Demand-Supply

Important Definitions:

Price Mechanism = The way in which prices are determined by free forces of demand and supply, acting as automatic signals which coordinate the actions of individual decision-making units who seek only to maximise their self interest.
Demand = The amount of a good that consumers are willing and able to purchase at each given price over a given period of time.
Quantity Demanded = The amount of a good that a consumer is willing and able to buy at a given price over a given period of time.
Consumers' Surplus = The difference between the maximum amount that consumers are willing to pay for a given quantity of a good and what they actually pay
Supply = The quantity of a good or service that producers are willing and able to offer for sale at each given price over a given period of time.
Producers' Surplus = The difference between the amount received by producers for selling their good and the minimum amount that they are willing and able to accept to produce the good.
Equilibrium = A position of balance, a position from which there is no inherent tendency for change. (i.e. no incentive to change their present economic actions)
Equilibrium Price = The price where the quantity demanded equals the quantity supplied (i.e. The price where there is no shortage or surplus.).
Price Elasticity of Demand = The measure of the responsiveness of the quantity demanded of a good to a change in its price, ceteris paribus.
Income Elasticity of Demand = The measure of the responsiveness of demand of a good to a change in the consumers' income, ceteris paribus.
Cross Elasticity of Demand = The measure of the responsiveness of demand of a good to a change in the price of another good, ceteris paribus.
Price Elasticity of Supply = The measure of the responsiveness of quantity supplied to a change in the commodity's own price, ceteris paribus.
Specific Tax = A constant sum levied on each unit of the good sold.
Ad Valoreum Tax = A tax pegged at a certain percentage of the price of the good.
Incidence of Tax = The distribution of the burden of taxation between consumers and sellers after the equilibrium price has risen after tax imposition.

Demand Theory:

Demand = The amount of a good that consumers are willing and able to purchase at each given price over a given period of time.
Quantity Demanded = The amount of a good that a consumer is willing and able to buy at a given price over a given period of time.

- Quantity demanded of a good/service is inversely related to its price, ceteris paribus.
    - i.e. Demand curve is downward sloping
    - *Income effect

        - ↑P ⇒ ↓p.p. ⇒ ↓ real income ⇒ Consumer is able to afford less of the good ⇒ ↓Qd
    - *Substitution effect
        - ↑P ⇒ Consumers substitute relatively cheaper goods for that good in order to maximise satisfaction with given income ⇒ ↓Qd
- Demand curve represents the maximum price consumers are willing and able to pay for each quantity of the good
    - Represents consumers' marginal willingness to pay
- Law of diminishing marginal utility
    - As quantity of good consumed increases, additional utility from additional unit of goods decreases
    - Hence, in order for one to be willing to buy greater quantity of goods, price has to be lower
- Non-price determinants of demand (TIGER PIE)
    - **T**aste and Preferences
        - Influences consumers' desired purchases
        - More desirable a good, the greater the demand
        - Factors affecting taste and preferences:
            - Advertisements
            - Age
            - Culture
            - Education
        - Seasonal Changes (subset)
            - Climate condtions (e.g. summer vs winter)
            - Festivals (e.g. CNY, Valentine's Day)
    - **I**ncome
        - Change in income leads to re-adjustments of consumers' expenditure patterns
        - Normal goods
            - When income increases, demand increases (i.e. rightward shift of the demand curve)
        - Inferior goods
            - When income increases, demand decreases (i.e. leftward shift of the demand curve)
    - **G**overnment Policies
        - Direct Tax = Tax on people's income
            - When income tax increases, people's disposable income decreases, hence purchasing power decreases and therefore, demand decreases
        - Direct Subsidy = Payments by government to consumers
            - When direct subsidy increases, people's disposable income increases, hence purchasing power increases and therefore, demand increases
    - **E**xpectations of Future Prices
        - If price expected to increase, demand increases even before prices have increased

