Demand, Supply, Applications

Content

(1) Demand, Law of Demand, Changes of Demand

(2) Supply, Law of Supply, Changes of Supply

(3) Market Equilibrium and Changes

(4) Elasticities of Demand and Supply

(5) Consumer and Producer Surplus Market Intervention

Revision: **definition of Market**

Market is a context where an exchange occurs. A few key elements are

(1) Buyer, Seller

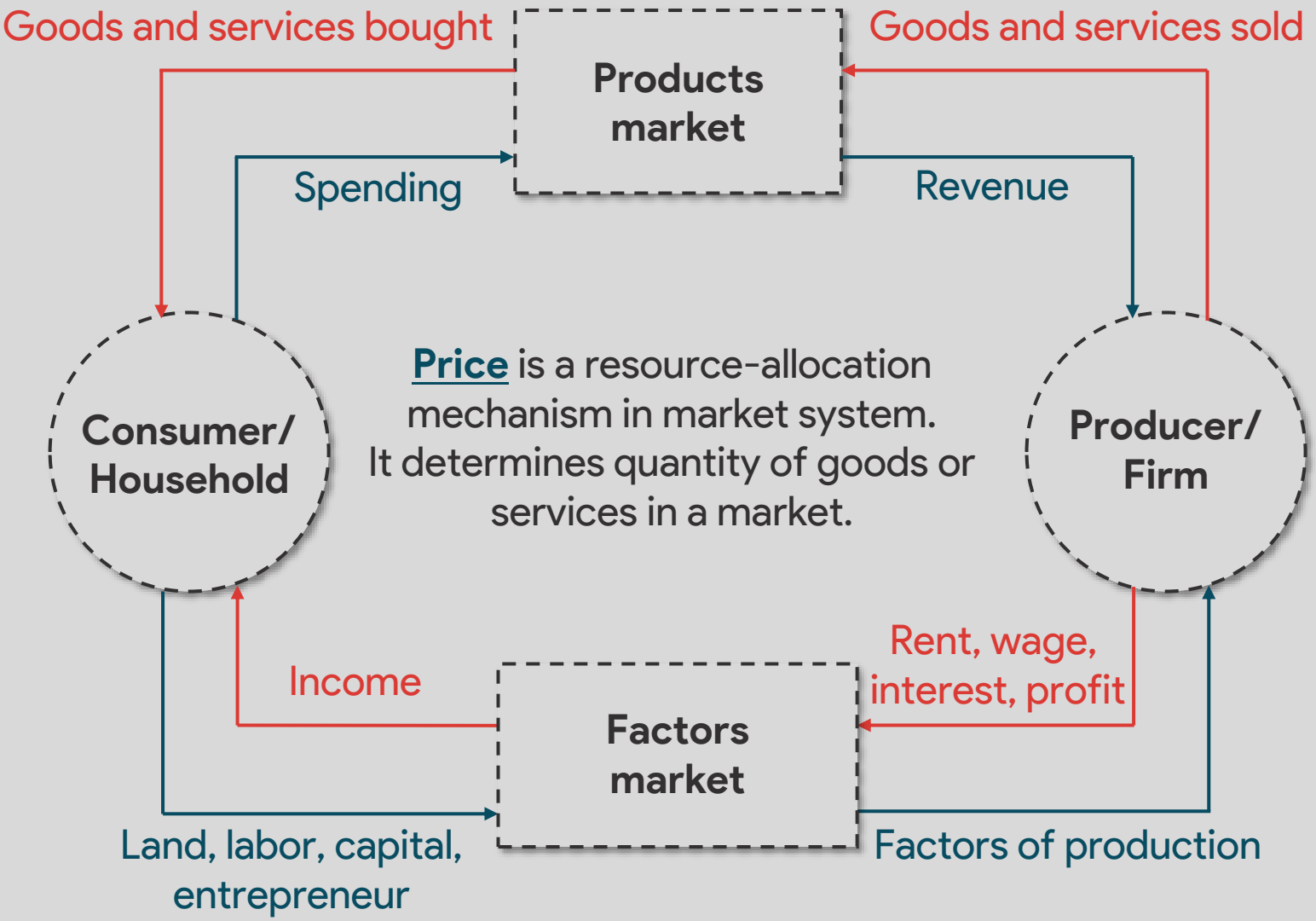
(2) Goods or Services

(3) Price

To study market, buyers, sellers or types of product must be clearly specified such as 'rice' market.

- Paddy rice
- Rice and curry
- G2G market

Revision: **Circular Flow**



Method and assumptions imposed

#1 **Comparative statics**

The comparison of two different economic outcomes, before and after a change in some underlying exogenous parameter.

#2 **Ceteris Paribus**

Other things being equal.

1. Demand

1.1 Definition of demand

2.1 Definition – Demand

Amount of goods or service that buyer(s) is (are) willing to purchase at a given price.

Components of Demand

(1) Want
(2) Affordability

Types of Demand

(1) Price demand
(2) Income demand
(3) Cross demand

1. Demand

1.2 Demand function, equation, table and individual demand

Function and equation

- $q_a = f(P)$
- $q_a(P)$
- $q_a = 10-2P$

Demand table

P	q_a

Individual demand curve

1. Demand

1.2 Demand function, equation, table and individual demand

Function and equation

- $4P = 12-2q_a$

Demand table

P	q_a

Individual demand curve

1. Demand

1.3 Law of demand

2.2 Definition – Law of Demand

A claim that when price of a goods or service rises, its quantity demanded will fall and vice versa, when all other factors that can affect demand are held constant.

When price changes, two effects take place at the same time.

(1) Income effect

Consumer's real income increases (decreases) when price falls (rises).

(2) Substitution effect

Relative price of substitutable goods or services differs. For instance, if price of goods A falls, A is considered relatively cheaper before the price drop comparing price of A to other substitutable goods or services.

1. Demand

1.4 Market demand

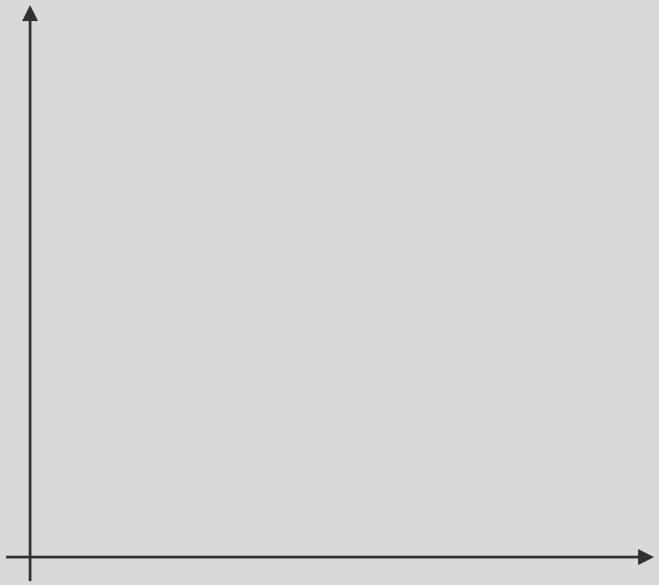
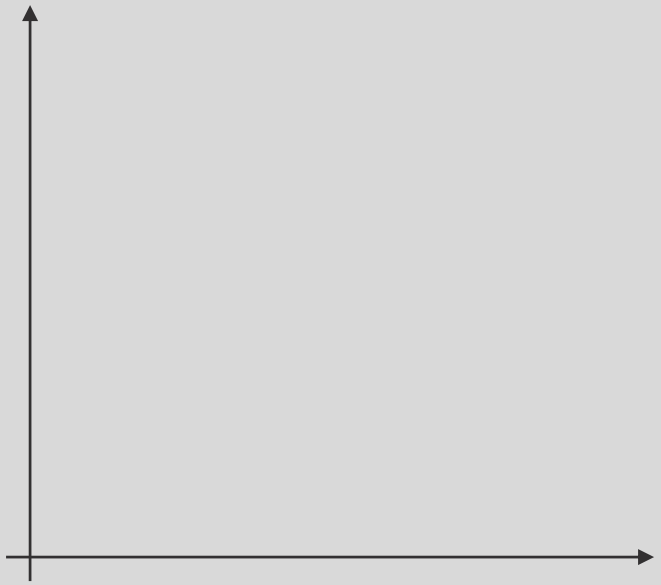
Demand table

P	q_a	q_b	Q
0	12	20	
10	10	16	
20	8	12	
30	6	8	
40	3	4	
50	0	0	

Individual vs. market demand

1. Demand

1.5 Changes of demand

Moving along	Demand shift
	

1. Demand

1.6 Demand shifters

Demand shift	Demand shifters
	(1) Consumers' income (2) Consumers' taste (3) Price of complementary or substituting goods change (4) Price expectation

1. Demand

1.7 Other types of demand

Income demand: normal goods	Note
	

1. Demand

1.7 Other types of demand

Income demand: inferior goods	Note
	

1. Demand

1.7 Other types of demand

Cross demand: substituting goods	Note
	

1. Demand

1.7 Other types of demand

Cross demand: complementary goods	Note
	

2. Supply

2.1 Definition and law of supply

2.3 Definition – Supply

Amount of a goods or service that seller(s) is (are) willing to produce and sell at a given price.

