand for its substitute increase
- *Complements:* cross-price elasticity of demand = negative
  - Rise in the price of a product makes demand for its complement negative

$$E_{Q_X P_Y} = \frac{\Delta Q_X/Q_X}{\Delta P_Y/P_Y} = \frac{P_Y}{Q_X}\frac{\Delta Q_X}{\Delta P_Y}$$

Price elasticity of supply: percentage change in quantity supplied resulting from a 1-percent increase in price. Usually positive, because higher price leads to suppliers increasing output

Point vs. Arc elasticities:
- Point elasticity of demand: price elasticity of a particular point on the demand curve
- Arc elasticity of demand: price elasticity calculated over a range of prices

arc elasticity : $E_P = (\Delta Q/\Delta P)(\overline{P}/\overline{Q})$
* $\overline{P}$ = average price; $\overline{Q}$ = average quantity

Short run vs. long run elasticities
1. Short-run: 1 year or less
2. Long-run: enough time is allowed for consumers/producers to adjust fully to price change

Demand: is much more price elastic in the long run than in the short run, it takes time for people to change their consumption practices

- Demand & durability: the more durable an item is, the more elastic demand is in the short run; the total stock of each good owned by consumer is large relative to annual production (car, fridges, etc)
- Income elasticities:
  - Most goods (foods, beverages, fuels, etc): income elasticity of demand is larger in the long run than in short run
  - Durable good: income elasticity of demand is larger in short run than in long run
- Cyclical industries: in which sales tend to magnify cyclical changes in gross domestic product and national income

Supply: elasticities of supply also differ in long-run and short-run
- For most products: long-run supply is much more price elastic than short-term supply
- Supply & durability:
  - Durable goods: Supply is more elastic in short-run

Understanding and predicting the effects of changing market conditions
- "Fit" linear demand and supply curves to market data
- Goal: to write down supply and demand curves that "fit" (are consistent with) these numbers:
  - Equilibrium price: P*
  - Equilibrium quantity: Q*
  - Price elasticity of supply: E_S
  - Price elasticity of demand: E_D
- Problem: choose numbers for constants a, b, c, d
  - DEMAND: $Q = a - bP$
  - SUPPLY: $Q = c + dP$
- Solution: 2-step procedure:
  1. Reconstruct demand and supply formulas:
     a. $E_D = -b(P^*/Q^*)$
     b. $E_S = d(P^*/Q^*)$
  2. Solve for remaining constants a & c
     a. Example: $a = Q^* + bP^*$

Example 1: $E_S = 1.5$, $P^* = \$3.00$, $Q^* = 18$

SUPPLY:
1. $1.5 = d(3/18) = d/6$; $d = (1.5)(6) = 9$
2. $18 = c + (9)(3) = c + 27$; $c = 18 - 27 = 9$
Therefore Supply curve: $Q = -9 + 9P$

DEMAND:
1. $-0.5 = -b(3/18) = -b/6; b = (0.5)(6) - 3$
2. $18 = a = (3)(3) = a - 9; a = 18 + 9 = 27$

Therefore Demand curve: Q = 27 − 3P

Example 2: demand depend on income as well as price = Demand: $Q = a - bP + fI$.
*I = index of aggregate income or GDP

$E_D = 1.3; I = 1.0, Q^* = 18 \rightarrow 1.3 = (1/18) (f) \rightarrow f = (1.3)(18)/1 = 23.4$

$18 = a - 3(3) + 23.4 (1) \rightarrow a = 3.6$

CHAPTER 3: THE ANALYSIS OF COMPETITIVE MARKETS

3.1 Evaluating the gains and losses from government policies (consumer and producer surplus)

Shortage: excess demand

Consumer surplus: measures the aggregate net benefit that consumers obtain from a competitive market
- Defined as the difference between what a consumer is willing to pay for a good and the consumer actually pays when buying it

FIGURE 3.1
CONSUMER AND PRODUCER SURPLUS

Consumer A would pay $10 for a good whose market price is $5 and therefore enjoys a benefit of $5. Consumer B enjoys a benefit of $2, and Consumer C, who values the good at exactly the market price, enjoys no benefit. Consumer surplus, which measures the total benefit to all consumers, is the yellow-shaded area between the demand curve and the market price. Producer surplus measures the total profits of producers, plus rents to factor inputs. It is the green-shaded area between the supply curve and the market price. Together, consumer and producer surplus measure the welfare benefit of a competitive market.
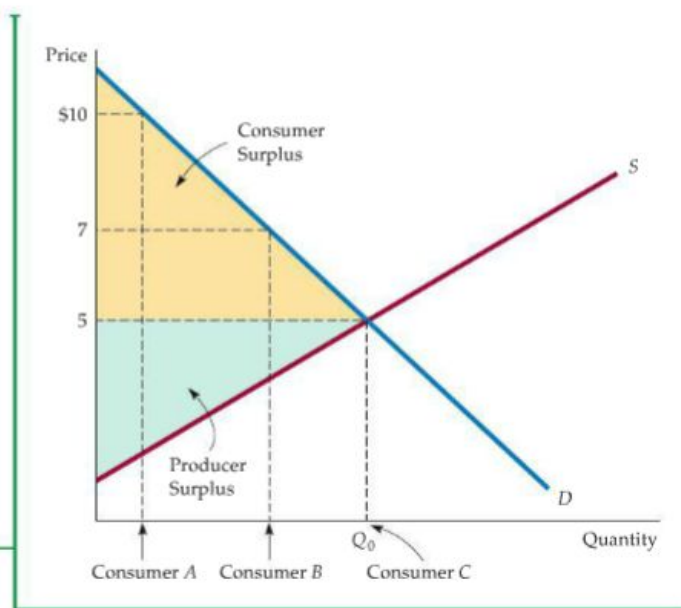
Producer surplus: measures the aggregate net benefit to produces
- Defined as the sum over all units produced of the difference between the market price of the good and the marginal cost of its production
- The benefit that lower-cost producers enjoy by selling at the market price

Welfare effects: gains and losses to consumers and producers

Different changes in supply and demand and their impact:
1. **Change in consumer surplus:**
   ○ Increase in consumer surplus:
       i. Benefit: consumers who can still buy the good
           - Can buy the good at a lower price
       ii. Don't benefit: those who can no longer buy the good lose surplus
           - Those who have been rationed out of the market because of the reduction in production and sales
   ○ *consumer surplus* $= A - B$

