

ECON1101 Notes

Part II Perfect Competitive Markets

2.0 Introduction

- Market: is the set of all the consumers and suppliers who are willing to buy and sell that good or service, has reached equilibrium when the price and the quantity sold of a given good are stable
- Market equilibrium: occurs when the price and the quantity sold of a given good is stable, i.e. when the price is such that the quantity consumers demand is equal to the quantity supplied
- Characteristics of perfectly competitive markets
 - Consumers and suppliers are price takers:
 - Suppliers and consumers are willing/able to affect the market price
 - Homogenous goods
 - All suppliers sell exactly the same product
 - No externality
 - Externality: is a cost (or benefit) that is incurred by someone who is not involved in the production or consumption of a certain good
 - In a market with no externalities, all production costs and benefits are incurred by the supplier
 - Similarly, all the consumption costs and benefits are incurred by the consumer of the good
 - Goods are excludable and rival
 - Suppliers can prevent consumers from consuming a certain good (excludability), once consumed, that good becomes unavailable to other consumers (rivalry)
 - Full information
 - Free entry and exit to the market
- External cost: an external cost is a cost incurred by someone who is not involved in the production/consumption of a given good
- External benefit: an external benefit is a benefit accrued to someone who is not involved in the production/consumption of a given good

2.1 Supply Curve for an individual

- Marginal benefit: the marginal benefit of producing a certain unit of a given good is the extra benefit accrued by producing that unit
- Marginal cost: of producing a certain unit of a given good is the extra cost of producing that unit (relevant cost is the opportunity cost)
- Cost-benefit principle: states that an action should be taken if the marginal benefit is greater than the marginal cost
- Economic surplus: is the difference between the marginal benefit and the marginal cost of taking that action
- Supply curve: the supply curve represents the relationship between the price of a good or service and the quantity supplied of that good or service
- Law of supply: describes the tendency for a producer to offer more of a certain good or service when the price of that good or service increases
- Horizontal interpretation of the supply curve: Start from a certain price and find the associated quantity on the supply curve. The quantity you found indicates how many units the producer is willing to supply at that price.

- Vertical Interpretation (of the Supply Curve): Start from a certain quantity (say 2 units) and find the associated price on the supply curve. The price you found indicates the minimum amount of money the producer is willing to accept to offer the *marginal* unit (in our example the marginal unit would be the 2nd unit).

2.2 How to Derive the Supply Curve for a Firm

- Sunk cost: is a cost that once paid cannot be recovered
- Fixed cost: is a cost associated with a fixed factor of production (cost associated with it does not vary with the quantity produced)
- Short run: denotes a period of time during which at least one factor of production is fixed (sunk cost)
- Variable factor of production: the cost associated with the production varies with the number of units produced
- Variable cost: a cost associated with a variable factor of production
- Long run: denotes a period of time during which all factors of production are variable
- In the short run, the entrepreneur should shut down production if $\pi^{\text{production}} < -FC$, otherwise should hire the optimal number of workers and continue operations
- In the long run, the entrepreneur should exit the industry if $\pi^{\text{production}} < 0$, otherwise should hire the optimal number of workers and continue operations
- If $\pi^{\text{production}} = 0$ the entrepreneur is indifferent between exiting and continuing operations

2.3 From a discrete to a continuous model

- In the previous section we considered a model where the entrepreneur could only hire workers in whole numbers
- If labour supply was much more flexible would be a smooth curve
 - Provides quick hint on how many units of the good the entrepreneur should produce (expand the quantity produced until the price line – marginal revenue – intersects the marginal cost curve)
 - Whether the entrepreneur should shut down (if the price is line is below the minimum point on the average variable cost curve – shut down condition in the short run – or the average total costs curve – shut down condition in the long run)
- Other aspects of the productive problem we are considering
 - The supply curve for a firm can be derived by changing the price and observe the variation in quantity produced
 - In context: the supply curve is equal to the marginal cost curve for those values of the MC that are higher than the minimum AVC (in the short run) and higher than the minimum ATC (in the long run)
 - The entrepreneur will not produce anything if the price is below these points, in the short and long run respectively
 - The MC curve eventually increases with the quantity produced i.e. production process is subject to increasing marginal costs
 - The MC curve cuts the AVC + ATC curve at their minimum points
 - Marginal costs are the extra cost associated with the production of an extra unit
 - If the extra cost is smaller than the average cost, the average decreases
 - If the extra cost is higher than the average cost, the average increases
 - Remains constant only if the marginal cost is equal to the average cost
 - Hence the AVC curve and the ATC curve decrease initially as the MC curve is below them until the MC curve intersects, and they begin to increase
 - As an entrepreneur moves into the long run the AVC curve would become identical to the ATC curve as all costs become variable