    - Prices of Inter**R**elated Goods
        - Substitute (Competitive demand) = Good that can be used in place of another
            - When price of a substitute increases, good A becomes relatively cheaper, hence demand for A increases
            - Leads to eventual increase in price of B
        - Complement (Joint demand) = Good that can be used in conjunction with another
            - When price of a complement increases, demand for both goods decreases
            - Leads to eventual decrease in price of B
        - Derived Demand = The demand for the factor of production that occurs as a result of the demand for another intermediate/final good or service.
            - When demand for product increases, demand for factors of production increases
            - Leads to eventual increase in price of derived demand
            - e.g. Labour
    - **P**opulation
    - **I**nterest Rates
    - **E**xchange Rates
- Quantity Demanded vs Demand
    - Quantity Demanded = A point on the demand curve
        - Change in **quantity demanded** involves a **movement along** (upward/downward movement) the demand curve
    - Demand = Entire demand curve
        - Change in **demand** involves a **shift in the demand curve** (leftward/rightward shift)
- Consumers' Surplus = Max consumers are willing to pay - Actual price
    - Max consumers are willing to pay indication of benefit that consumers derive from buying the good
    - Consumers will buy up to the point where marginal benefit = marginal cost
    - Measure of consumer welfare

Supply Theory:

- Quantity supplied of a good is directly related to its price, ceteris paribus
    - i.e. Supply curve is upward sloping
    - Beyond a certain output level, workers have to be paid overtime and machines reach working capacity
        - Higher prices induce firms to increase quantity supplied due to higher marginal benefit covering the higher marginal cost
- Supply curve represents the minimum price producers are willing and able to supply for each quantity of the good
    - Represents marginal cost of producing each marginal unit
- As number of goods produced increases, marginal cost of producing additional good also increases

    - Hence, in order to induce firms to increase quantity supplied, price increases so that the higher marginal cost can be covered by the marginal benefit
- Non-price determinants of supply (ECoNNS GP)
    - **E**xpectations of Future Prices
    - **Co**sts of Production (Prices of Factors of Production)
    - **N**atural Factors
    - **N**umber of Firms
    - **S**tate of Technology
        - Technological advances in the industry increases the productivity of the factors of production
        - Unit cost of production lower
    - **G**overnment Policies
        - Indirect taxes = Tax on expenditure of goods and services (e.g. GST)
            - Levied on producer (Paid by producer to the government)
            - When indirect tax increases, minimum price at which producers are willing and able to produce a certain quantity of the good increases and hence, leads to a fall in supply and a leftward shift in the supply curve
        - Indirect subsidies = Payment made to producers by government
            - When indirect subsidy increases, minimum price at which producers are willing and able to produce a certain quantity of the good decreases and hence, leads to a rise in supply and a rightward shift in the supply curve
    - **P**rices of Interrelated Goods
        - Joint Supply = Production of goods that are derived from a single product
            - A and B produced at the same time
            - Increase in supply of A leads to increase in supply of B
            - Leads to eventual decrease in price of B
        - Competitive Supply = Production of one good or the other by a firm
            - Either A or B produced with the factor resources
            - Increase in supply of A leads to decrease in supply of B
            - Leads to eventual increase in price of B
- Supply vs Quantity supplied
    - Quantity Supplied = A point on the supply curve
        - Change in **quantity supplied** involves a **movement along** (upward/downward movement) the supply curve
    - Supply = Entire supply curve
        - Change in **supply** involves a **shift in the supply curve** (leftward/rightward shift)
- Producers' Surplus = Actual price - Min producers are willing to sell

Demand-Supply Model

Price adjustment process

- When prices above equilibrium price, quantity supplied exceeds quantity demanded
    - Surplus in the market and downward pressure on prices

    - Producers are unable to sell at that price and thus will lower their prices
    - Consumers recognise the surplus and hence, offer lower prices
    - Market price will fall until equilibrium price (i.e. quantity demanded = quantity supplied) reached
- When prices below equilibrium price, quantity demanded exceeds quantity supplied
    - Shortage in market and upward pressure on prices
    - Consumers are unable to purchase all they want of the good and thus will offer higher prices
    - Producers recognise the shortage and are willing to increase quantity supplied at higher prices
    - Market price will increase until equilibrium price is reached

<u>How the free market achieves efficient allocation of resources?</u>
Assumptions:

- Markets are perfectly competitive with no single producer or consumer having a significant market power to influence the market demand and supply
- Both consumers and producers are rational and driven by self-interest
- Absence of all sources of market failure
- There is freedom of choice and enterprise
    - Consumer sovereignty - Free to decide what to buy with their incomes
    - Producers free to choose what to sell and what production methods to use
- Private ownership of property

Allocative efficiency:

- Demand is the amount of goods and services that consumers are willing and able to purchase at each given price level over a given period of time
    - In the pursuit of self interest, consumers will seek to maximise CS ⇒ Consumers willing to increase Qd when P falls, c.p.
    - Law of diminishing marginal utility where marginal utility decreases as quantity of the good consumed increases ⇒ DD curve is downward sloping
    - DD curve represents value of the good to consumers ⇒ Consumers' MB derived from consuming additional unit of the good
- Supply is the amount of goods and services that producers are willing and able to produce at each given price level over a given period of time
    - In the pursuit of self-interest, producers will seek to maximise PS ⇒ Producers only willing to increase Qs if P increases c.p.
    - Law of diminishing marginal returns in production ⇒ Increasing marginal costs of production ⇒ SS curve is upward sloping
    - SS curve represents MC of producing an additional unit of the good
- Allocative efficiency achieved when value society places on the last unit of the good (P) = Opportunity cost in terms of resources used in producing the last unit of the good (MC) ⇒ i.e. When DD=SS ⇒ Maximises society's welfare as CS and PS maximised

How prices achieve efficient allocation of resources:

- Prices perform signalling function and incentive function
    - Provide information to both producers and consumers about changes in market conditions
        - e.g. When DD increases, at current price levels, there is a shortage created as Qs is less than Qd ⇒ Upward pressure on prices ⇒ Rise in price is a signal to consumers to reduce Qd along the DD curve + incentivises producers to increase Qs along the SS curve ⇒ [see below] ⇒ More resources reallocated to the market due to price signals ⇒ When price finally reaches new equilibrium where DD=SS, shortage is eliminated as Qd = Qs ⇒ Society's welfare is maximised ⇒ Achieves allocative efficiency
- Prices perform rationing function
    - Prices serve to ration scarce resources when DD > SS
        - e.g. When DD increases, at current price levels, there is a shortage ⇒ Consumers bid up prices ⇒ Only consumers with the willingness and ability to pay will be able to consume the goods produced
- How producers decide how to produce
    - Increase in prices incentivises producers to increase production ⇒ Demand for factors of production is a derived demand ⇒ Producers will to pay more for factors of production ⇒ More factors of production channeled from other industries to the industry with higher demand to increase production ⇒ More resources reallocated to the market
    - Producers decide which factors of production to use based on the relative prices of the factors of production
        - e.g. If labour is relatively more expensive, producers will use more capital goods

Elasticities

- Price Elasticity of Demand = % Change in quantity demanded/% Change in price of good
    - Price elastic demand = Fall in price leads to more than proportionate rise in quantity demanded and vice versa (PED>1)
    - Price inelastic demand = Fall in price leads to less than proportionate rise in quantity demanded and vice versa (PED<1)
    - Determinants
        - Substitutes: More substitutes, more price elastic demand
        - Habitual consumption: If good is bought habitually, generally price inelastic demand

        - % Income spent: Higher proportion of income spent, more price elastic demand
        - Time period: Shorter time period, more price inelastic demand
    - Applications
        - Firms' Pricing Decisions
            - Price elastic demand: Decrease in price leads to more than proportional rise in quantity demanded, hence increasing total revenue
            - Price inelastic demand: Increase in price leads to less than proportional fall in quantity demanded, hence increasing total revenue
        - Timing of pricing and marketing decisions
            - Short run: Demand relatively price inelastic, adopt price adjustment strategy to increase total revenue
            - Long run: Demand relatively more price elastic, focus on product differentiation to make product less substitutable and hence, less price elastic demand
        - Important in determining extent of price change when supply curve shifts
            - For a given increase in supply, price will fall and quantity demanded will rise a larger extent for price inelastic demand than for price elastic demand.
            - Direction of total revenue change when supply curve shifts depends on PED
        - Indirect taxes
            - Tax revenue larger when imposed on goods with price inelastic demand
- Income Elasticity of Demand = % Change in quantity demanded/% change in income
    - Inferior good = Increase in income leads to fall in demand, ceteris paribus (YED<0)
    - Income inelastic good (Luxury goods) = Increase in income leads to less than proportionate increase in quantity demanded (0<YED<1)
    - Income elastic good (Necessities) = Increase in income leads to more than proportionate increase in quantity demanded (YED>1)
    - Determinants
        - Level of economic development of the country
            - A good may be viewed as a luxury in a developing country but in a developed country, it could be viewed as a necessity
        - Level of income of consumer
            - A good may be viewed as a luxury to consumers at lower income levels but to a consumer with higher income levels, it could be viewed as a necessity or even an inferior good
    - Applications
        - Firms could try to predict the trends of income levels and produce goods accordingly
            - If income is rising, firms could try to produce more income elastic goods
            - If income is falling, firms could try to produce more income inelastic