2.4 Definition – Law of Supply

A claim that price of a goods or service and its quantity supplied are positively related, when all other factors that can affect supply are held constant.

2. Supply

2.2 Supply function, equation, table and individual demand

Function and equation

- $q_k = f(P)$
- $q_k(P)$
- $q_k = 3P$

Supply table

P	q_k

Individual supply curve

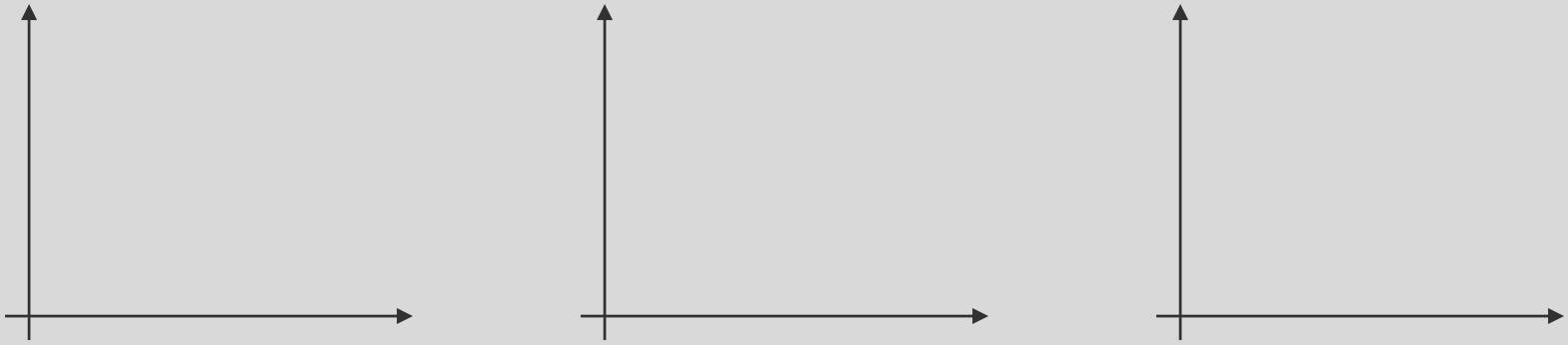
2. Supply

2.3 Market supply

Supply table

P	q_k	q_l	Q
0	0	1	
1	3	3	
2	6	5	
3	9	7	
4	12	9	
5	15	11	

Individual vs. market supply



2. Supply

2.4 Changes of supply

Moving along	Supply shift
	

2. Supply

2.5 Supply shifters

Supply shift	Supply shifters
	(1) Factors of production cost (2) Technological progress (3) Number of producers (4) Price expectation

2. Supply

2.1 Proposition – Demand

- Key components of demand are want and affordability.
- Law of demand states that price and quantity demanded are **negatively** related, in case of normal goods.
- When price change, quantity demanded moves along the demand curve. Other factors cause demand shift.

2.2 Proposition – Supply

- Law of supply states that price and quantity demanded are **positively** related.
- When price change, quantity supplied moves along the supply curve. Other factors cause supply shift.

3. Market Equilibrium

3.1 Definition of equilibrium

2.5 Definition – Market equilibrium

There exists equilibrium price and quantity in a market, when quantity demanded and supplied are equal. Without exogenous force, equilibrium price and quantity remains stable.

2.3 Proposition – Equilibrium

- When price changes, while other factors remain unchanged, equilibrium price and quantity will return to its original equilibrium.
- If other factors cause (a) shift(s) in demand or supply curve, new equilibrium price and quantity will be reached.

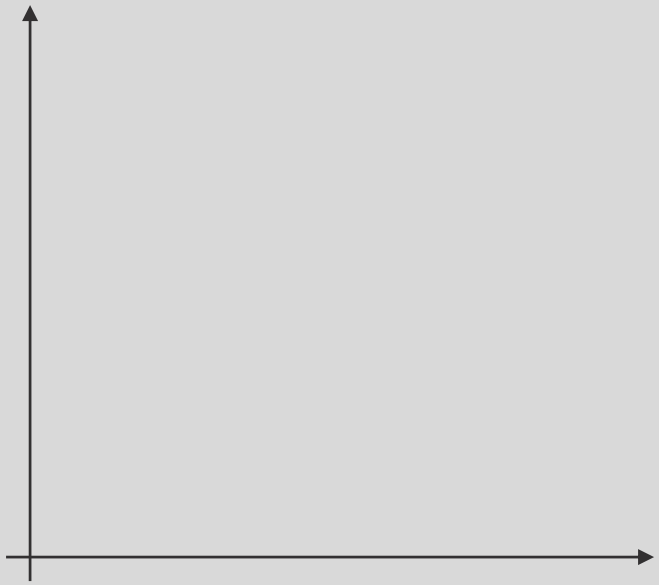
3. Market Equilibrium

3.2 Equilibrium price and quantity

Graphical approach	Equations approach
	• $Q_d = 10-2P$ • $Q_s = 3P$

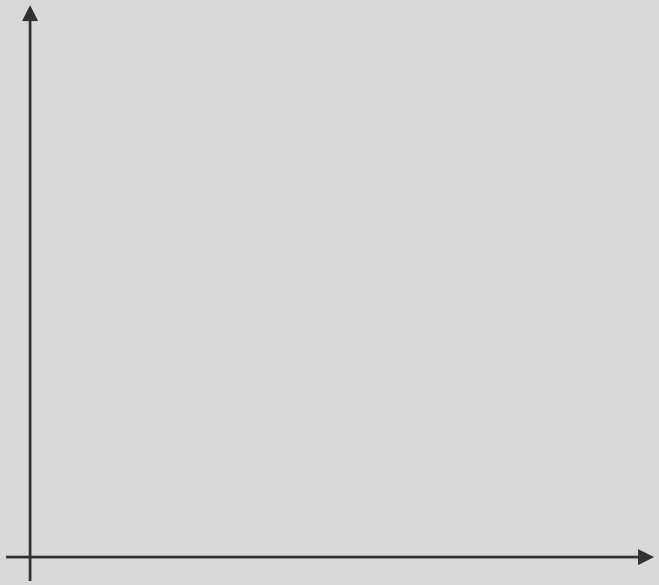
3. Market Equilibrium

3.3 Price change from the equilibrium

Price fall	Effects and adjustments
	• Price falls • Excess demand • Moving along adjustments

3. Market Equilibrium

3.3 Price change from the equilibrium

Price rise	Effects and adjustments
	• Price rises • Excess supply • Moving along adjustments