- What causes shifts along the supply curve
 1. Technology: increases efficiency and therefore production
 2. Input prices: changes in these prices will affect the productive capacity of a firm/industry, reflected in the supply
 3. Expectations: expected future prices changes will make suppliers adjust their behavior to advantage (or shield themselves) from the new opportunities
 4. Changes in pricing for other products: if a seller is producing two or more goods, a surge in demand for one product will cause a shift of factors to the higher demanded good
 5. Number of suppliers: the higher the number of suppliers entering a market, the larger the right shift in the curve

2.4 Price Elasticity of supply

- Price elasticity of supply: denotes the % change in the quantity supplied resulting from a very small % change in price
- $\text{Elasticity}^A = (\Delta Q / Q^A) / (\Delta P / P^A)$ or $\text{Elasticity}^A = (\Delta Q / Q^A) * (1/\text{slope})$
 - Where the term slope indicates the gradient of the supply curve
- The law of supply states that supply curves tend to be upward sloping, and hence elasticity must be positive
- Supply is said to be:
 - Elastic if the elasticity is greater than 1
 - Unit elastic if the elasticity of supply is equal to 1
 - Inelastic if the elasticity of supply is less than 1

2.5 Determinants of Price Elasticity of supply

- What affects the willingness of sellers to adjust their productive decisions after a price change:
 - Availability of raw materials: larger availability, more elastic supply
 - Factors mobility: more mobile the factors of production the higher the elasticity
 - Inventories/excess capacity: the larger the amount of inventories and excess capacity, the higher the elasticity
 - Time horizon: the longer the time horizon, the higher the elasticity tends to be

3.1 Demand Curve for an Individual

- Utility: denotes the satisfaction that an individual derives from consuming a given good or taking a certain action, measured in utils per unit of time
 - Decreasing marginal utility: implies that the utility from consuming an extra unit of a given good decreases with the no. of units that have been previously consumed
- Substitution/income effect
 - Substitution effect captures the change in the quantity demanded of a given good following a change in its relative price
 - Income effect: captures the changes in the quantity demanded of a given good following the reduction in the consumer's purchasing power
 - For a normal good, a decrease (respectively increase) in income reduces (respectively increases) the quantity consumed
 - E.g. normal good = expensive wine, the richer you are the more you buy
 - E.g. inferior good = fast food, the richer you are the less you consume
 - The opposite applies in the case of an inferior good: a decrease (respectively increase) in income increases (respectively decreases) the quantity consumed

- Even when the good is inferior, the substitution effect is almost always stronger than the income effect, hence an increase in price of a good tends to reduce the quantity demanded
- Law of demand: demand curve tends to be downward sloping; as price increases demand decreases and vv.
- Demand curve: represents the relationship between the price of a given good/service and the quantity demanded
 - Horizontal interpretation: start from a certain price and then use the demand curve to derive how many units of the good will be consumed
 - Vertical interpretation: start from a given quantity, find the associated price

3.2 From a discrete to a continuous model

- If demand became flexible, the resulting demand graph would be smooth
- Factors that cause a shift to the right in the demand curve (a shift to the left is generated if these factors are reversed, i.e. the opposite)
 - Successful marketing campaign
 - Decrease in the price of compliments
 - Complements: when a decrease in the price of one causes an increase in the quantity demanded of the other
 - An increase in the price of substitutes
 - Substitutes: when an increase in the price of one good causes an increase in the quantity demanded of the other e.g. iPhone and Samsung's
 - An increase in income for a normal good
 - A decrease in income for an inferior good
 - A positive shift in consumer's preferences towards a certain good
 - Expectations of an increase in future prices that push the buyers to try to purchase the goods early
 - Population growth

3.3 Price Elasticity of demand

- Price elasticity of demand measures the responsiveness of the quantity demanded of a given good to changes in its price
- $\text{Elasticity}^A = (\Delta Q / Q^A) / (\Delta P / P^A)$ or $\text{Elasticity}^A = (\Delta Q / Q^A) * (1/\text{slope})$
 - where the percentage change in price is small, e.g. 1%
 - Almost always negative, due to the fact that price and quantity tend to move in opposite direction
 - For simplicity, will ignore the negative sign, and will just consider the absolute value of the price elasticity
- Demand is
 - Elastic if price elasticity of demand is greater than 1
 - Unit elastic if price elasticity of demand is equal to 1
 - Inelastic if price elasticity of demand is less than 1

