H2 Economics – Content Clinic 1

(Price Mechanism)

1. Demand, Supply & Elasticities

2.1 Price Mechanism and its Applications

2.1.1 Price mechanism and its functions
- a. Resource allocation in a free market

2.1.2 Interaction of demand and supply
- a. Determinants of demand and supply
- b. Equilibrium price and equilibrium quantity
- c. Changes in demand and supply leading to changes in market equilibrium

2.1.3 Applications of demand and supply analysis to real-world markets*
- a. Responsiveness of consumers and/or producers
  - Price elasticity of demand
  - Price elasticity of supply
- b. Impact of market outcomes on consumers and producers#
  - Consumer expenditure and producer revenue^
- c. Rationale and impact of government intervention on consumers and producers
  - Taxes and subsidies
  - Price controls – maximum and minimum prices
  - Quantity controls – quotas

a. Key Definitions:
   i. **Demand** is defined as the quantity of a good (or service) that a consumer is both willing and able to buy at each possible price during a given period of time, ceteris paribus.
   ii. **Supply** is defined as the quantity of a good or service that a producer is both willing and able to sell at each possible price during a given period of time, ceteris paribus.
   iii. **Price elasticity of demand** (PED) is a measure of the degree of responsiveness of the quantity demanded for a good to a change in the price of the good itself, ceteris paribus.
   iv. **Price elasticity of supply** (PES) is a measure of the responsiveness of the quantity supplied of a good to changes in its price, ceteris paribus.
   v. **Income elasticity of demand** (YED) is a measure of the degree of responsiveness of the demand for a good to a change in the income, ceteris paribus.
   vi. **Cross elasticity of demand** (XED or CED) is a measure of the degree of responsiveness of the demand for one good to a change in the price of another good, ceteris paribus.

b. Key Concepts

i. Demand & Supply

	Demand	**Quantity Demanded**
Graphical Representation	Refers to the entire demand curve	Refers to a point on the demand curve
Shift vs Movement	• A change in non-price factors will cause a shift in the demand curve. • When demand ↑/↓ (shifts right/left), it means that qty dd has ↑/↓ at all prices.	A change in the price of the good will cause a movement along the demand curve.
Factors	• **E**xpectations of future price change • **G**ovt policies • **Y** - income • **P** - Price of related goods (substitutes/Complements), Population size • **T** – Tastes and Preferences	• Price of the good itself
	Supply	**Quantity Supplied**
Graphical Representation	Refers to the entire supply curve	Refers to a point on the supply curve
Shift vs Movement	• A change in non-price factors will cause a shift in the supply curve. • When supply ↑/↓ (shifts right/left), it means that qty ss has ↑/↓ at all prices.	A change in the price of the good will cause a movement along the supply curve.
Factors	• Number of sellers • Marginal cost of production • Unpredicted Events/ Supply shocks • Qty of goods in joint supply or competitive supply • Expectations of future price change • Govt policies	• Price of the good itself

Note: When explaining shifts in demand or supply, do the following:

- *Based on the event, **identify and explain** the non-price factor (include assumptions, if any)*
- *State whether there is an ↑/↓ in demand/supply*

Example: Given the global economic recovery → economies are experiencing econ growth → ↑income by households → ↑purchasing power → assume the good is a normal good → ↑qty dd at all prices → ↑demand

Practice 1: Identify the impact on demand or supply, and the direction of change.

Market	Event	Explain impact on demand and/or supply
Cars	There have been increasing occurrences of disruptions in the public transport system	Favourable change in preferences towards cars → ↑qty dd at all prices → ↑demand for cars
Cigarettes	Government has raised the tobacco tax	↑indirect tax → ↑marginal COP for producers → ↓qty ss at all prices → ↓supply for cigarettes
Housing	Singapore has a high national income	No change in demand as there is no change in income.
Surgical Masks	Public and firms expects prices to rise in future due to dwindling stocks	Expectation of future price increase → consumers buy more now to avoid higher prices in future → ↑qty dd at all prices → ↑demand for masks in current period (This event also causes **↓supply**)