3. Market Equilibrium

3.4 Shifting demand and supply

Case 1A: Increasing demand	Case 1B: Decreasing demand
	

3. Market Equilibrium

3.4 Shifting demand and supply

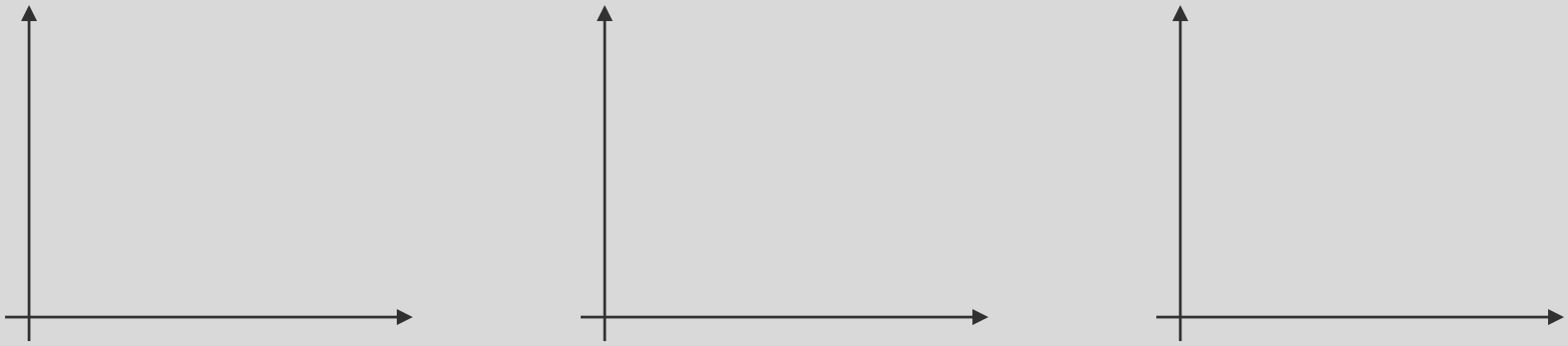
Case 2A: Increasing supply

Case 1B: Decreasing supply

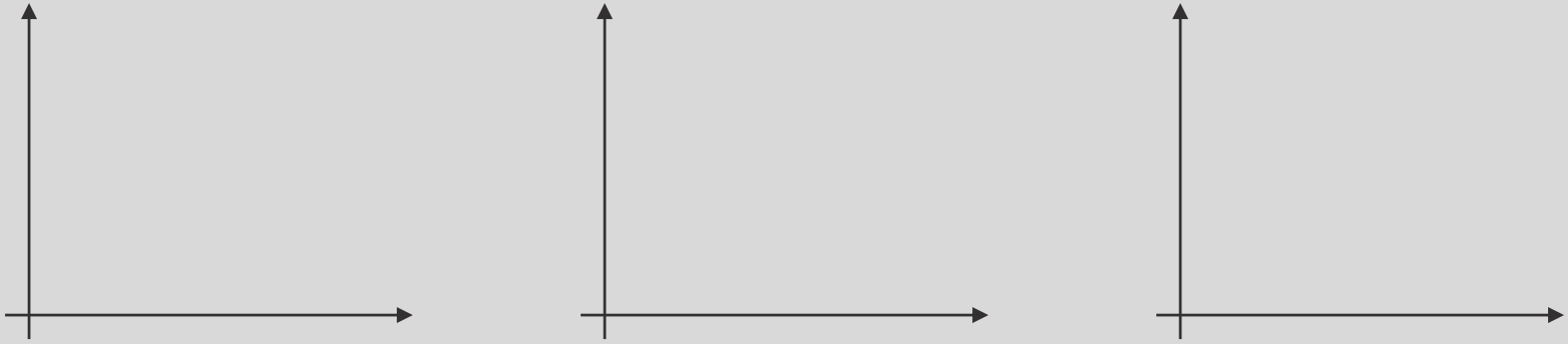
3. Market Equilibrium

3.4 Shifting demand and supply

Case 3A: Increasing demand and supply



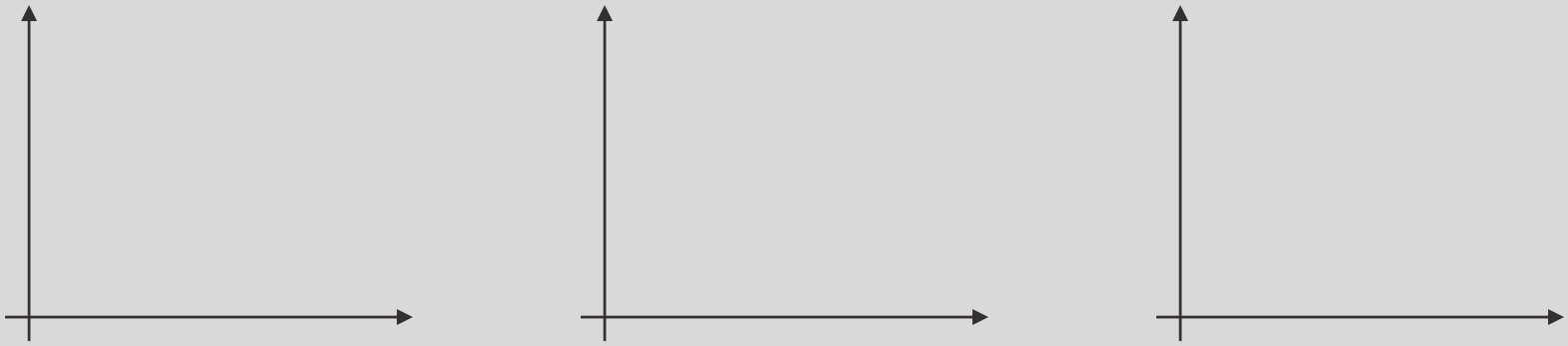
Case 3B: Decreasing demand and supply



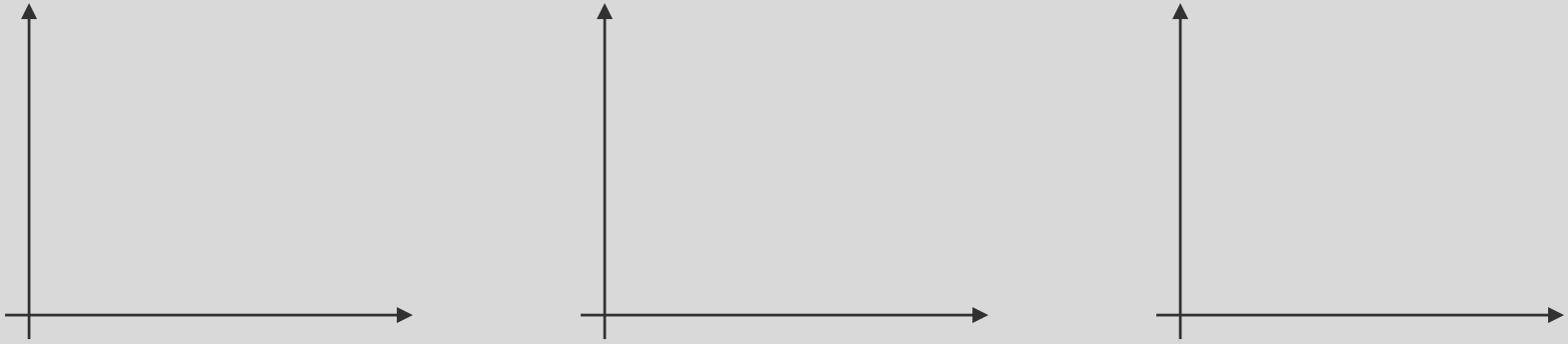
3. Market Equilibrium

3.4 Shifting demand and supply

Case 3C: Increasing demand and decreasing supply



Case 3D: Decreasing demand and increasing supply



4. Elasticities

Thought-provoking question

An economist is studying changes in price of a pair of following goods

- Fuel oil vs. diamond ring (when price increases 100 baht)
- Alcoholic beverage vs. pork (when price decreases 50 baht)
- Car vs. instant noodle (when price increases 20 baht)

What is the difficulties of studying these changes and their effects?

4. Elasticities

4.1 Definition of elasticity

2.6 Definition – Elasticity

A measure of sensitivity of one variable to a change in another variable. General formula takes the form of

$$\varepsilon = \frac{\%\text{ change in variable of interest}}{\%\text{ change in an independent variable}}$$

Therefore, if economists are interested in quantity demanded, affected from price change, price elasticity of demand can be defined as follows.

2.7 Definition – Price Elasticity of Demand

Percentage change in quantity demanded for 1 percent price increase.

$$\varepsilon_d = \frac{\%\text{ change in quantity demanded}}{\%\text{ change in price}}$$

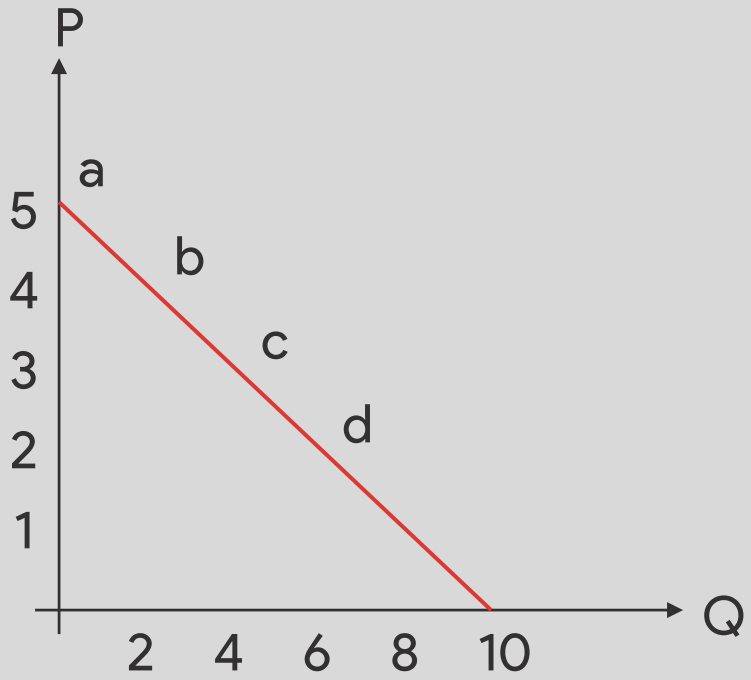
4. Elasticities

4.2 Mathematical proof

Proof	Formulae
$\varepsilon_d = \frac{\%\text{ change in quantity demanded}}{\%\text{ change in price}}$	• Point elasticity $\varepsilon_d = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$ • Arc elasticity $\varepsilon_d = \frac{\Delta Q}{\Delta P} \cdot \frac{P_1 + P_2}{Q_1 + Q_2}$