3.4 Determinants of Price Elasticity of demand

- Factors that affect the willingness of an individual to adjust their consumption decisions after a price change
 - Availability of substitutes
 - The more substitutes, the more elastic demand tends to be
 - Definition of a good
 - The broader the definition of the good/service, lower the elasticity

- E.g. salt (as the category) has few substitutes and hence low elasticity, but salt brands have a high elasticity as there are alternatives
- Income share
 - The larger the share of income required to purchase a good/service, the higher the elasticity
 - E.g. 80% increase in a pen, wouldn't really affect decision, 80% in holiday would affect the decision
- Time horizon
 - The longer the time horizon, the higher the elasticity tends to be
 - As buyers can search for alternative substitutes

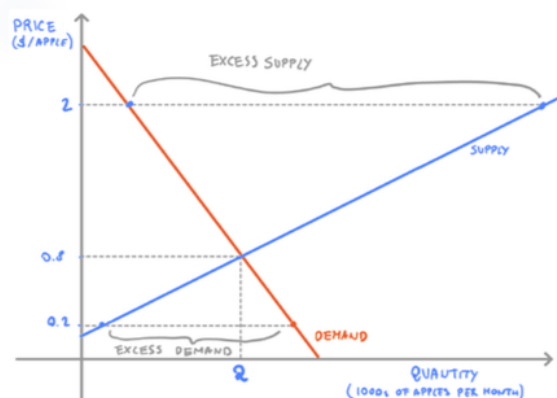
4.1 Demand and Supply Aggregation

- In order to find the supply curve of a market (with two or more suppliers), sum up the two supply curves horizontally
- i.e. take one price and see how much producer produces and add up this value
- in order to obtain the aggregate demand for a market (with two or more consumers), sum up the demand curves horizontally i.e. same as for supply
- the **aggregate demand and supply** is the horizontal sum of the individual demand and supply curves

4.2 Market Equilibrium

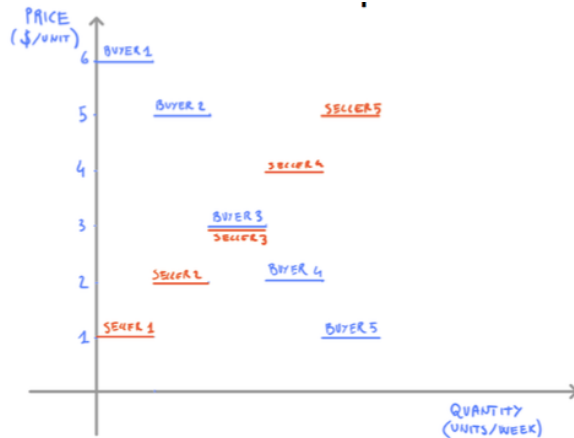
- **equilibrium:** the equilibrium price (quantity) represents the price (quantity) such that the quantity supplied equals the quantity demanded
- equilibrium mechanism
 - any other price would create either excess demand or excess supply
 - in the case of excess supply, sellers that are left without buyers, find it desirable to lower the price in order to attract buyers
 - in the case of excess demand, buyers who are unable to secure the good, will be willing to pay a higher price
 - this will continue until excess demand/supply is eliminated

Market Equilibrium



- in order for a market to be perfectly competitive, buyers and sellers need to be (equilibrium) price *accepters*
- reservation prices:
 - reservation price: the reservation price of a buyer is the highest price a buyer is willing to pay for a given good

- reservation price (seller): is the lowest price a seller is willing to accept for a given good
 - if the price at which the good is sold is below the RP the seller will not supply the good
- indicate the opportunity costs associated with acquiring (for the buyers) and producing (for the sellers) the good, measured in dollars