ii. PED and PES

	PED	PES
Formula	$PED = \frac{\%\ change\ in\ qty\ dd\ for\ a\ good}{\%\ change\ in\ price\ of\ the\ good\ itself}$	$PES = \frac{\%\ change\ in\ qty\ ss\ of\ a\ good}{\%\ change\ in\ price\ of\ the\ good\ itself}$
Factors	• **S**ubstitutability (avail of close substitutes) • **P**roportion of income spent on the good • **L**uxury or necessity (Degree of necessity) • **A**ddiction • **T**ime	• **M**obility of FOPs • **E**xistence of spare capacity • **A**vailability of stocks • **T**ime

Note: When explaining the value of PED/PES:

- *Based on the context, identify and explain the PED/PES factor*
- *Explain the link to the magnitude*

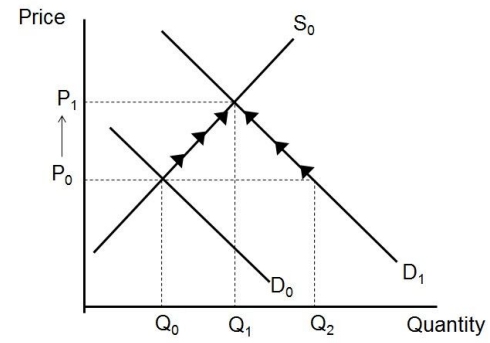
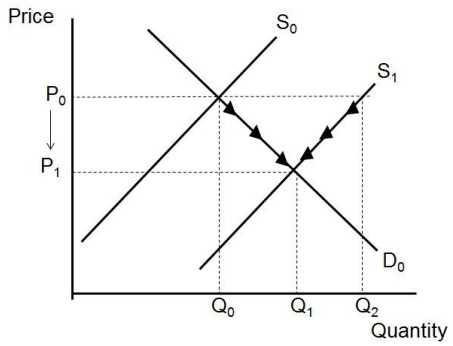
*Example: As vegetables are perishable, it cannot be stored for long periods and thus there is likely to be **low availability of stocks.** The supply is likely to be **price inelastic** as any **increase in price of vegetables will only lead to a less than proportionate ↑qty ss, ceteris paribus,** as the **producers have little stock to draw upon to raise qty ss**.*

iii. YED and XED

	YED	XED
Formula	$YED = \frac{\%\ change\ in\ qty\ dd\ (or\ demand)\ for\ a\ good}{\%\ change\ in\ income}$	$XED = \frac{\%\ change\ in\ qty\ dd\ (or\ demand) of\ good A}{\%\ change\ in\ price\ of\ good\ B}$
Factors	**Nature of good:** Sign • Normal good: YED>0 • Inferior good: YED<0 Magnitude For normal goods, • Necessity: 0<YED<1 • Luxury: YED>1	**Nature of relationship:** Sign • Substitutes: XED>0 • Complements: XED<0 **Closeness of relationship:** Magnitude • Weak: 0<XED<1 • Strong: XED>1
Note: When explaining the value of YED/XED: • *Explain the reason for the sign (positive or negative)* • *Explain the reason for the magniture (>1 or <1)* *Example: As rice is considered a **normal good** which has a **YED that is positive** i.e., **a rise in income would result in a rise in demand for rice**. Specifically, rice is considered a **necessity**. This means that the **magnitude of YED is less than one**. A **rise in income would lead to a less than proportionate increase in demand**, ceteris paribus.*		