goods
        - Firms could segment the market into different income groups and produce the appropriate range of products to suit the different income groups
        - Governments could predict demand patterns based on changes in the income levels and project changes in government policies
- Cross Elasticity of Demand (of B w.r.t. to A) = % Change in demand of good B/% Change in price of good A
    - Substitutes = Increase in price of A leads to increase in quantity demanded of B (CED >0)
    - Complements = Increase in price of A leads to fall in quantity demanded of B (CED<0)
    - The larger the magnitude of CED, the greater the degree of substitutability/complementarity.
    - Applications
        - Firm with product with high positive CED in relation to rival's product would respond to changes in the price of rival's product.
        - Firm would try to make its good less substitutable so that it is less affected by the pricing policies of rival firms
        - Firms with products that are complements of each other could collaborate
- Price Elasticity of Supply = % Change in quantity supplied/% Change in price of good
    - Price elastic supply = Rise in price leads to more than proportionate rise in quantity supplied and vice versa (PES>1)
    - Price inelastic suppy = Rise in price leads to less than proportionate rise in quantity supplied and vice versa (PES<1)
    - Determinants
        - Time period: Shorter time period, more price inelastic supply
        - Factor mobility: More easily and quickly resources can be shifted from one industry to another, the more price elastic supply
        - Number of firms: Greater number of firms, more price elastic supply
        - Stocks/Spare capacity: Greater stocks/spare capacity, more price elastic supply
    - Application
        - Important in determining extent of change in price when demand curve shifts
            - For a given increase in demand, price will rise a larger extent and quantity demanded will rise a smaller extent for price inelastic demand than for price elastic demand.
            - Price inelastic goods have larger price fluctuations than price inelastic goods
            - Total revenue always increases when demand increases and vice versa
- Limitations of elasticity concepts
    - Difficulty in calculating exact values
    - Estimates become outdated quickly
    - Ceteris paribus assumption is unrealistic

Government Intervention

- Indirect taxes
    - Leads to leftward shift of supply curve
    - Specific tax: Parallel shift of supply curve
        - Leads to decrease in supply
    - Ad valoreum tax: Pivotal shift of supply curve
        - Leads to decreased and more price inelastic supply
    - Incidence of tax can be shifted to the consumer through an increase in selling price
        - Extent depends on PED and PES
        - Relatively more price inelastic demand and price elastic supply: Consumers bear higher burden of the tax
        - Relatively more price elastic demand and price inelastic supply: Producers bear higher burden of the tax
    - Leads to deadweight loss to society due to allocative inefficiency by under-allocation of scarce resources to the production of the good
- Price floor
    - Set above market equilibrium price
    - To provide income support for farmers and protect low skilled and low wage workers
    - Consequences
        - Surplus as quantity supplied exceeds quantity demanded
        - Deadweight loss to society due to allocative inefficiency by over-allocation of scarce resources to the production of the good
        - Minimum wage
            - Firms may develop and switch to labour-saving techniques of production
            - May lead to illegal employment of workers at wages below legal minimum wages
- Price ceiling
    - Set below market equilibrium price
    - To achieve some form of equity and make necessities more affordable for low-income earners
    - Consequences
        - Shortage as quantity demanded exceeds quantity supplied
        - Deadweight loss to society due to allocative inefficiency by under-allocation of scarce resources to the production of the good
        - Non-price rationing by coupons/queues etc.
        - Emergence of black markets as people sell goods illegally at prices above the maximum price
    - Governments can try to encourage supply by
        - Drawing on past surpluses
        - Engage in direct production
        - Give subsidies/tax relief to producers
    - Governments can try to reduce demand by

- Controlling income
- Providing more alternatives

Things to note:

Drawing Demand/Supply Curves:

- Label axes
- Label the demand/supply curve(s)
- x-axis = Price
- y-axis = Quantity

Markets are not always in equilibrium nor are their prices always at equilibrium. However, in dynamic markets, quantity and price levels will always tend towards the equilibrium.