FIGURE 3.2
CHANGE IN CONSUMER AND PRODUCER SURPLUS FROM PRICE CONTROLS

The price of a good has been regulated to be no higher than P_{max}, which is below the market-clearing price P_0. The gain to consumers is the difference between rectangle A and triangle B. The loss to producers is the sum of rectangle A and triangle C. Triangles B and C together measure the deadweight loss from price controls.
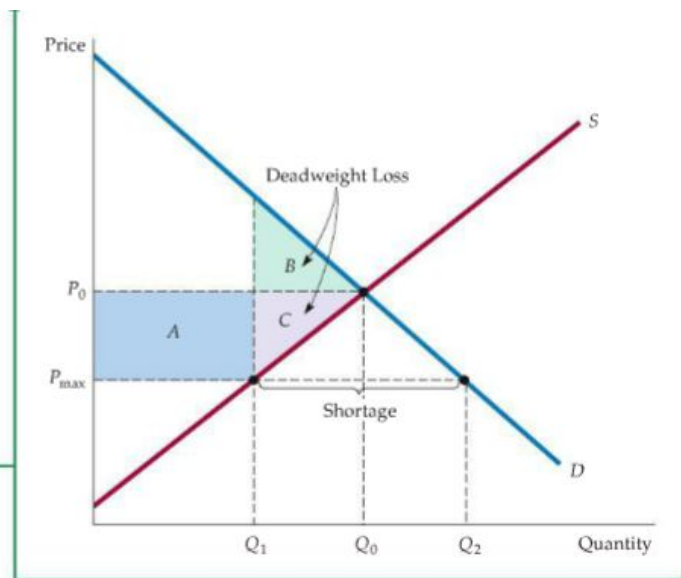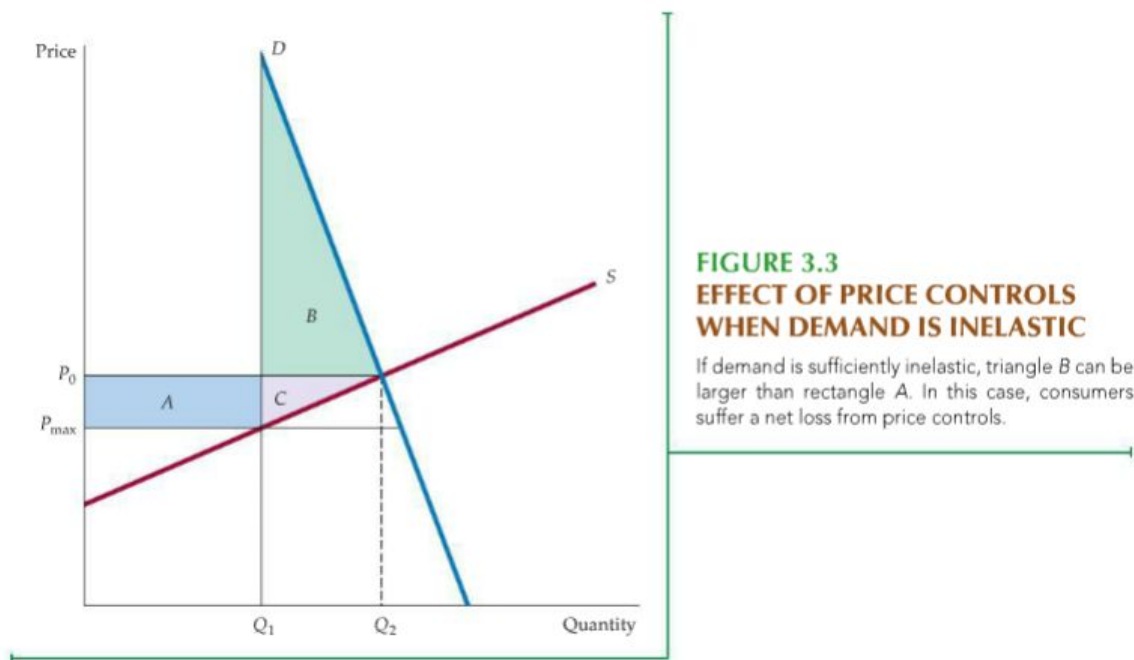
2. **Change in producer surplus:**
   ○ Benefit: those who will receive a lower price
   ○ Don't benefit: those who leave the market
   ○ *Change in producer surplus* $: -A - C$
3. **Deadweight loss:** net loss of total (consumer plus producer) surplus
   ○ *total change in surplus* $= (A - B) + (-A - C) = -B - C$
   ○ It is an inefficiency caused by price controls
   ○ Loss in producer surplus exceeds gain in consumer surplus

Price |

FIGURE 3.3
EFFECT OF PRICE CONTROLS WHEN DEMAND IS INELASTIC

If demand is sufficiently inelastic, triangle B can be larger than rectangle A. In this case, consumers suffer a net loss from price controls.

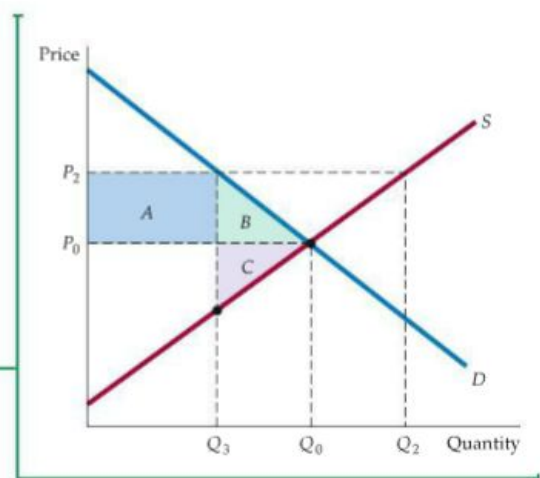## 3.2 The Efficiency of a competitive market

Economic efficiency: the maximization of aggregate consumer and producer surplus

Market failure: unregulated competitive market is inefficient because prices fail to provide proper signals to consumers and producers. 2 ways in which market failure can occur:
1. **Externalities**: action taken by producer or consumer which affects other producers or consumers but its not accounted for by the market price
2. **Lack of information**: consumers are not informed about quality of product and so cannot make purchase decisions

FIGURE 3.5
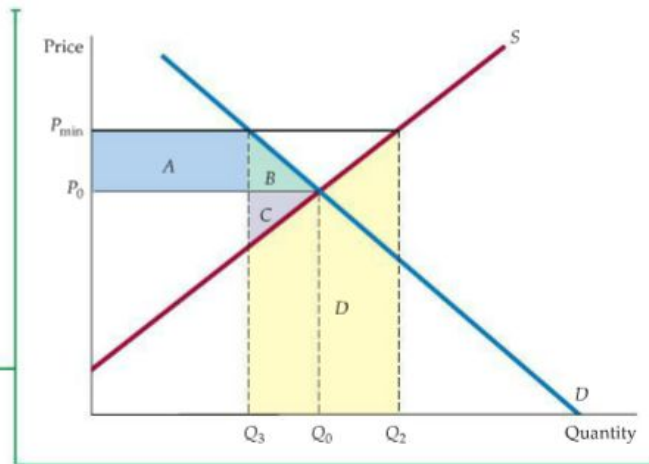**WELFARE LOSS WHEN PRICE IS HELD ABOVE MARKET-CLEARING LEVEL**

When price is regulated to be no lower than P_2, only Q_3 will be demanded. If Q_3 is produced, the deadweight loss is given by triangles B and C. At price P_2, producers would like to produce more than Q_3. If they do, the deadweight loss will be even larger.

3.3 Minimum prices

Price | S

P_min
A | B
P_0 | C
D

Q_3 | Q_0 | Q_2 | Quantity

Change in consumer surplus:
$$\Delta CS = -A - B$$

Change in producer surplus
$$\Delta PS = A - C - D$$

3.4 Price supports and production quotas

Price support: price set by government above free-market level and maintain by governmental purchases of excess supply.