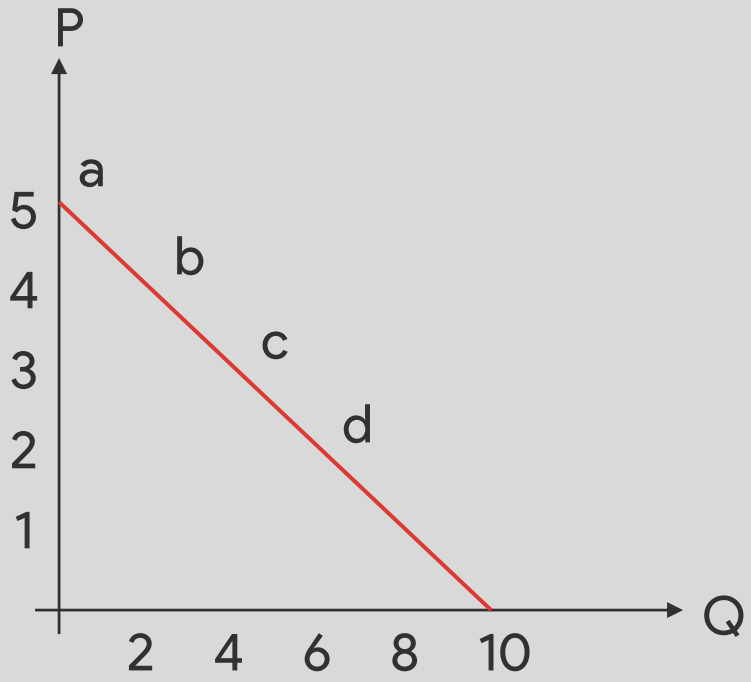
4. Elasticities

4.3 Point elasticity on a demand curve

Demand curve	Elasticity
• $Q_d = 10-2P$ 	• $\varepsilon_{d(a)} =$ • $\varepsilon_{d(b)} =$

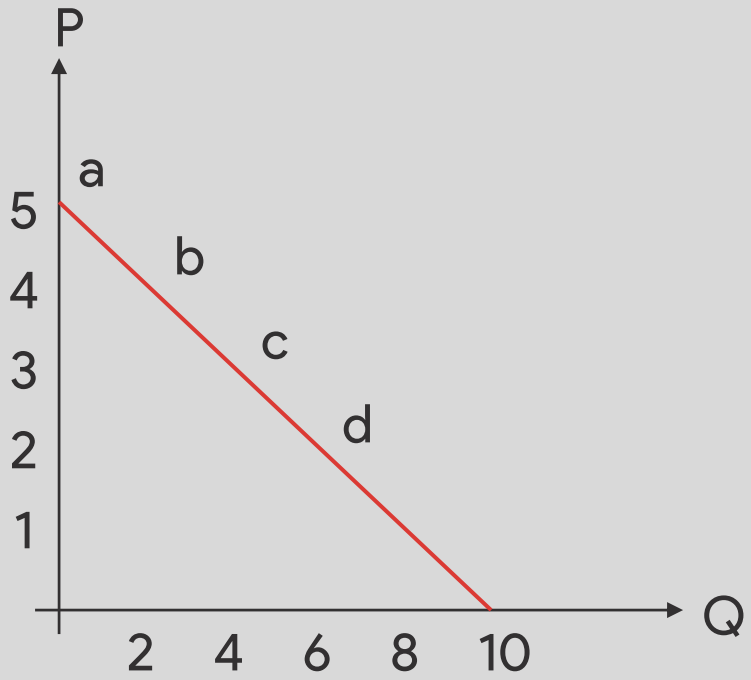
4. Elasticities

4.3 Point elasticity on a demand curve

Demand curve	Elasticity
• $Q_d = 10-2P$ 	• $\varepsilon_{d(c)} =$ • $\varepsilon_{d(d)} =$

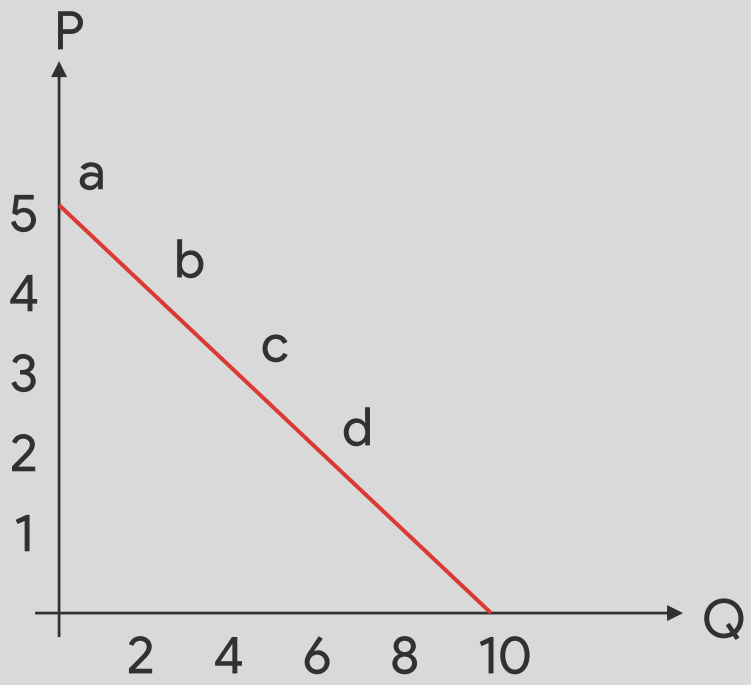
4. Elasticities

4.4 Arc elasticity on a demand curve

Demand curve	Elasticity
• $Q_d = 10-2P$ 	• $\varepsilon_{d(ab)} =$ • $\varepsilon_{d(bc)} =$

4. Elasticities

4.4 Arc elasticity on a demand curve

Demand curve	Elasticity
• $Q_d = 10-2P$ 	• $\varepsilon_{d(cd)} =$ • $\varepsilon_{d(ac)} =$

4. Elasticities

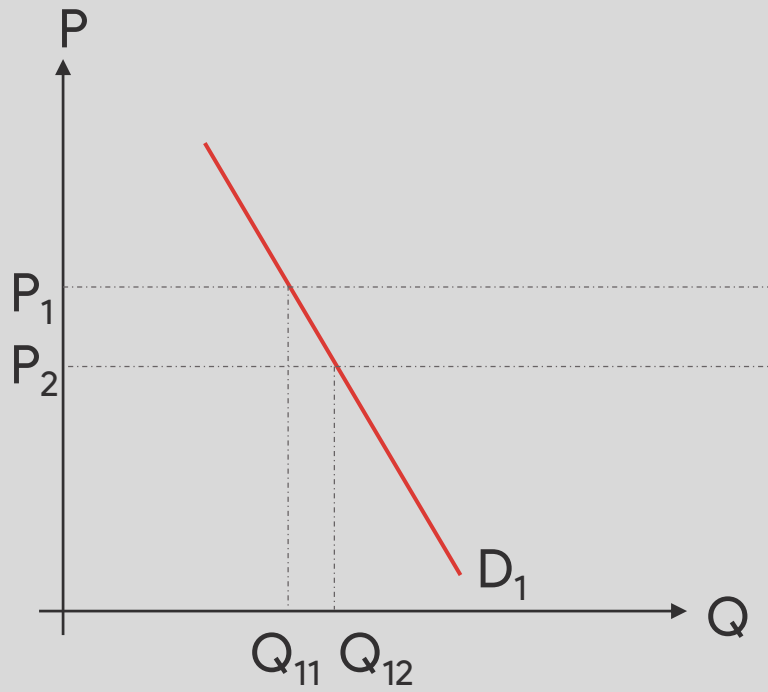
4.5 A few notes on price elasticity of demand

Notices	Quick answer
• What is $\frac{\Delta Q}{\Delta P}$? • What is the unit for elasticity? • Are slope and elasticity the same? • How much the price elasticity of demand is considered ‘elastic’ or ‘inelastic’?	