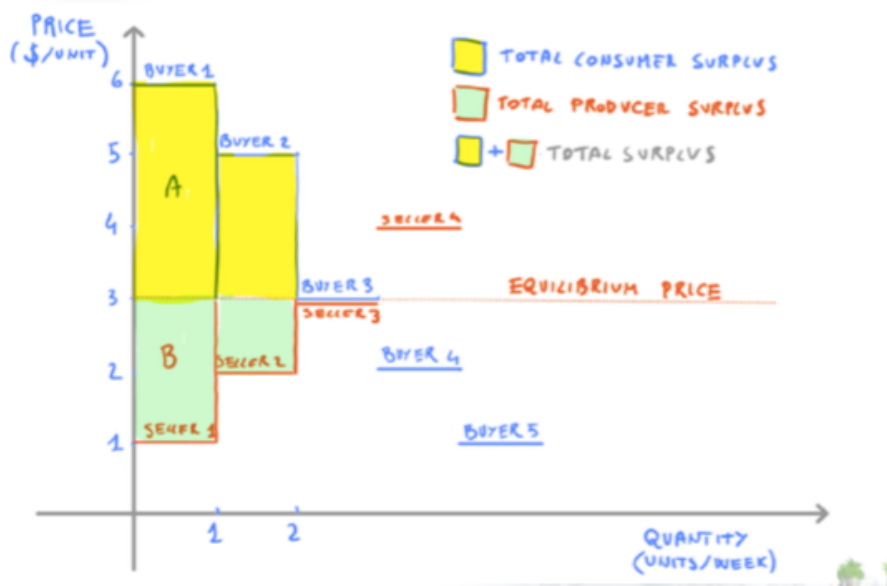


- rationing rule: states that buyers who value the good more will be the first to buy it
 - allocation mechanism can then be constructed as a sequential game
 - the buyer with the highest reservation price moves first and decides which seller to approach, the price requested = common knowledge
- want to show that in equilibrium
 - every seller sells at the same price
 - the price is such that the quantity demanded is equal to the quantity supplied
- consumer surplus
 - occurs when the buyer pays less than they are willing to pay for a good
 - = (reservation price) – (price actually paid)
 - as the consumer surplus is +, cost-benefit principle suggests that the buyer should indeed acquire
- producer surplus
 - occurs when the producer receives a price that is higher than she is willing to accept (reservation price)
 - = (price received) – (reservation price)

4.3 Consumer and Producer Surplus

- the area comprised between the reservation price and the market price for each consumer and producer represents their economic surplus
- **total consumer surplus:** represents the sum of the economic surplus of all consumers
- **total producer surplus:** represents the sum of the economic surplus of all producers
- **total surplus:** is the sum of the total consumer surplus and total producer surplus
 - is maximized exactly at the equilibrium price
 - can be checked by calculating the total surplus for any alternative price
- in larger markets

- the total consumer surplus is equal to the area below the demand curve and above the market equilibrium price
- the total producer surplus is equal to the area above the supply curve and below the market equilibrium price