- Government can also increase prices by restricting production either directly or through incentives to producers
- Consumers: $\Delta CS = -A - B$
- Producers: $\Delta PS = A + B + D$
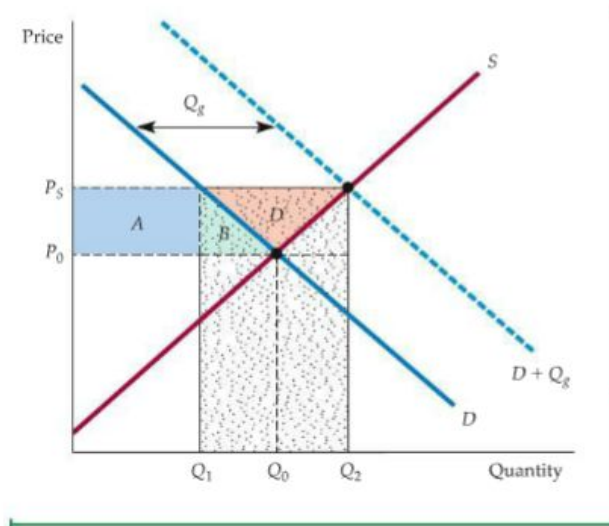- Government: $\Delta CS + \Delta PS - Cost\ to\ govt. = D - (Q_2 - Q_1)P_S$


FIGURE 3.11
PRICE SUPPORTS

To maintain a price P_s above the market-clearing price P_0, the government buys a quantity Q_g. The gain to producers is $A + B + D$. The loss to consumers is $A + B$. The cost to the government is the speckled rectangle, the area of which is $P_s(Q_2 - Q_1)$.

Production quotas

- Government can cause price of good to rise by reducing supply by setting quotas on how much each firm can produce

FIGURE 3.12
SUPPLY RESTRICTIONS

To maintain a price P_s above the market-clearing price P_0, the government can restrict supply to Q_1, either by imposing production quotas (as with taxicab medallions) or by giving producers a financial incentive to reduce output (as with acreage limitations in agriculture). For an incentive to work, it must be at least as large as $B + C + D$, which would be the additional profit earned by planting, given the higher price P_s. The cost to the government is therefore at least $B + C + D$.
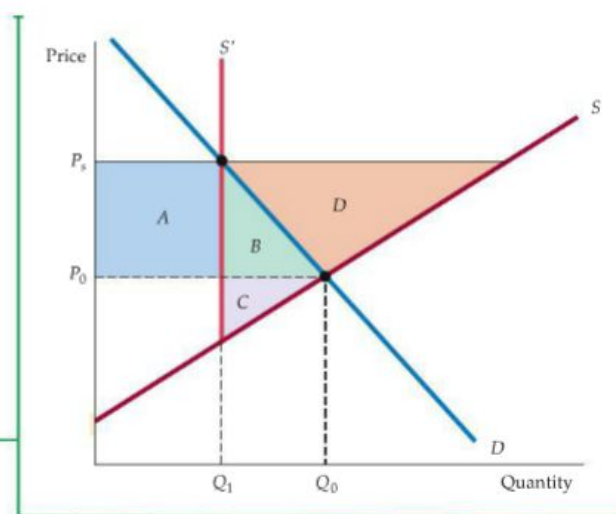
Incentive programs:

- *Acreage limitation programs:* give farms financial incentives to leave some of their acreage idle

Production quotes cause:
- Consumer surplus: $\Delta CS = -A - B$
- Producer surplus: $\Delta PS = A - C + Payments\ for\ not\ producing$
- Cost to government and total change of producer surplus:
  $\Delta PS = A - C + B + C + D = A + B + D$
- Change in welfare: $\Delta WELFARE = -A - B + A + B + D - B - C - D = -B - C$

3.5 Import quotas and tariffs

Government uses import quota & tariffs to keep domestic price of a produce above work levels and enable domestic industry to enjoy higher profits than under free trade
- Import quota: limit on the quantity of a food that can be imported
- Tariff: tax on an imported good

Impact on:
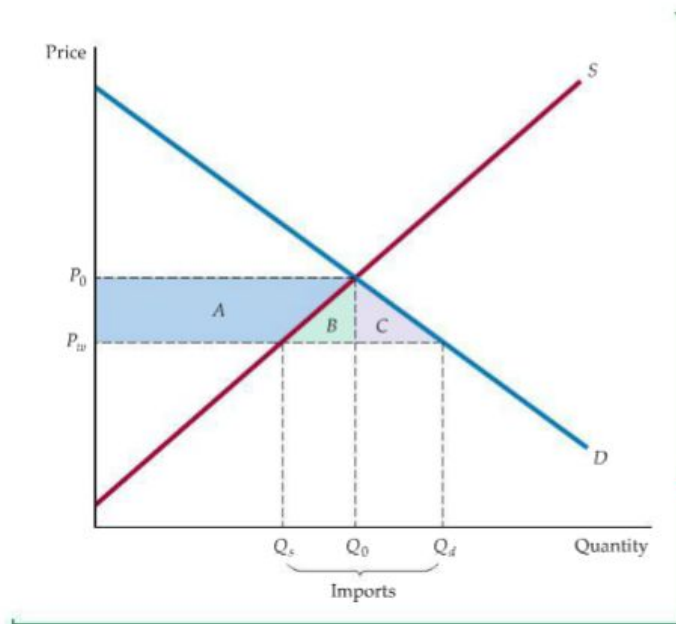- $\Delta CS = -A - B - C - D$
- $\Delta PS = A$

FIGURE 3.16
IMPORT TARIFF OR QUOTA THAT ELIMINATES IMPORTS

In a free market, the domestic price equals the world price P_w. A total Q_d is consumed, of which Q_s is supplied domestically and the rest imported. When imports are eliminated, the price is increased to P_0. The gain to producers is trapezoid A. The loss to consumers is A + B + C, so the deadweight loss is B + C.

FIGURE 3.17
IMPORT TARIFF OR
QUOTA (GENERAL CASE)

When imports are reduced, the domestic price is increased from P_w to P^*. This can be achieved by a quota, or by a tariff $T = P^* - P_w$. Trapezoid A is again the gain to domestic producers. The loss to consumers is $A + B + C + D$. If a tariff is used, the government gains D, the revenue from the tariff, so the net domestic loss is $B + C$. If a quota is used instead, rectangle D becomes part of the profits of foreign producers, and the net domestic loss is $B + C + D$.
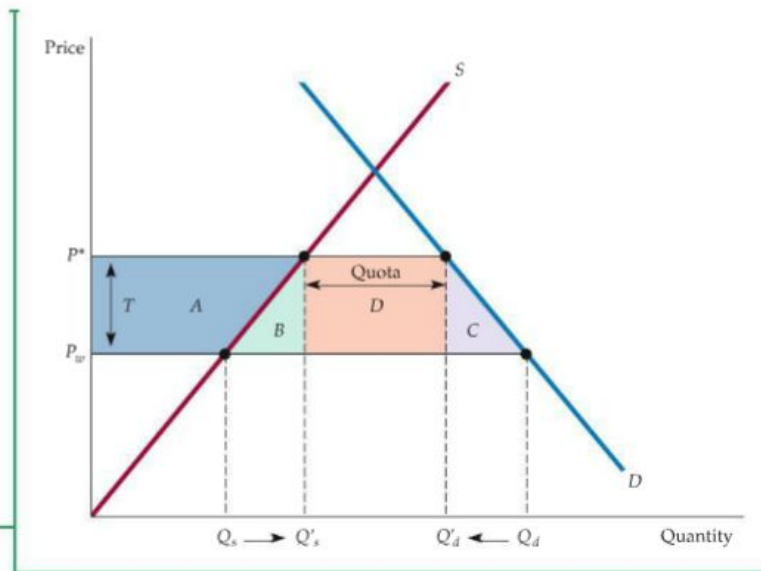
3.6 The impact of a tax or subsidy

The effects of specific tax:
- *Specific tax:* tax of a certain amount of money per unit sold
- *Ad valorem tax:* proportional; state sales tax