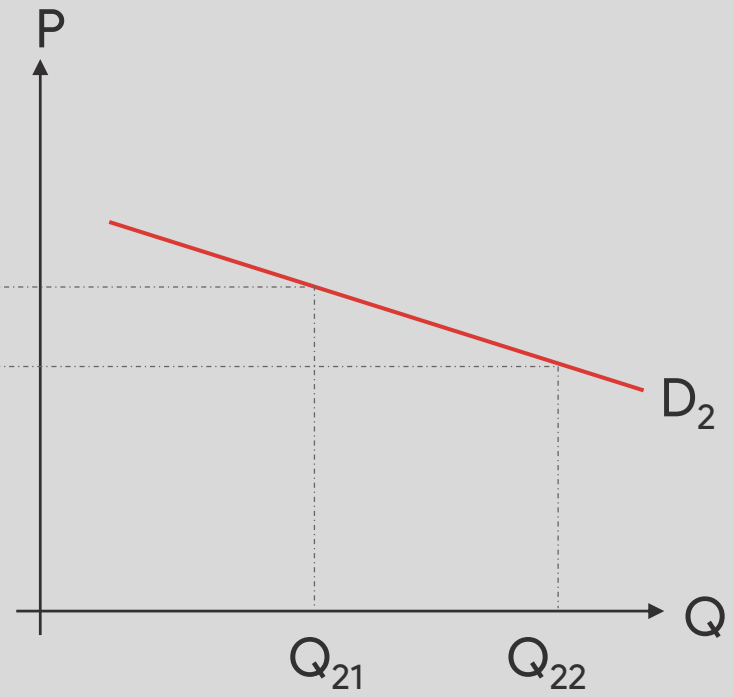
4. Elasticities

4.6 Slope and elasticity

Relatively-steep demand curve



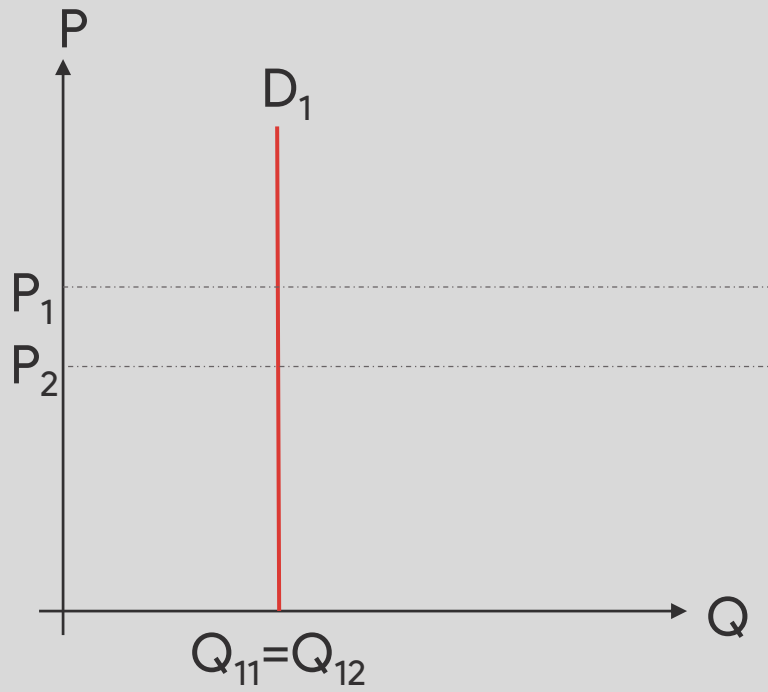
Relatively-flat demand curve



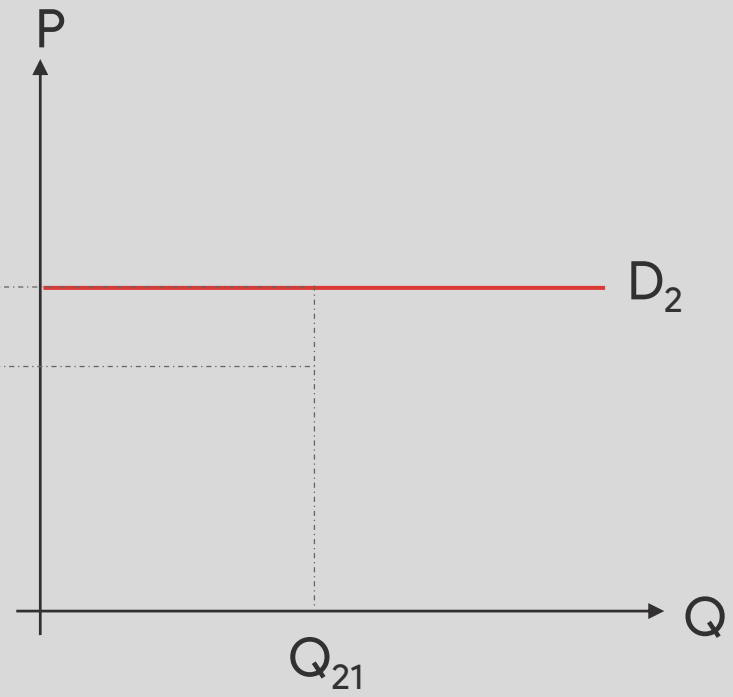
4. Elasticities

4.6 Slope and elasticity

N/A-slope demand curve



Zero-slope demand curve



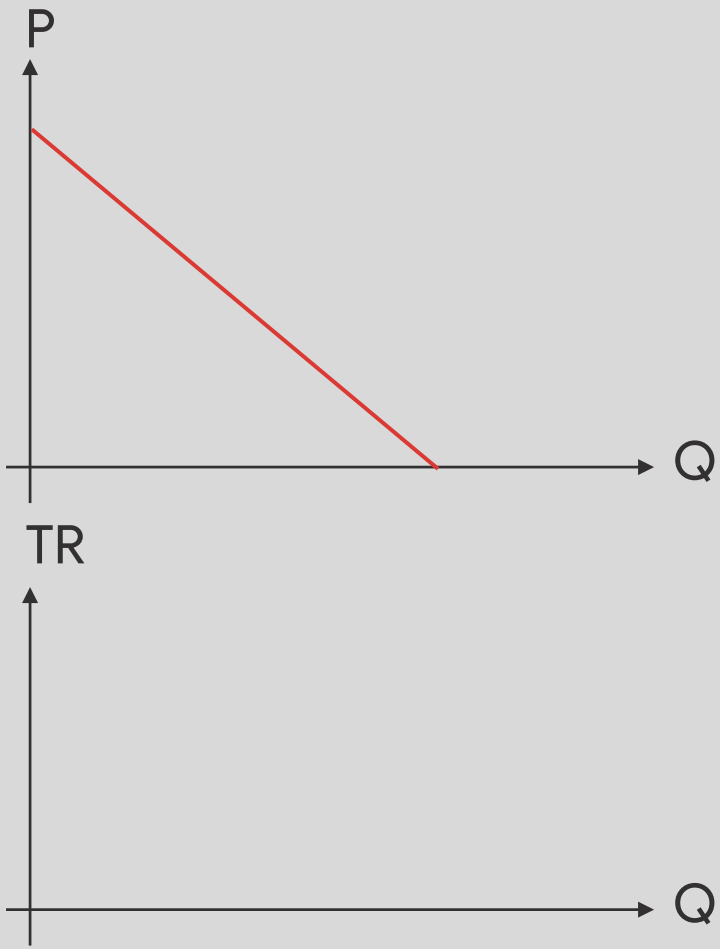
4. Elasticities

4.7 Price elasticity of demand determinants

Examples of price elasticity		Determinants
Goods/service	**Elasticity**	• Substitutable goods
Cigarette	-0.06	
Electricity (for accommodation)	--0.13	
Rice	-0.15	• Necessity for basic needs
Pesticide	-0.21	
Express toll	-0.29	
Fuel oil (imported)	-0.60	• Examining time frame
Electricity (for lighting)	-0.81	
Rice whisky	-1.31	
Vehicle and components (imported)	-1.52	