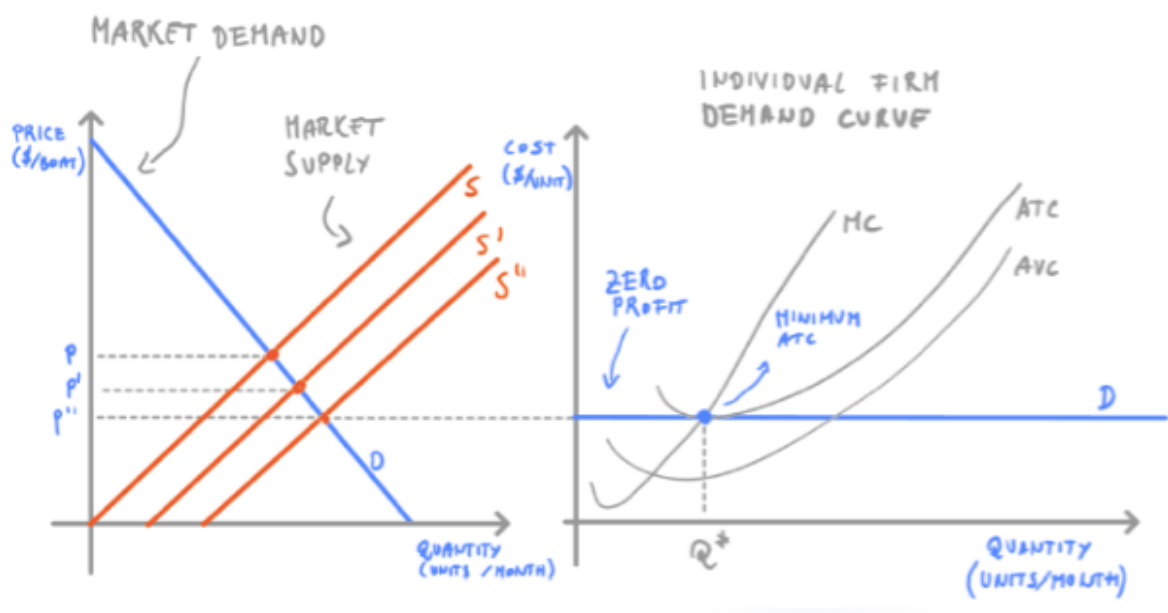
4.4 About Models – watch the videos

4.5 Consumer and Producer Surplus

- **Pareto efficiency:** is an outcome situation in which it is impossible to make any individual better off without making at least one other individual worse off
 - A situation is Pareto efficient if there is no transaction that can be arranged that would make someone better off without harming someone else
 - Perfectly-competitive market equilibrium is Pareto efficient as any attempt to move the price from equilibrium results in a reduction of the total surplus i.e. someone is worse off
 - One problem is that is completely agnostic in terms of equity, makes no statement about overall well-being of society
 - Is a valuable but cannot be the final goal, once achieving max social surplus society should consider how to redistribute the surplus
- **Pareto improving transaction:** transaction where all parties involved are better off
- Markets are capable of coordinating production in a way that eliminates any excess supply or demand autonomously
- Markets achieve this in a way that is Pareto efficient, the total societal surplus is maximized, no alternative outcome that could make society as a whole better off

4.6 Competitive Markets are great! The Invisible Hand (Long Run)

- The invisible hand principle states that individuals' independent efforts to maximize their gains (profits for sellers; utility for buyers) will generally be beneficial for society and result in the socially optimal allocation of resources
- In the long run, firms produce at lowest possible ATC
 - Existing firms can adjust all their factors of production (and perhaps exit) → it's the long run
 - new firms can enter the market (as long as $\pi_{\text{production}} > 0$)
 - S curve shifts to right → $P^* \downarrow$
 - $\pi_{\text{production}} \downarrow$ until $\pi_{\text{production}} = 0$
 - firms produce Q^* such that ATC is minimized
 - $P^*_{\text{LR}} = \min(\text{ATC})$!!!**
 - what if initially $\pi_{\text{production}} < 0$?



4.7 The Long Run Supply Curve in a More General Model

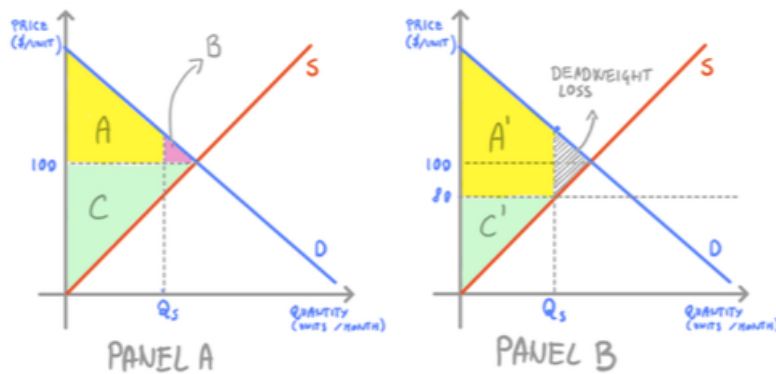
- Previously the long run supply curve is horizontal which only holds if all firms have the same identical productive technology
- A model with heterogeneous firms is harder to represent, with curves being upward/downward sloping

5.1 Price Ceiling

- Price ceiling:** represents a maximum allowable price imposed by the government
 - a price ceiling above equilibrium will have no impact
- the introduction of a price ceiling
 - forces the price down, creating excess demand
 - the lucky buyers with the highest willingness to pay can acquire the good at a lower price – rationing assumption and so their surplus increases compared with the surplus they get in the absence of the price ceiling
 - however, one group that could previously acquire the good, can no longer, simply the result of the reduction in price that occurs after the introduction of the price ceiling, reducing the quantity producers are willing to supply
 - producers are definitely worse off

- the price ceiling is doomed to decrease the total surplus in the economy, i.e. deadweight loss
- deadweight loss: is the loss in economic surplus due to the market being prevented from reaching the equilibrium price and quantity where marginal benefit equals marginal cost

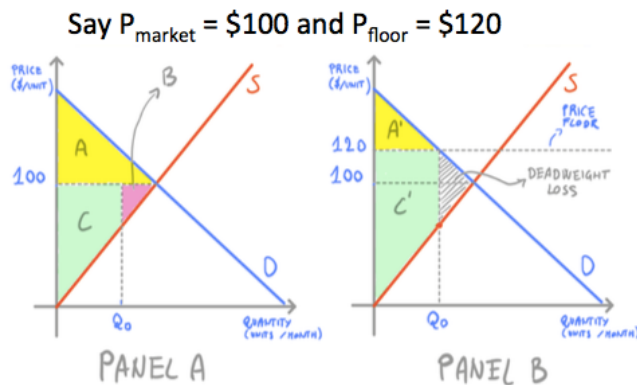
Say $P_{\text{market}} = \$100$ and $P_{\text{ceiling}} = \$80$



If $P_{\text{market}} < P_{\text{ceiling}} \rightarrow$ policy has no effect !!