iv. Single and double shift analysis to determine P & Q

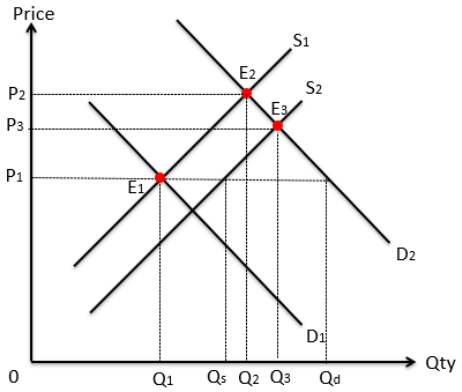
Single Shift Analysis on P & Q

↑Demand	↑Supply
	

• **Initial Eqm:** Market is initially at equilibrium, producing Q0 units at Price, P0. *(don't write P0Q0!)*
• **Shift:** Explain the shift in demand
• **Shortage/Surplus:** At the original equilibrium price P0, quantity demanded increases to Q2 while the quantity supplied remains at Q0, creating a shortage of Q0Q2.
• **Upward/Downward Pressure on Price:** Buyers, competing for the good, bid up prices. As the price rises, two things happen:
  ○ Utility-maximising consumers, constrained by their budget, reduce the quantity demanded.
  ○ The units of output that can only be produced at higher marginal cost now become profitable at higher prices, incentivising firms to increase the quantity supplied.
• **Equilibrium:** The process will continue until the price eventually reaches P1 where quantity demanded exactly balances quantity supplied and the shortage is removed, removing further pressure on the market to adjust. The new equilibrium quantity rises from the original Q0 to a higher Q1.
	• **Initial Eqm:** Market is initially at equilibrium, producing Q0 units at Price, P0
	• **Shift:** Explain the shift in supply
	• **Shortage/Surplus:** At the original equilibrium price P0, quantity supplied increases to Q2 while the quantity demanded remains at Q0, creating a surplus of Q0Q2.
	• **Upward/Downward Pressure on Price:** To remove the surplus, firms cut prices. As the price falls, two things happen:
	  ○ Quantity demanded rises as utility-maximising consumers, constrained by their budget, are now willing and able to buy larger quantities.
	  ○ The units of output that are produced at higher marginal cost become unprofitable at lower prices. Profit-maximising firms cut back output to avoid the marginal losses, reducing quantity supplied.
	• **Equilibrium:** The process will continue until the price eventually reaches P1 where quantity demanded exactly balances quantity supplied and the surplus is removed, removing further pressure on the market to adjust. The new equilibrium quantity rises from the original Q0 to a higher Q1.

Double Shift Analysis on P & Q

Context: ↑Demand + ↑Supply



Note: Before drawing the diagram, you should pre-determine the relative extent of the shift in dd and ss.

- **Initial Eqm:** Market is initially at equilibrium, producing Q1 units at Price, P1.
- **Shift 1:** Explain the shift in demand + explain MAP → ↑demand → ↑P to P2 and ↑qty to Q2
- **Shift 2:** Explain the shift in supply → ↑supply → ↓P to P3 and ↑qty to Q3
- **Overall:**
    - Both the ↑dd and ↑ss have led to an ↑qty → overall large ↑qty
    - However, ↑dd led to ↑P but ↑ss led top ↓P → price is indeterminate.
    - Use the context to explain the relative extent of the shift in dd and ss, and determine overall change in the indeterminate value e.g., assuming ↑dd>↑ss (explain why), overall price will ↑ to P3 from P1.

Note: For double shifts, price is not always the variable that is indeterminate. Sometimes, it is quantity that is indeterminate, e.g., when ↑Demand + ↓Supply.

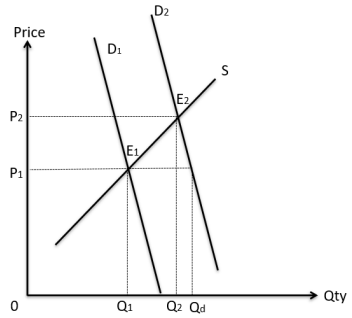
In the event that a double shift analysis is required for only 4-5 marks, the following less rigorous analysis can be used.