4. Elasticities

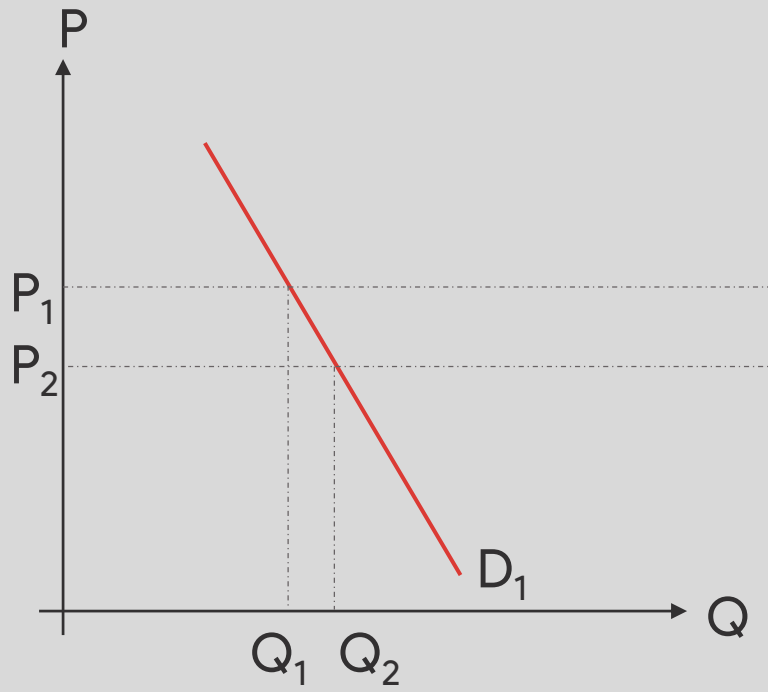
4.8 Price elasticity of demand and total revenue

Demand and total revenue curve	Mathematical relation
	

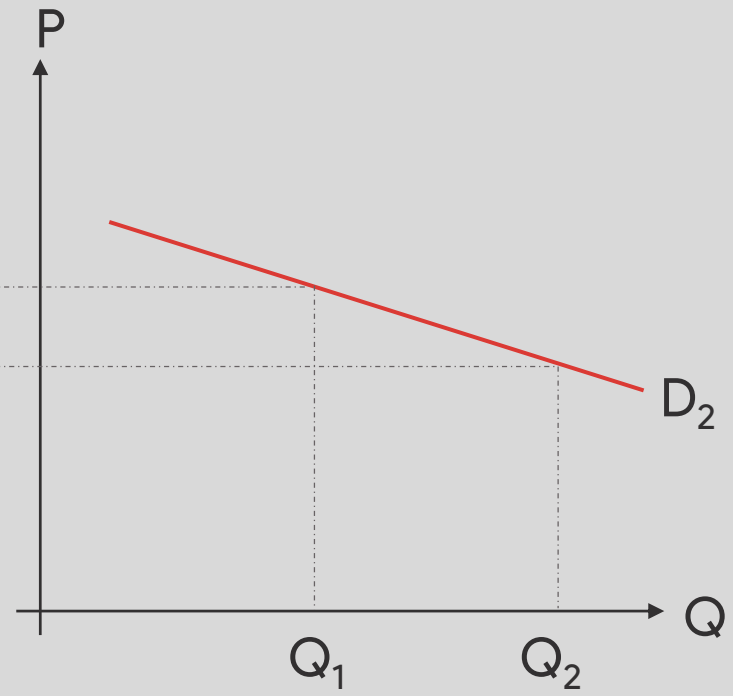
4. Elasticities

4.8 Price elasticity of demand and total revenue

Inelastic demand



Elastic demand



4. Elasticities

2.4 Proposition – Price Elasticity of Demand

- Price elasticity of demand represents percentage change of quantity demanded when price increase for 1 percent.
- Elasticity may not equal for different points of measure on a demand curve.
- Slope is relatively related to elasticity.
- Demand is 'elastic' when an absolute value of elasticity is more than 1. On the other hand, the value less than 1 is considered 'inelastic'.
- Necessity for basic needs and substitutable goods availability are the most prominent determinants of price elasticity of demand.

4. Elasticities

4.9 Income elasticity of demand

2.8 Definition – Income Elasticity of Demand

Percentage change in quantity demanded for 1 percent of consumers' income increase.

$$\varepsilon_I = \frac{\%\text{ change in quantity demanded}}{\%\text{ change in income}}$$

Formulae

- Point elasticity

$$\varepsilon_I = \frac{\Delta Q}{\Delta I} \cdot \frac{I}{Q}$$

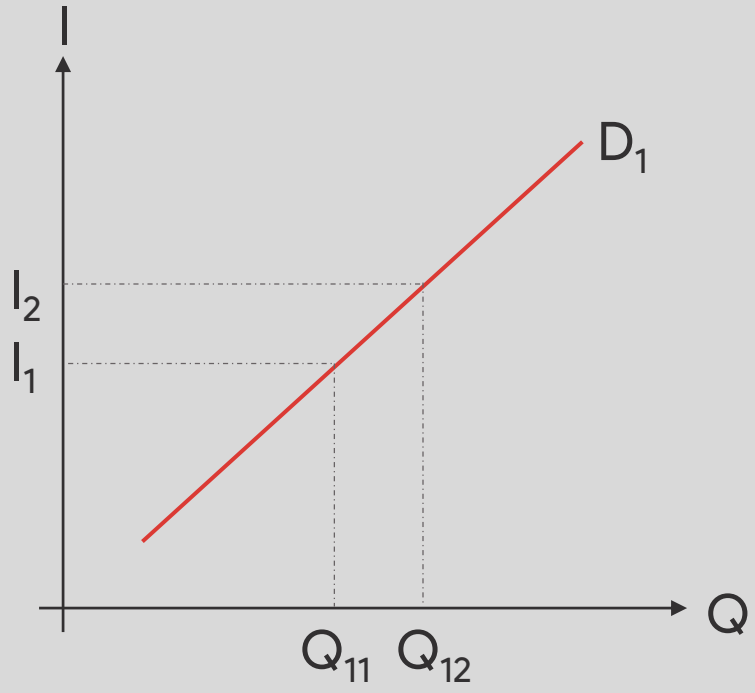
- Arc elasticity

$$\varepsilon_d = \frac{\Delta Q}{\Delta I} \cdot \frac{I_1 + I_2}{Q_1 + Q_2}$$

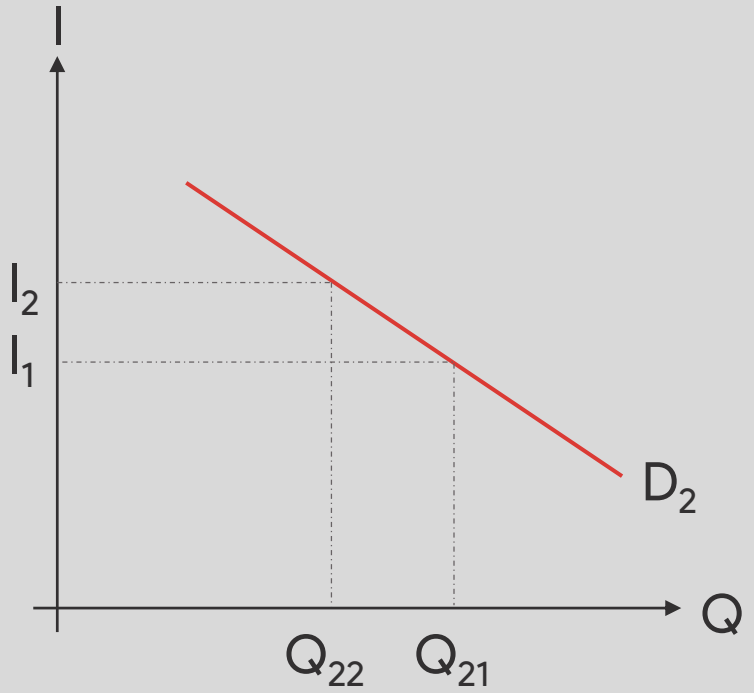
4. Elasticities

4.9 Income elasticity of demand

Normal goods



Inferior goods



4. Elasticities

4.10 Cross-price elasticity of demand

2.9 Definition – Cross-Price Elasticity of Demand

Percentage change in quantity demanded for 1 percent of another goods' price increase.

$$\varepsilon_C = \frac{\%\text{ change in quantity demanded}}{\%\text{ change in another goods' price}}$$