5.2 Price Floor

- price floor: is a minimum allowable price, the opposite of a price ceiling
 - if it set below the market price it will no effect, the market will push the price above the price floor until it reaches the equilibrium
 - if imposed above equilibrium price the market will be forced to settle at the price level dictated by the price floor
 - generate excess supply
 - the producers who manage to sell the good benefit from the higher price imposed by the government, the producers who do not experience a sharp decline in surplus
 - all consumers are worse off
 - the introduction of any price floor unambiguously decreases the total surplus in the economy (dead weight loss)
- inefficiency of this policy
 - those who lose are the producers and consumers who are no longer able to buy and sell the good
 - the consumers who are able to buy the good but have to pay a higher price
 - they experience a loss in surplus, would be willing to pay the winners (producers that continue to sell and now at a higher price) in exchange for the elimination of the policy



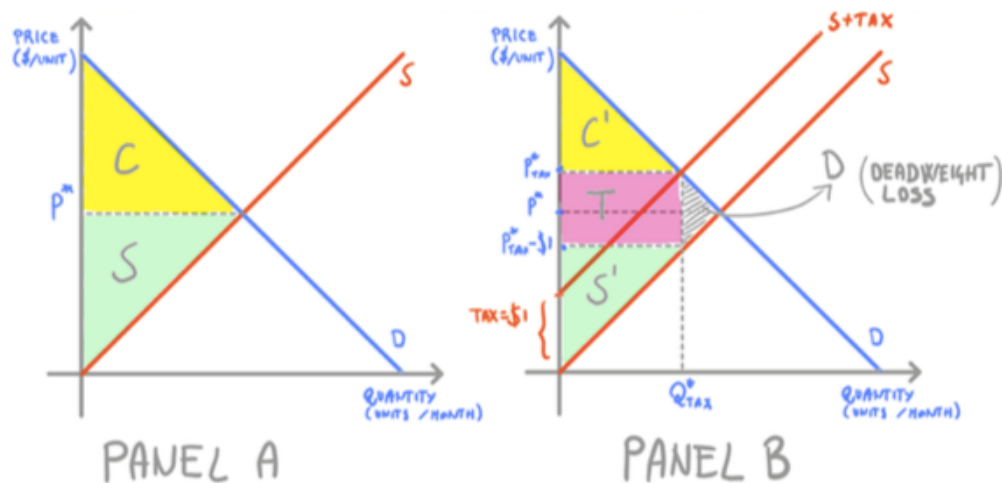
If $P_{\text{market}} > P_{\text{floor}} \rightarrow$ policy has no effect !!

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5.3 Taxation

- often used to improve the distribution of income and opportunities across different population groups
- generates tax revenues – used to redistribute wealth within a society
- consider a per-unit tax imposed on each of the goods sold in the market
 - for the supplier, the effect of this tax is similar to an increase in the production cost, the marginal cost increases by exactly the tax amount
 - shifts the supply curve to the left, where the vertical distance between the original curve and shifted one = tax amount
 - the equilibrium price increases, and equilibrium quantity decreases after intro of a tax
 - the consumers bear only a fraction of the tax burden, as they suffer an increase in price that is smaller than the full tax amount
 - the remaining part of the tax burden must be borne by the producers
 - both producers and consumers are worse off, the government however receives tax revenue, which can be used to benefit the buyers and sellers
 - deadweight loss arises from taxation because after imposing a tax, the market reaches an equilibrium price and quantity where the marginal benefit equals the marginal cost plus the tax
- in order to understand how inefficient tax can be, consider;
 - consumers and producers (losers) lost more than the tax revenues accrued to the government
 - hence the losers would prefer to pay the winner the exact amount it gained from the intervention in exchange for cancellation of tax
 - taxation creates a loss in economic surplus
- what is the most efficient way of collecting tax revenues?
 - The more elastic supply and demand are at the initial equilibrium price, the bigger the deadweight \rightarrow if supply and demand are highly elastic, even a small tax will determine a large reduction in the quantity demanded and supplied
 - The larger the reduction in the quantity exchanged, the larger the reduction in tax revenue
 - Should apply tax to a less responsive market (lowest elasticity)