- **Initial Eqm:** Market is initially at equilibrium, producing Q1 units at Price, P1.
- **Extent of shifts:** Make assumption and explain the relative extent of the shift in dd and ss
- **Shift both dd and ss simultaneously:** Explain the shift in demand + shift in supply → explain MAP → ↑P to P3 from P1 and ↑qty to Q2
- **Overall:**
    - Both the ↑dd and ↑ss have led to an ↑qty → overall large ↑qty
    - However, ↑dd led to ↑P but ↑ss led top ↓P → price is indeterminate.
    - Explain assumptions of relative extent of the shift in dd and ss, and determine overall change in the indeterminate value e.g., assuming ↑dd>↑ss (explain why), overall price will ↑ to P3 from P1.

v. Single and double shift analysis to determine revenue, expenditure

Single Shift Analysis on Revenue/Expenditure (PxQ)

↑Demand



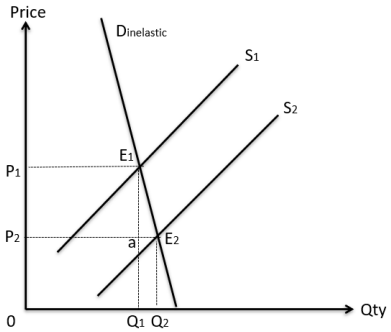
- **Initial Eqm:** Market is initially at equilibrium, producing Q0 units at Price, P0.
- **Explain shift:** ↑demand + MAP
- **Impact on P & Q:** ↑P + ↑Q
- **Impact on revenue:** Since revenue is the product of price and quantity (PxQ), revenue would ↑ to 0P2E2Q2 as both price and output ↑.

  Note: Revenue/Expenditure is referenced from the diagram as 0P2E2Q2 <u>not</u> P2Q2!

Think: Is PES required to analyse a change in revenue due to ↑demand?

PES is not required to analyse changes in revenue given a ↑demand. This is because when there is ↑demand, there will be both a ↑price and ↑qty which both contribute to a rise in total revenue (P x Q). Regardless of the PES, total revenue would increase.

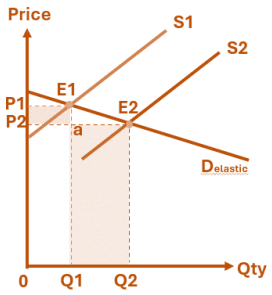
↑Supply



- **Initial Eqm:** Market is initially at equilibrium, producing Q0 units at Price, P0.
- **Explain shift:** ↑supply + MAP
- **Impact on P & Q:** ↓P + ↑Q
- **Impact on revenue:** Since revenue is the product of price and quantity (PxQ), revenue is indeterminate as price ↓ and output ↑.
- **Explain value of PED:** Assuming PED<1 (explain this), ↓ price would lead to a <u>less than proportionate</u> ↑ qty dd
- **Analysis on revenue:** ↓revenue (P1P2aE1) due to ↓P is larger than the ↑revenue (Q1Q2E2a) due to less than proportionate ↑Qty → revenue would ↓ to 0P2E2Q2

Try: How would you explain the change in revenue if demand was price elastic?

- **Analysis on revenue:** As demand is price elastic, ↓revenue (P1P2aE1) due to ↓P is smaller than the ↑revenue (Q1Q2E2a) due to <u>more</u> than proportionate ↑Qty dd → revenue would ↑ to 0P2E2Q2



Double Shift Analysis on Revenue/Expenditure (PxQ)

Scenario: ↑demand and ↑supply

Step 1: Analyse impact of ↑demand

- **Initial Eqm:** Market is initially at equilibrium, producing Q0 units at Price, P0.
- **Explain shift:** ↑demand + MAP
- **Impact on P & Q:** ↑P + ↑Q
- **Impact on revenue:** Since revenue is the product of price and quantity (PxQ), revenue would ↑ as both price and output ↑.

Step 2: Analyse impact of ↑supply

- **Initial Eqm:** Market is initially at equilibrium, producing Q0 units at Price, P0.
- **Explain shift:** ↑supply
- **Impact on P & Q:** ↓P + ↑Q
- **Impact on revenue:** Since revenue is the product of price and quantity (PxQ), revenue is indeterminate as price ↓ and output ↑.
- **Explain value of PED:** Assuming PED<1 (explain), ↓ price would lead to a **less than proportionate** ↑ qty dd
- **Analysis on revenue:** ↓revenue (P1P2aE1) due to ↓P is larger than the ↑revenue (Q1Q2E2a) due to less than proportionate ↑Qty → revenue would ↓ to 0P2E2Q2