FIGURE 3.19
INCIDENCE OF A TAX

P_b is the price (including the tax) paid by buyers. P_s is the price that sellers receive, less the tax. Here the burden of the tax is split evenly between buyers and sellers. Buyers lose $A + B$, sellers lose $D + C$, and the government earns $A + D$ in revenue. The deadweight loss is $B + C$.
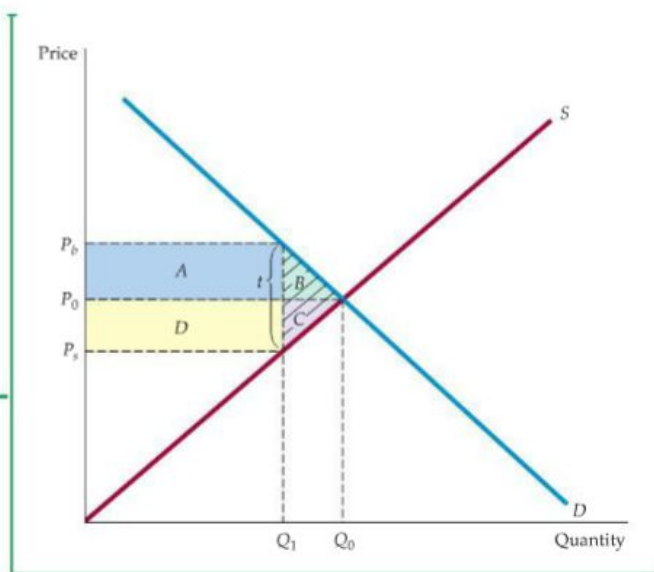
Market clearing requires 4 conditions to be satisfied after tax is in place:
1. Quantity sold and buyer's price must lie on the demand curve (b/c buyers are interested only in price they must pay)

2. Quantity sold and seller's price must be on supply curve (b/c sellers are only interested in amount of money the receive net of tax)
3. Quantity demanded must = quantity supplied
4. Difference between price buyer pays and price seller receives must equal the tax

Conditions summarized as:

$$Q^D = Q^D (P_D)$$

$$Q^S = Q^S (P_S)$$

$$Q^D = Q^S$$

$$P_D - P_S = t$$

Tax results in:
- Revenue to government: $t \times Q^* = A + D$
- $\Delta CS = -A - B$
- $\Delta PS = -C - D$
- DW loss$= \Delta PS + \Delta CS + rev\ to\ govt = -A - B - C - D + AD = -B - C$
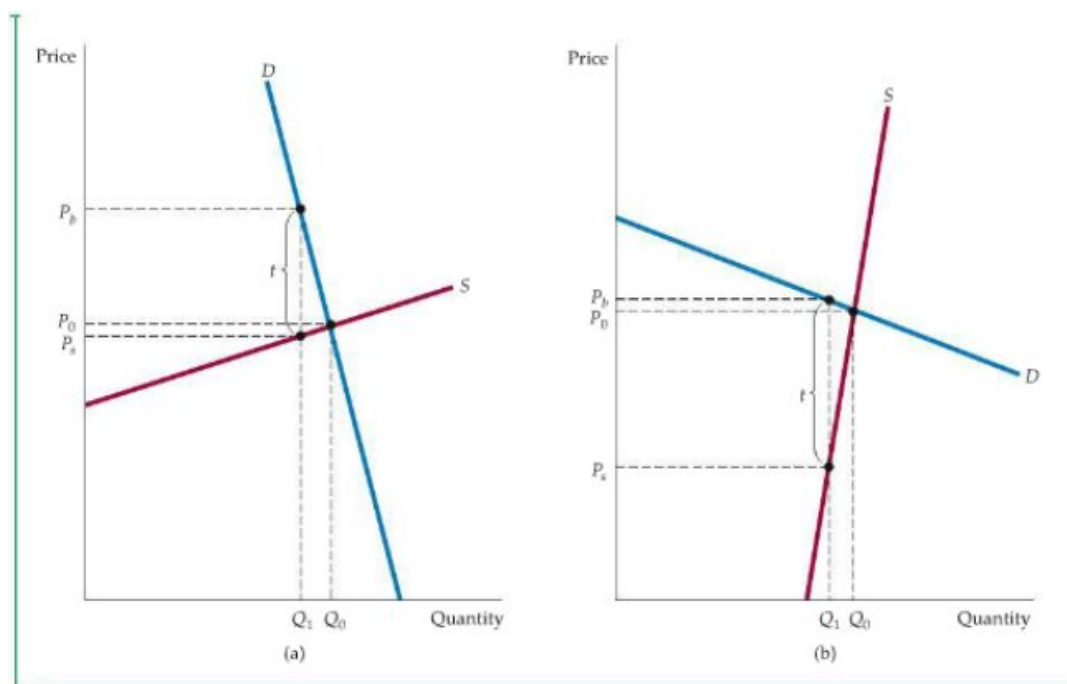

FIGURE 3.20
IMPACT OF A TAX DEPENDS ON ELASTICITIES OF SUPPLY AND DEMAND
(a) If demand is very inelastic relative to supply, the burden of the tax falls mostly on buyers.
(b) If demand is very elastic relative to supply, it falls mostly on sellers.

Pass-through fraction:

Used to calculate % of the tax borne by buyers

$E_S/(E_S - E_D)$

Used to calculate % of tax borne by suppliers

$-E_D/(E_S - E_D)$

Tax Impact on:
- **Not beneficial to:**
  - Suppliers when E_d/E_S is large
  - Buyers when E_d/E_S is small

The effects of a subsidy
- *Subsidy:* payment reducing the buyer's price below the seller's price (negative tax)
- Beneficial to:
  - Suppliers when E_d/E_S is large
  - Buyers when E_d/E_S is small
- Conditions:

$$Q^D = Q^D(P_b) \qquad \text{(3.2a)}$$
$$Q^S = Q^S(P_s) \qquad \text{(3.2b)}$$
$$Q^D = Q^S \qquad \text{(3.2c)}$$
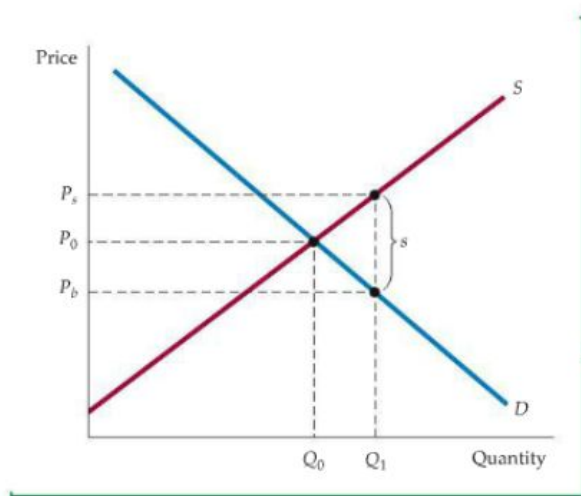$$P_s - P_b = s \qquad \text{(3.2d)}$$

FIGURE 3.21
SUBSIDY

A subsidy can be thought of as a negative tax. Like a tax, the benefit of a subsidy is split between buyers and sellers, depending on the relative elasticities of supply and demand.