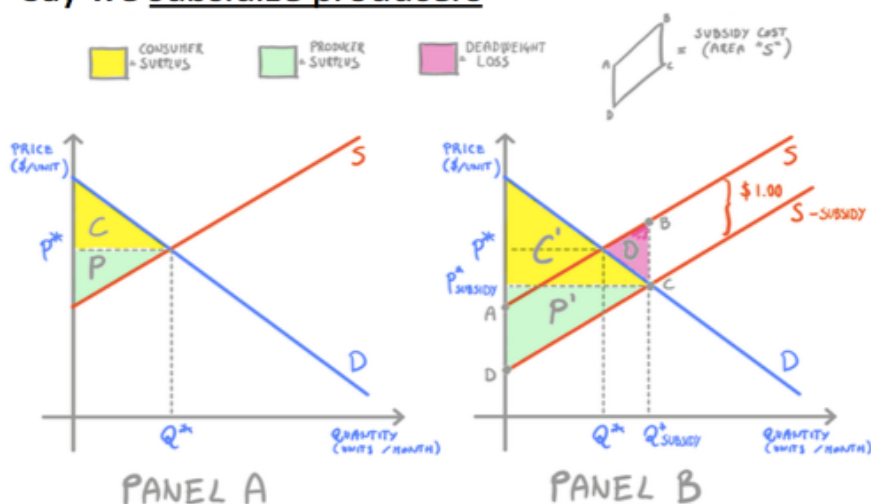
Say we tax producers (Who bears the tax burden?)



5.4 Subsidy

- is the opposite of a tax, essentially the government pays the seller for each unit of good sold to enable them to compete on the international market
- it helps decrease the marginal cost of domestic producers and so the supply curve shifts to the right
- the market experiences a reduction in price, and increase in quantity exchanged
- it is a cost for the government, and creates a deadweight loss in the economy
- the 'winners' of this policy are the consumers and producers, but it costs more to the Government then it benefits the people

Say we subsidize producers



6.1+6.2 Exporting Country and Importing Country

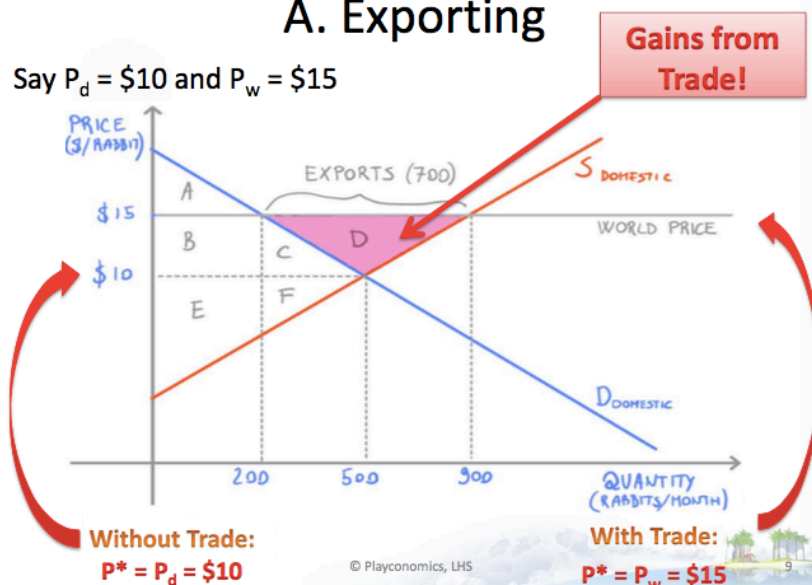
Key Definitions

- ✓ **domestic price:** represents the equilibrium price that would occur in a country if no international trade is allowed
- ✓ **world price:** represents the equilibrium price on the international market

- ✓ **small open economy:** is an economy that participates in international markets for goods and services, but its production or consumption is small enough compared to the rest of the world that its supply or demand does not affect the world price
 - ✓ **closed economy:** is an economy that does not engage in international trade
 - ✓ **open economy:** an economy that engages in international trade
 - ✓ **gains from trade:** capture the extra total surplus available in an open economy situation compared to a closed economy (come from international consumers)
- if $P^d < P^w$ our country has comparative advantage in producing that good + will become an exporter upon opening up to international trade
 - consumer surplus is the area above P^d and below the demand curve
 - producer surplus is the area above the supply curve and below the price P^d
 - together this represents our total surplus
 - small open economy
 - has a certain P^d (domestic price)
 - takes P^w (world price) as given
 - no seller will accept less than P^w as they could always sell overseas at P^w
 - no buyer will pay more than P^w as they can always buy from overseas at P^w