Formulae

- Point elasticity

$$\varepsilon_C = \frac{\Delta Q_a}{\Delta P_b} \cdot \frac{P_b}{Q_a}$$

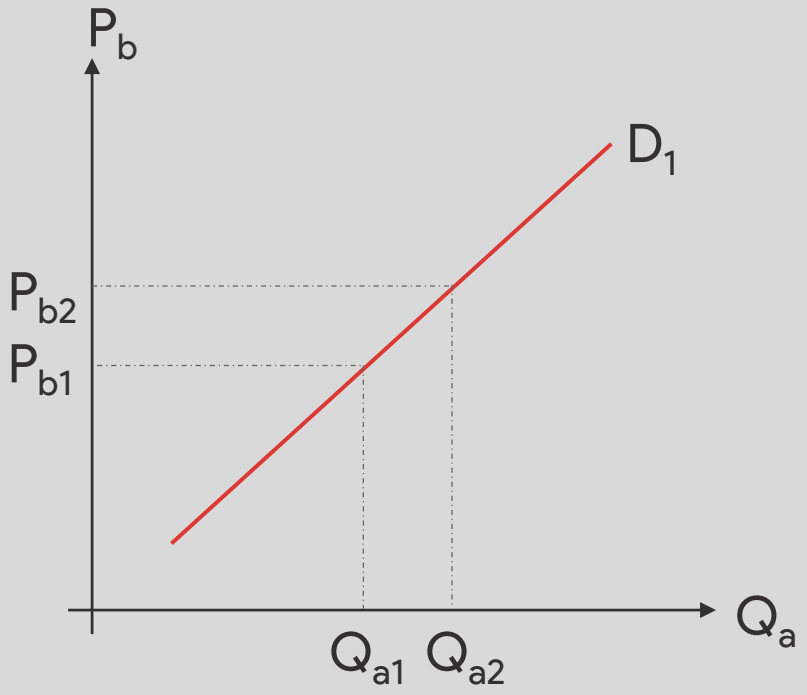
- Arc elasticity

$$\varepsilon_C = \frac{\Delta Q_a}{\Delta P_b} \cdot \frac{P_b^1 + P_b^2}{Q_a^1 + Q_a^2}$$

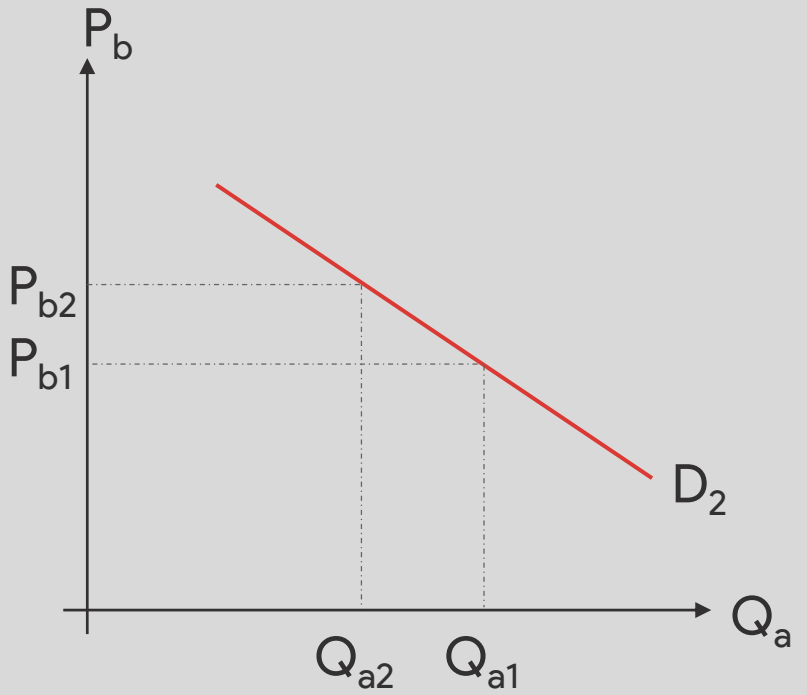
4. Elasticities

4.12 เส้นอุปสงค์ต่อราคาสินค้าชนิดอื่น

Substitutable goods



Complementary goods



4. Elasticities

4.13 ความยืดหยุ่นของอุปทาน

2.10 Definition –Price Elasticity of Supply

Percentage change in quantity supplied for 1 percent of price increase.

$$\varepsilon_s = \frac{\%\text{ change in quantity supplied}}{\%\text{ change in price}}$$

Formulae

- Point elasticity

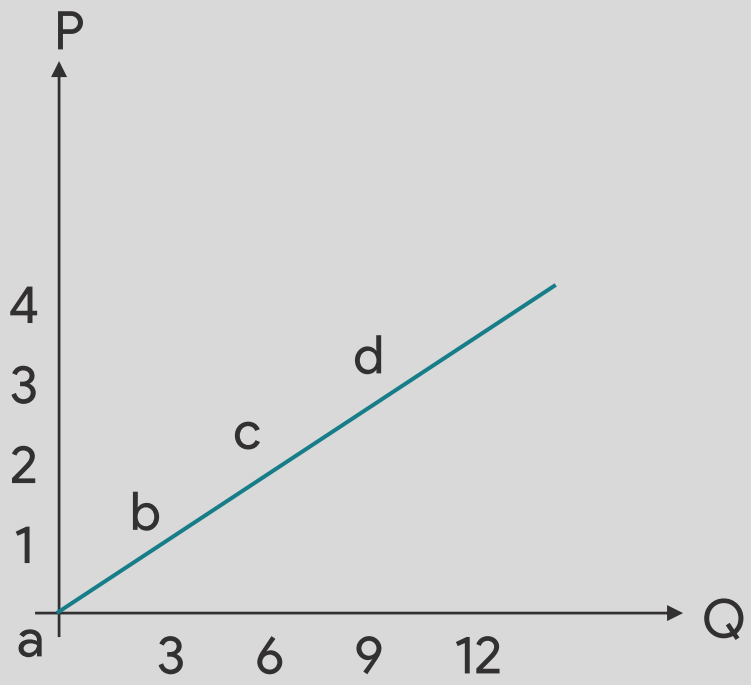
$$\varepsilon_s = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$$

- Arc elasticity

$$\varepsilon_d = \frac{\Delta Q}{\Delta I} \cdot \frac{P_1 + P_2}{Q_1 + Q_2}$$

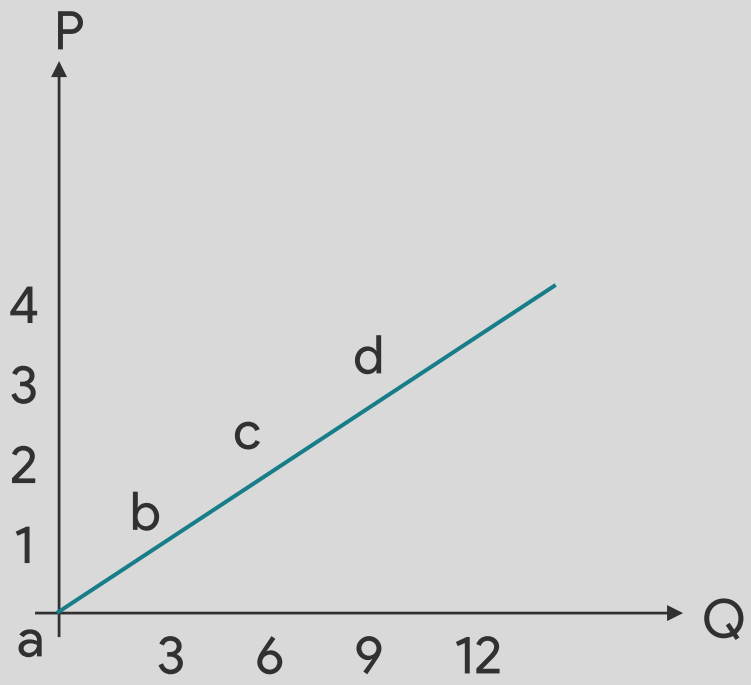
4. Elasticities

4.14 Point elasticity of supply

Supply curve	Elasticity
• $Q_s = 3P$ 	• $\varepsilon_{s(a)} =$ • $\varepsilon_{s(b)} =$