CHAPTER 4: OVERVIEW OF THE LABOR MARKET

Labor market:
- Buyers = employers; sellers = workers
- *Labor force:* refers to all those over 16 years of age who are employed, actively seeking work or expecting recall from a layoff. Consists of the employed and unemployed

4 major flows:
- Employed: become unemployed by quitting voluntarily or being laid off
- Unemployed: obtain employment by being newly hired or being recalled ot a job from which they were temporarily laid off
- Those in labor force, whether employed or unemployed, can leave the labor force by retiring or otherwise deciding against taking or seeking work for pay (dropping out)
- Those who have never worked or looked for a job expand the labor force by entering it while those who have dropped out do so by entering the labor force

Unemployment rate: ratio of those in labor force to those who are unemployed
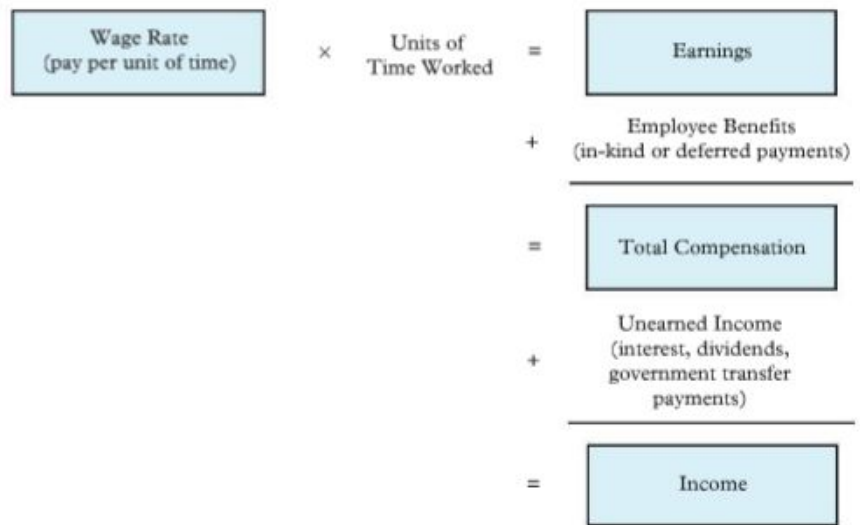
The earnings of labor:
- Nominal wage: what workers get paid per hour in current dollars' nominal wages are most useful in comparing the pay of carious workers at a given time
- Real wages: nominal wages divided by some measure of prices, suggest how much can be purchased with workers' nominal wages
  - Useful in comparing purchasing power of worker's earnings over a period of time when both nominal wages and product prices are changing
  - E.g.: worker earns $64/day and shoes cost $32 then real wage = 64/32 = 2

Wages, earnings and income:
- Wages: payment for a unit of time
- Earnings: wages multiplied by # of time units (typically hours) worked
- Total compensation: consists of earnings plus employee benefits
  - Benefits that are either payments in kind or deferred
    - *Payments in kind:* are employer-provided health care and health insurance wherein the employee receives a service or an insurance policy rather than money. Paid vacation time
    - *Deferred payments:* form of employer-financed retirement benefits
- Income: the total command over resources of a person or family during soe time period (includes earnings, benefits, unearned income , dividends or interest received on investments and transfer payments received from govt, welfare payments, unemployment compensation, and the like)

Figure 4.4

Relationship among Wages, Earnings, Compensation, and Income

Wage Rate (pay per unit of time) × Units of Time Worked = Earnings

+ Employee Benefits (in-kind or deferred payments)

= Total Compensation

+ Unearned Income (interest, dividends, government transfer payments)
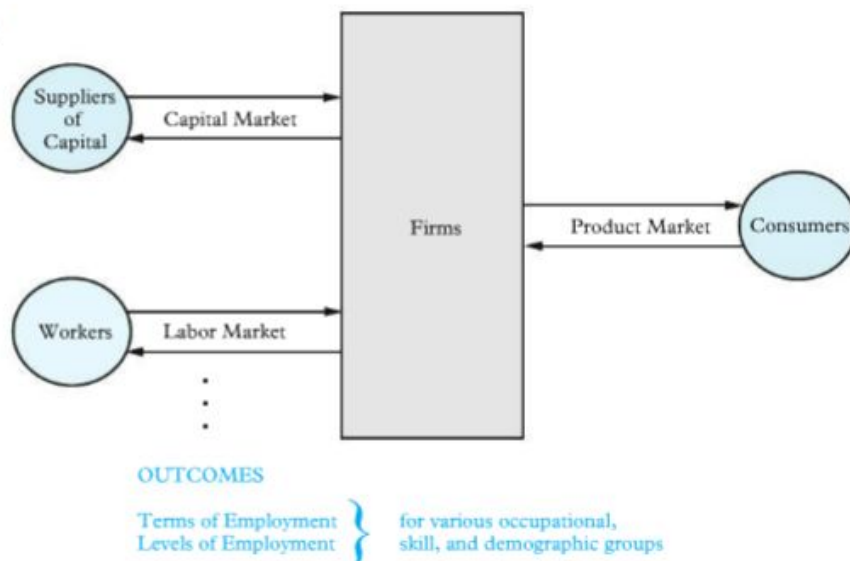
= Income

Major labor outcomes are due to:

1. The terms of employment (wages, compensation level, working conditions)
2. Levels of employment

Figure 4.5

The Markets in Which Firms Must Operate

Suppliers of Capital — Capital Market — Firms — Product Market — Consumers

Workers — Labor Market — Firms

OUTCOMES

Terms of Employment
Levels of Employment
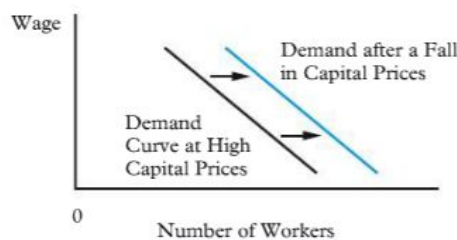} for various occupational, skill, and demographic groups

Wage changes:

1. Effect on quantity of labor demanded if wage rate increased:

a. Scale effect: decline in employment due to smaller scale of production because higher wages mean higher costs and consumers buy less and employers therefore reduce employment
b. Substitution effect: capital is substituted for labor in the production process
2. Effect on quantity of labor demand due to other forces
   a. Demand for product increases: any output price, the product could be sold. It would increase the labor desired at any wage level that might prevail (demand shifts to the right)
   b. Supply of capital changes: capital prices fall to 50% of their prior level; a fall in capital prices generates 2 **opposite** effects on the demand curve
      i. Capital prices decline: costs of producing tend to decline which increases production and increase employment at any wage
      ii. Capital prices decline with substitution effect: firm adopts capital-intensive technologies in response to cheaper capital and labor demand curve will shift to the left
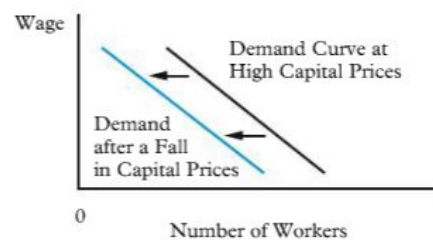

Figure 4.8

Possible Shifts in Demand for Labor Due to Fall in Capital Prices

(a) Scale Effect May Dominate

Wage

Demand after a Fall in Capital Prices

Demand Curve at High Capital Prices

0   Number of Workers

(b) Substitution Effect May Dominate

Wage

Demand Curve at High Capital Prices

Demand after a Fall in Capital Prices

0   Number of Workers

Movement along curve vs shifts of curve:
1. Movement along the curve: when wage changes and other forces are unchanged
2. Shifts of curve: when other forces change as well

Demand for labor can be analyzed at 3 levels:
1. Analyze demand for labor by particular firm
2. Analyze effects of wage increase on employment by using an industry demand curve
3. Use a market demand curve to see how wage increase would affect entire labor market for particular firm in all industries