Step 3: Overall impact

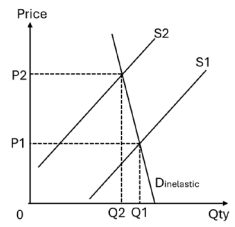
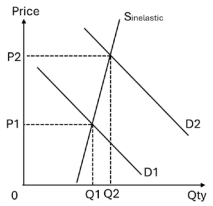
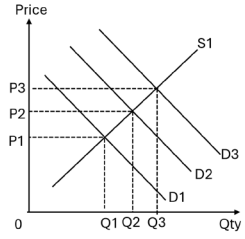
- As ↑dd results in an ↑revenue but the ↑supply results in a ↓revenue, the overall impact on revenue depends on the relative extent of shift of dd and ss
- Assuming ↑dd > ↑ss → overall revenue would ↑

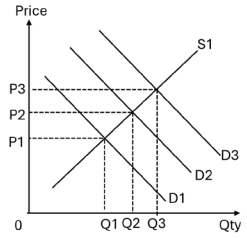
Note: If both shifts impact revenue in the same way, i.e., both lead to a ↑revenue, there is no need to make assumptions on the extent of shift.

For your practice in the Promo Revision Package:

- 2021 DHS Promo Essay 1, part (a) and part (b)
- 2022 DHS Promo Essay 1, part (a) and part (b)
- 2023 DHS Promo CSQ part (ai) and (aii)

- **Evaluating using Elasticity Concepts:** Using PED, PES, YED and XED to evaluate changes in P & Q

Elasticity Concept	Scenario	Explanation
PED	Evaluate the impact of a ↓supply on the market for cigarettes	 • **Analyse ↓supply on market**: market is initially at eqm where S1=$D_{inelastic}$ at eqm price P1 and eqm qty Q1 → ↓supply (explain) → explain MAP → new eqm price ↑ to P2, eqm qty ↓ to Q2 • **Justify value of PED**: explain why PED<1 • **Use PED to evaluate extent of change in P & Q**: With PED<1 → ↑P to P2 has led to a less than proportionate ↓ in <u>qty dd</u> → <u>large</u> ↑ in price, <u>small</u> ↓ in qty
PES	Evaluate the impact of a ↑demand on the market for fresh vegetables	 • **Analyse ↑demand on market**: market is initially at eqm where $S_{inelastic}$=D1 at eqm price P1 and eqm qty Q1 → ↑demand (explain) → explain MAP → new eqm price ↑ to P2, eqm qty ↑ to Q2 • **Justify value of PES**: explain why PES<1 • **Use PES to evaluate extent of change in P & Q**: With PES<1 → ↑P to P2 has led to a less than proportionate ↑ in <u>qty ss</u> → <u>large</u> ↑ in price, <u>small</u> ↑ in qty
YED	Evaluate impact of the ↑income on the market for luxury cars	 • **Analyse ↑demand on market**: market is initially at eqm where $S_{inelastic}$=D1 at eqm price P1 and eqm qty Q1 → ↑demand to D2 due to ↑income (assume normal good, YED>0) → explain MAP → new eqm price ↑ to P2, eqm qty ↑ to Q2

		• **Justify value of YED**: explain why YED>1 for luxury car • **Use YED to evaluate extent of change in P & Q**: With YED>1 → ↑income leads to a more than proportionate ↑demand to D3 → <u>large</u> ↑ in price to P3, <u>large</u> ↑ in qty to Q3.
XED	Evaluate impact of ↑price of beef on the market for chicken	 • **Analyse ↑demand on market**: market is initially at eqm where $S_{inelastic}$=D1 at eqm price P1 and eqm qty Q1 → ↑demand for chicken to D2 due to ↑price of beef (assume chicken is a substitute of beef, XED is positive) → explain MAP → new eqm price ↑ to P2, eqm qty ↑ to Q2 • **Justify value of XED**: explain why XED>1 (i.e., close substitute) • **Use XED to evaluate extent of change in P & Q**: With XED>1 → ↑price of beef leads to a more than proportionate ↑demand for chicken to D3 → <u>large</u> ↑ in price to P3, <u>large</u> ↑ in qty to Q3.