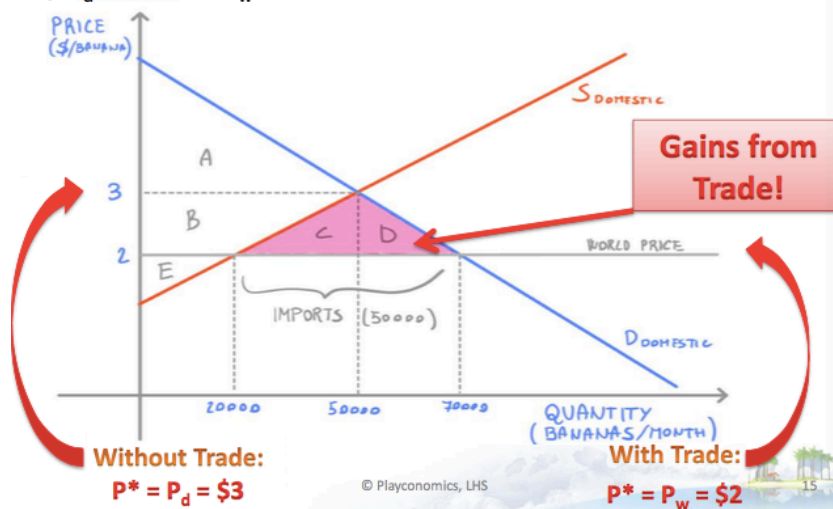
A. Exporting

Say $P_d = \$10$ and $P_w = \$15$



B. Importing

Say $P_d = \$3$ and $P_w = \$2$



6.3 Winners and Losers from International Trade

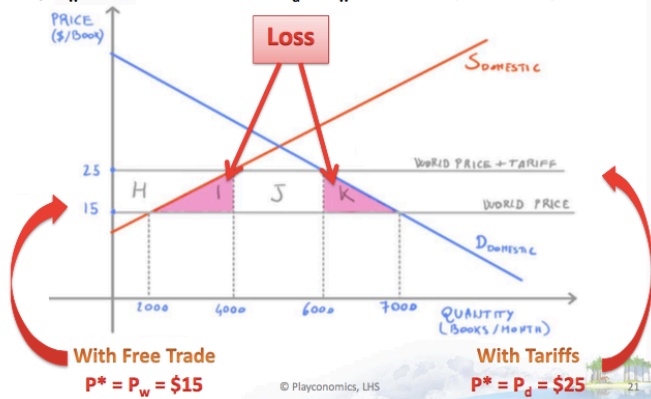
- if a country exports/imports the total surplus is higher with trade however;
 - domestic consumers lose surplus when their country starts to export
 - domestic producers lose surplus when their country starts to import
- the consumers/producers if they are powerful enough may lobby the government to restrict free trade
- as the gains from trade are often thinly spread over many consumers, losses felt strongly by a small group of producers, the lobbying is done by domestic producers wanting to restrict imports
- other benefits from engaging in trade
 1. consumers have access to a wider variety of goods
 2. producers may be able to take advantage of economies of scale by selling to a larger market
 3. domestic monopolies or oligopolies might face international competition, reducing their market power
 4. the flow of ideas and technology is faster and easier

6.4 Trade Restrictions

- **import tariff:** represents a tax on imported goods or services
- **import quota:** represents a quantity limit on the amount of goods or services permitted to be imported
- the placement of a tariff on a particular good has rippled effects
 - it benefits domestic producers as they receive more revenue, as the tariff places the price up for all goods
 - it benefits the government as they receive the revenue from the tariff
 - but domestic consumers have to pay more for the particular good
 - consumers lose more than what the producers and government gain – the deadweight loss of the tariff

C. Trade Restrictions: Tariffs

Say $P_w = \$15$ & $t = \$10 \rightarrow P_d = P_w + t = \25 (all books)



- the placement of a quota has similar affects
 - governments do not receive any revenue
 - importers however are the winners here, as they pay \$15 for the good and sell it for \$25

D. Trade Restrictions: Quotas

Say $q = 2,000$ books per month