Long run vs. short run
● Short run: hard to substitute capital for labor (or vice versa) & customers are less responsive to product demand in respect to price increase

- Long run: responses to changes in wages or other forces affecting demand for labor are larger and more complete

The supply of labor

Market supply:
- wages/salaries of certain industry rise: more people want to enter this industry; hence supply of labor to market is positively related to wage rate prevailing in that market
- wages/salaries of other industry increase: then less people want to be in particular industry and supply decreases

Supply to firms:
- The difference in slope between market supply curve and supply curve to firm is directly related to type of choice facing workers
- If wages for paralegals fall (for example), not everyone would withdraw from market bc jobs of insurance and paralegal are **not perfect substitutes**
- Horizontal supply curve: reflects supply decisions made among alternatives that **are perfect substitutes** for each other

Figure 4.10

Shift in Market Supply Curve for Paralegals as Salaries of Insurance Agents Rise

Supply of Paralegals when Salaries of Insurance Agents Are:
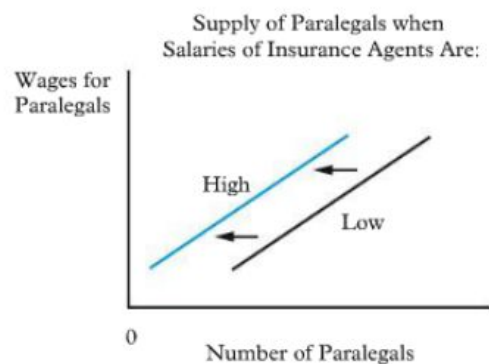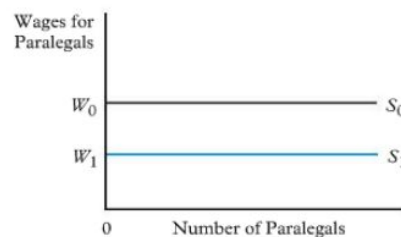
Figure 4.11

Supply of Paralegals to a Firm at Alternative Market Wages

Market clearing wage
- Recall:
  - Market demand curve: shows how many workers would want at each wage rate, holding capital prices and product demand schedule constant
  - Market supply curve: shows how many workers would enter market at each wage level, holding wages in other occupations constant
- Situations:
  - Low wage: demand exceeds supply, shortage of workers will exist. Employers would be forced to increase wage offers and 2 things would happen: (1) more workers would enter market and look for jobs = movement along supply curve (2) increasing wages would motivated employers to seek fewer workers = movement along demand curve
  - High wage: supply exceeds demand, surplus of workers.
- *Market-clearing wage:* wage rate at which demand equals supply, where there is no surplus or shortage. The market is in equilibrium
  - Market-clearing wage, W_e = *going wage*
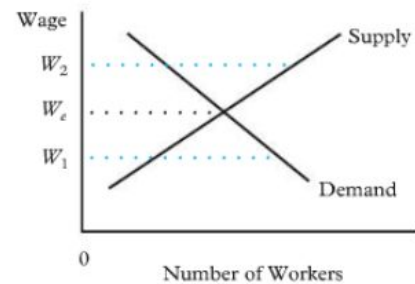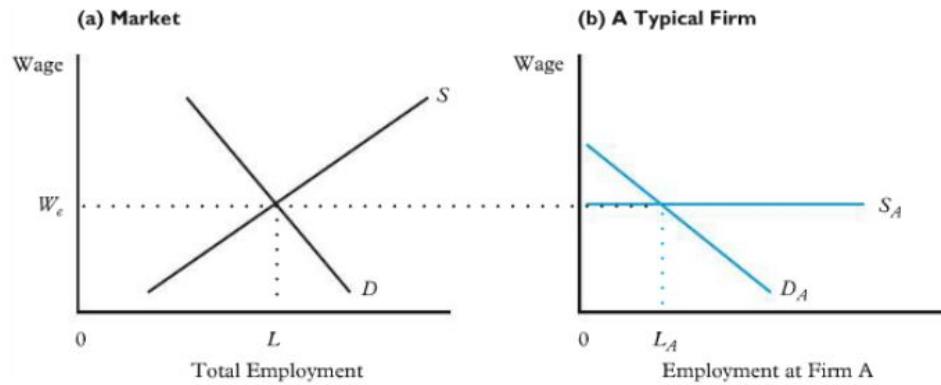
Figure 4.12

Market Demand and Supply

Figure 4.13

Demand and Supply at the "Market" and "Firm" Levels

(a) Market

(b) A Typical Firm

by the market and "announced" to individual market participants. Figure 4.13 graphically depicts *market* supply and demand in panel (a), along with the supply and demand curves for a typical *firm* (firm A) in that market in panel (b). All firms in the market pay a wage of W_e' and total employment of L equals the sum of employment in each firm.

Disturbing the equilibrium
- Rightward shift of demand: would create a labor shortage
- Left shift of supply & rightward shift in labor demand: market wage rises a lot
- Rightward shift supply/leftward shift demand: fall in market-clearing wage rate

Figure 4.15

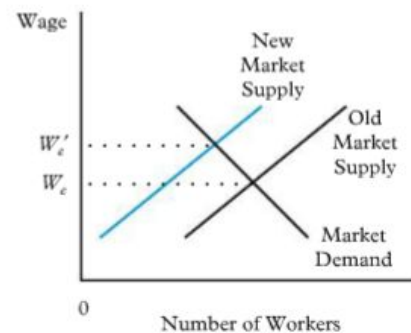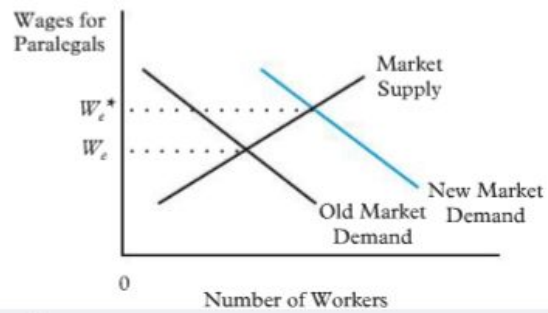New Labor Market Equilibrium after Supply Shifts Left

Figure 4.14

New Labor Market Equilibrium after Demand Shifts Right

Disequilibrium and nonmarket influences:
- Non Market forces: laws, customers, institutions constraining the choice of individuals and firms
  - Usually serve to keep wages above market levels

**Applications of theory**

Who is underpaid and who is overpaid?
- Above-market wages:
  - Overpaid workers are those that receive wages that are higher than the market-clearing wage for heir job
- Wage above market: has 2 implications
  - Employers are paying more than necessary to produce their output
  - More workers want jobs than can find them
- Below-market wages:
  - Underpaid employees are receiving wages that are below market-clearing levels
  - Labor shortage exists

Economic rents
- Economic rent: amount by which one's wage exceeds one's *reservation wage (*wage below which worker would refuse job) in a particular job is the amount of his or her economic rent

Figure 4.19

Labor Supply to the Military: Different Preferences Imply Different "Rents"
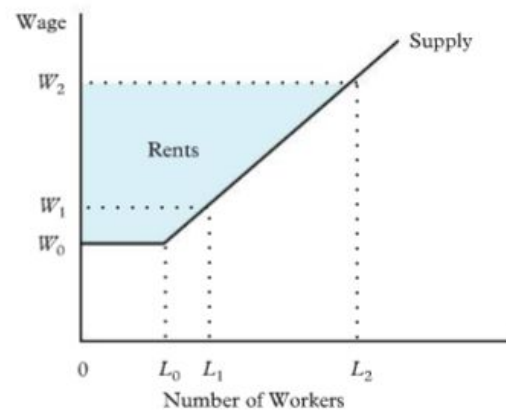
CHAPTER 5: The demand for labor

This chapter will:

- Identify assumptions underlying the proposition that labor demand is a downward-sloping function of the wage rate

Labor demand when the product market is not competitive
- Based on the assumptions that
  - Firm is a price taker
  - Firm is a wage taker
  - Makes decisions only about the levels of outputs and inputs

Profit maximization
- Firms (employers of labor) seek to maximize profits
- Decision rules:
  - Income generated by employing one more unit of an input **exceeds** additional expense = add a unit of input
  - Income generated by one more unit of input is **less than** additional expense, reduce employment of input
  - Income generated by one more unit of input = to additional expense = no change
- Two thing to note:
  1. A firm can only change variables within it control (increasing or decreasing output NOT price)
     - As long as marginal revenue from added unit of output exceeds marginal cost, firm will continue to expand output
     - Marginal cost exceeds marginal output: firm will decrease output
     - Firm can increase/decrease output using 2 types of input: **labor and capital**
  2. Theory must address small (marginal) changes that must be made almost daily. Holding employment of other inputs constant

Marginal income from an additional unit of input

Marginal revenue product = change in physical output produced (marginal product) x MR generated per unit of physical output
- Example:
  - 20,000 spectators attendance increase
  - 25$ for each additional fan
  - Marginal revenue product = 20,000 x $25 = $500,000

Marginal product (of labor): the change in physical output produced by change in units of labor, holding capital constant

$$M_{P_L} = \Delta Q \div \Delta L$$

Marginal product of capital: the change in output associated with a one-unit change in the stock of capital, holding labor constant

$$M_{P_K} = \Delta Q \div \Delta K$$

Marginal revenue:
- Pure competitive market (no control over price): marginal revenue per unit of output sold is = to product price
- Differentiated product (some control): extra units of output can be sold only if product price is reduced

Marginal revenue product of labor:
- General case: $MRP_L = MP_L \times MR$
- Competitive market: $MRP_L = MP_L \times P$

Marginal expense of an added input:
- Competitive labor market (no control over wages that must be paid): "wage taker", marginal expense of labor = market wage
  - Therefore, labor supply curve = horizontal at the going way

The short-run demand for labor when both product and labor markets are competitive
- In the short-run: firm only needs to decide whether to alter its output level, how to increase/decrease output is not an issue because only employment of labor can be adjusted

A critical assumption: declining MP_L
- Positive MP_L: as long as output increases as labor is added
- Falling MP_L: as more input is used, MP_L declines → "law of diminishing returns" is an empirical proposition that derives from the fact that a sa employment expands, each additional worker has progressively smaller share of capital stock to work with
  - We assume MP_L is <u>always falling</u>

From profit maximization to labor demand
- Profits are maximized only when employment is such that any further one-unit change in labor would have a marginal revenue product equal to marginal expense:
  - $MRP_L = ME_L$
- We can represent profit-maximizing level of labor input as that level at which
  - $MP_L \times P = W$, stated in **monetary unit** (dollars)
- Profit-maximizing condition for hiring labor in terms of **physical quantities:**
  - $MP_L = W \div P$

Labor demand in terms of real wages:
- Demand for labor in the short run is equivalent to the downward-sloping segment of its MP_L schedule
- To maximize profits (given any real wage rate), a firm should stop employing labor at the point in which any additional labor would cost more than it would produce
  - Implies 2 things:
    - Employ labor until real wage = MP_L BUT not beyond that point
    - Profit-maximizing level of employment lies in range where MP_L is declining

-

Figure 5.1

Demand for Labor in the Short Run
(Real Wage)

Marginal Product
of Labor (MP_L),
Real Wage (W/P)

$(W/P)_0$

MP_L

$0 \qquad E_1 \quad E_0 \qquad E_2$
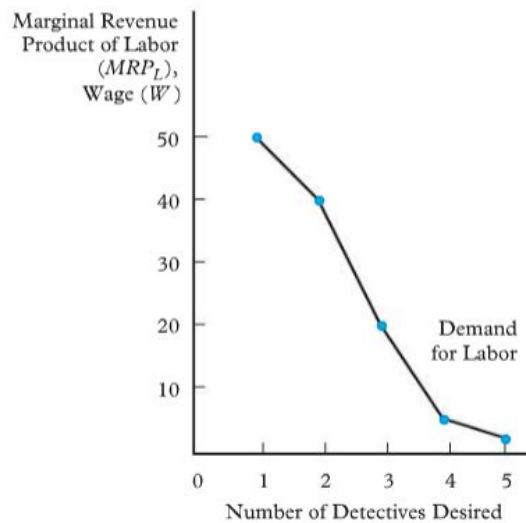
Employment (E)
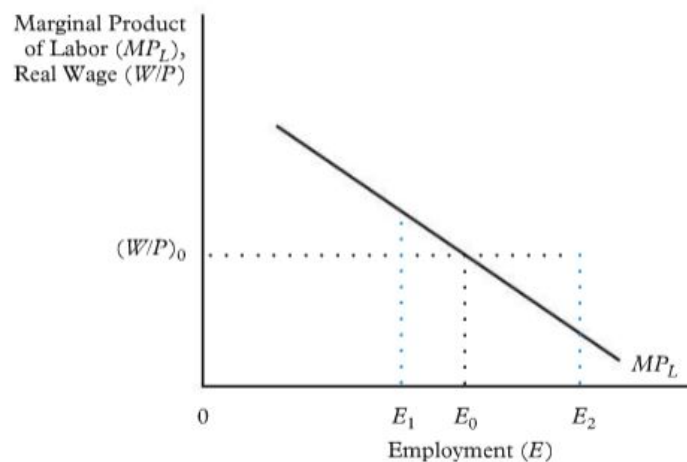
Labor demand in terms of money wages:
- Labor demand curve in the short run slopes downward because it is the MRP_L Curve
- The MRP_L curve slopes downward because of labor's diminishing marginal product
- The demand curve and the MRP_L curve coincide

Figure 5.2

Demand for Labor in the Short Run (Money Wage)

Market demand curves:
- Market demand curve (or schedule) is the summation of the labor demanded by all firms in a particular labor market at each level of the real wage
- Slopes downward as a function of the real wage
  - Real wage falls: number of workers that firms want to employ increases
  - Real wage increases: number of workers that firms want to employ decreases

Objections to the marginal productivity theory of demand:
1. Almost no employer is aware of marginal revenue product of labor. Employers are mostly unable to accurately measure output of individual workers
   - Answer to objection 1: employers must at least intuit them (profit maximizing conditions, measuring MRP_L) to survive in a competitive environment
   - Employers can know these concepts without verbalizing them
2. Many cases, it seems that adding labor while holding capital constant would not add to output at all. Example: 1 secretary, 1 computer. Adding a 2nd secretary with no computer will not generate more output
   - Answer to objection 2: two secretaries can take turns using computer, while other secretary is doing other work tasks

The demand for labor in competitive markets when other inputs can be varied

Labor demand in the long run
- To maximize profits, labor and capital must be adjusted so marginal revenue product of each equals its marginal expense
  - $MP_L \, x \, P \; = \; W$
  - $MP_K \, x \, P \; = \; C \, (profit-maximizing \; condition \; for \; capital)$

- Isolating P
  - $P = W \div MP_L$
  - $P = C \div MP_K$
- Profit maximization requires that
  - 5.8 $W \div MP_L = C \div MP_K$, hence to maximize profits the firm must adjusts its labor and capital inputs so that marginal cost of producing an added unit of output using labor is equal to the marginal cost of producing an added unit of output using capital
    - $\frac{W}{MP_L}$ = added cost of producing an added unit of output when using labor to generate the increase in output
    - $\frac{C}{MP_K}$ = marginal cost of producing an extra unit of output using capital
- What would happen to demand for labor in the long run of the wage rate facing a profit-maximizing firm were to rise
  - The rise in W disturbs equality in equation 5.8 and the firm will want to cut back on use of labor even before it can adjust its capital which will raise MP_L
  - MP_K falls which will cause firm to want to reduce its stock of capital
  - Rise in W will end equality in equation 5.8 = marginal cost of production using labor now exceeds marginal cost using capital
- Conclusion:
  - Increase in W = firm to reduce desired employment level for 2 reasons
    - Firm's profit-maximizing level of output will fall and associated reduction in required inputs (both capital and labor) is an example of the **scale effect**
    - Rise in W also causes firm to substitute capital for labor so it can again produce in the least-cost manner; changing mix of capital and labor in production process is known as **substitution effect**
    - **Scale & substitution effects of a wage increase:** have ambiguous effect on firm's desired stock of capital but both serve to reduce the demand for labor

More than 2 inputs:
- **Substitute inputs:** the greater use of one in producing output can compensate for reduced use of the other. Increases in price of the other input may shift the entire demand curve for a given category of labor either to right or left depending on strength of substitution and scale effects
- Increase in price of one input shifts demand for other input to left: scale effect has dominated the substitution effect and the 2 inputs are known as **gross complements**
- Increase shifts demand for other input to the right, substitution effect has dominated and the two inputs are **gross substitutes**
- **Perfect complements/complements in production:** two inputs must be used together

○ No substitution effect
○ Only scale effect
○ Two inputs must be gross complements

Figure 5.3

Effect of Increase in the Price of One Input (*k*) on Demand for Another Input (*j*), Where Inputs Are Substitutes in Production
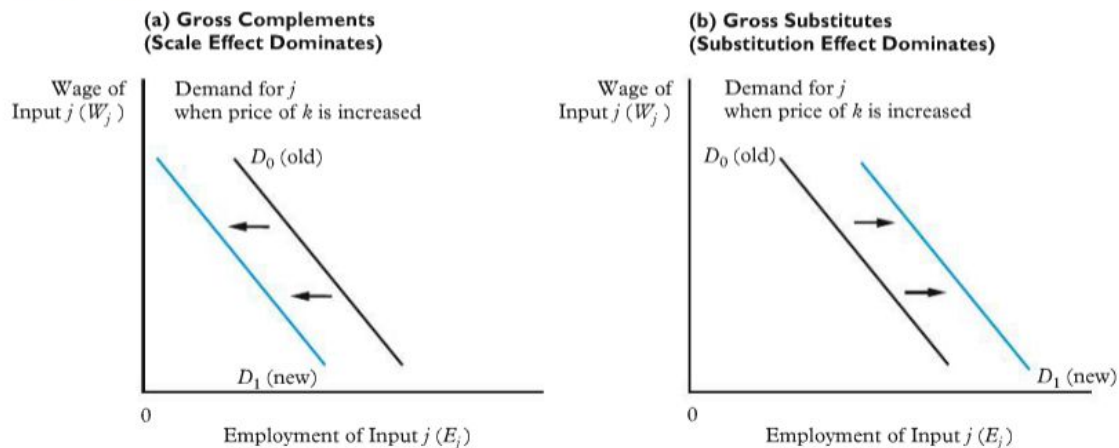
Labor demand when the product market is not competitive
- Monopolistic, noncompetitive product markers on the demand for labor
- Are not price takers

Maximizing monopoly profits
- Are not price takers
- Can expand sales by reducing product price, means that their marginal revenue from an extra unit of output is less than product price ($ME_L = W$)
- Monopolist would hire workers until marginal revenue product of labor (MRP_L) = wage rate
  ○ $MRP_L = MR \times MP_L = W$
- Express demand for labor in short run in terms of real wage:
  ○ $\frac{MR}{P} \times MP_L = \frac{W}{P}$
- $\frac{MR}{P}$ always less than 1: since marginal revenue is always less than a monopoly's product price
- Demand curve monopoly will lie below competitive market demand curve
  ○ Level of employment and level of profit-maximizing output is lower than competitive market

Do monopolies pay higher wages?
- Pay high wages and pass costs along to consumers in the form of higher prices

Policy application: the labor market effects of employer payroll taxes and wage subsidies

Who bears the burden of a payroll tax
- Effects on labor demand: Employees are not exempted from bearing costs when the government chooses to generate revenues through a payroll tax on employers
- Effects on labor supply: depends on amount of employer payroll tax that gets shifted to employee's wages
  - Less responsive labor supply to changes in wages: fewer employees who withdraw from market and higher proportion of tax that gets shifted to workers in the form of a wage decrease

Figure 5.4

The Market Demand Curve and Effects of an Employer-Financed Payroll Tax
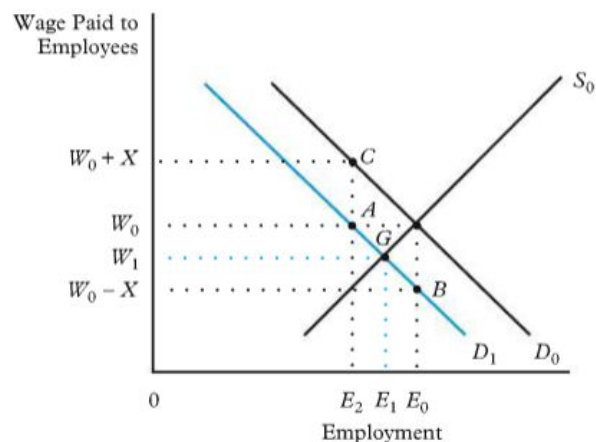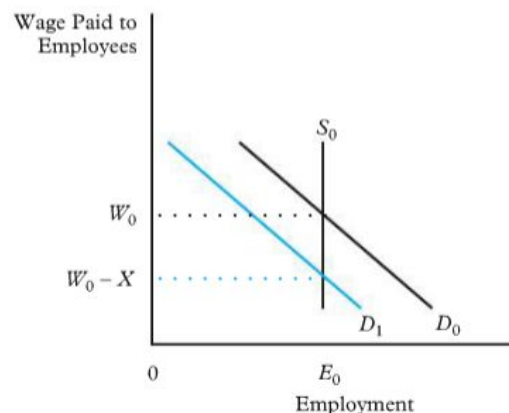

Figure 5.5

Payroll Tax with a Vertical Supply Curve

Employment subsidies as a device to help the poor
- Opposite of payroll tax

- Can be in form of cash payments or tax credits
- Credits may directly reduce firm's payroll-tax rate or reduce some other tax by amount proportional to number of labour hours hired. Credit has the effect of reducing the cost of hiring labor

Hiring subsidy programs:
- General: not conditional on the characteristics of the people hired
- Selective (or targeted): makes the subsidy conditional on hiring people from certain target groups (disadvantaged)

Payroll tax cuts:
- Stimulates hiring
- Cutting payroll taxes during period when there is high unemployment can increase employment
- Reduce employer payroll tax = labor demand curve would shift right

Figure 5.6

Payroll Tax Reductions in a Period of Widespread Unemployment