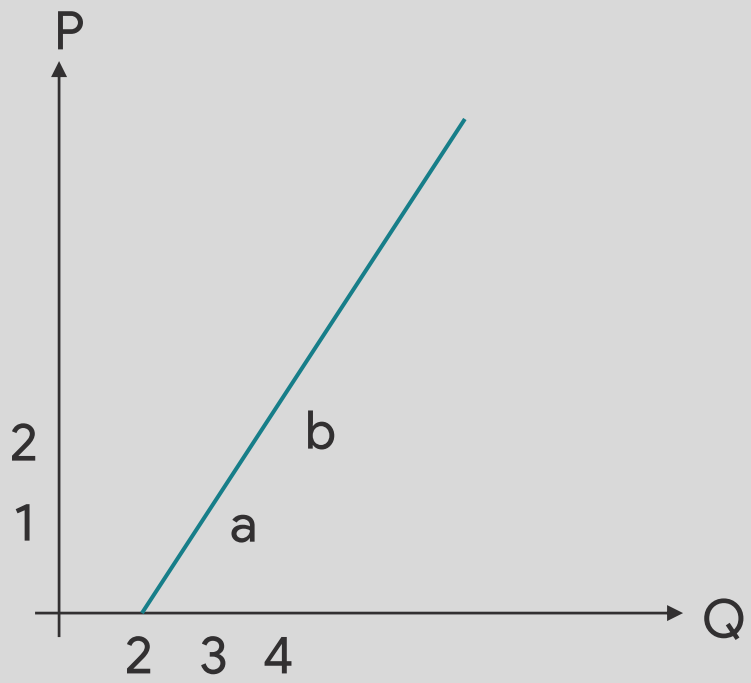
4. Elasticities

4.14 Point elasticity of supply

Supply curve	Elasticity
• $Q_s = 3P$ 	• $\varepsilon_{s(c)} =$ • $\varepsilon_{s(d)} =$

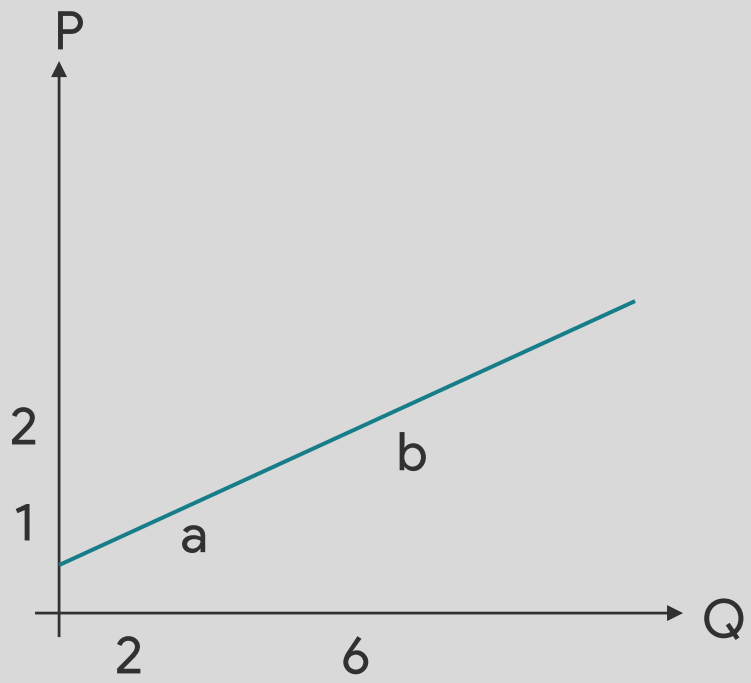
4. Elasticities

4.14 Point elasticity of supply

Supply curve	Elasticity
• $Q_s = P+2$ 	• $\varepsilon_{s(a)} =$ • $\varepsilon_{s(b)} =$

4. Elasticities

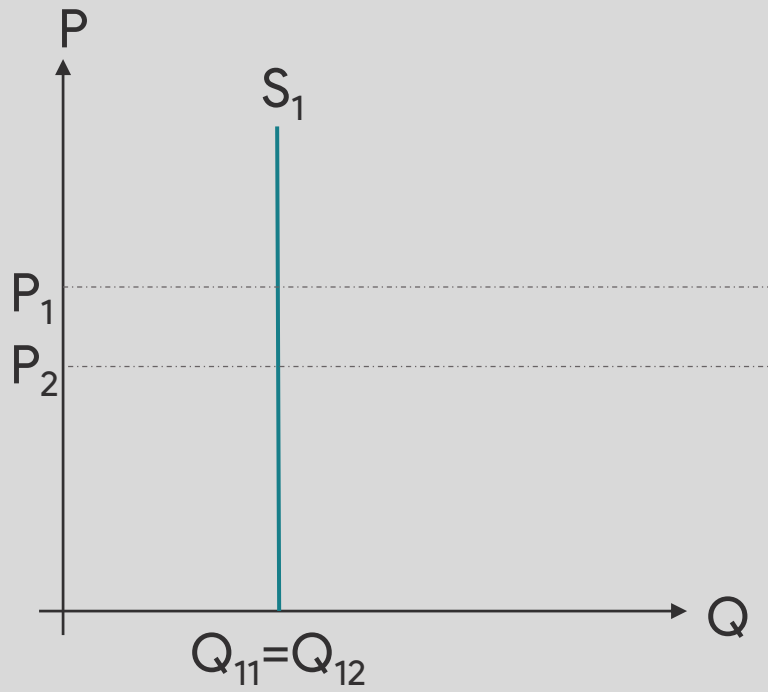
4.14 Point elasticity of supply

Supply curve	Elasticity
• $Q_s = 4P-2$ 	• $\varepsilon_{s(a)} =$ • $\varepsilon_{s(b)} =$

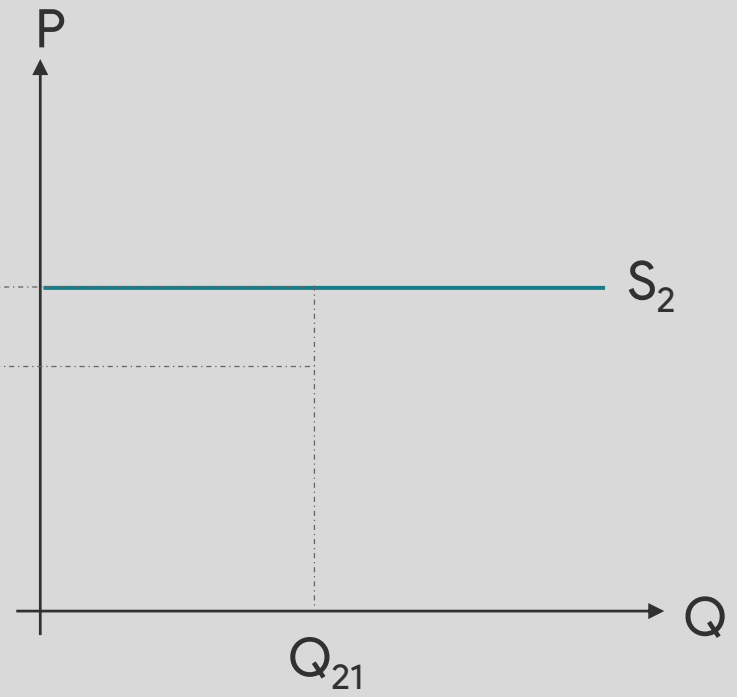
4. Elasticities

4.15 Other types of supply elasticity

N/A-slope supply curve



Zero-slope supply curve



4. Elasticities

4.16 Supply elasticity determinants

- Cost of production
- Duration of production
- Examining time frame

2.5 Proposition – Price Elasticity of Supply

- Price elasticity of supply represents percentage change of quantity supplied when price increase for 1 percent.
- Supply curve intercept determines elasticity of supply.
- The most prominent determinants of supply elasticity are cost and duration of production

5. Surplus

5.1 Meaning of surplus

A demand curve	Willingness to pay
	

5. Surplus

5.1 Meaning of surplus

Market price	Consumer surplus at market price
	

2.11 Definition – Consumer Surplus

Net gain or benefit of all consumers' in a market. (Total market price minus willingness to sell)

5. Surplus

5.1 Meaning of surplus

A supply curve	Willingness to sell
	

5. Surplus

5.1 Meaning of surplus

Market price	Producer surplus at market price
	

2.12 Definition – Producer Surplus

Net gain or benefit of all producers' in a market. (Total willingness to pay minus market price)

5. Surplus

5.2 Total surplus in a market

Surplus at the equilibrium	Total surplus in a competitive market
	

5. Surplus

5.2 Total surplus in a market

Demand increase

5. Surplus

5.2 Total surplus in a market

Supply increase

6. Market Intervention

For some certain situations, a policy maker can intervene a market for numbers of reason such as

#1 Market can not handle resources allocation for everyone efficiently.

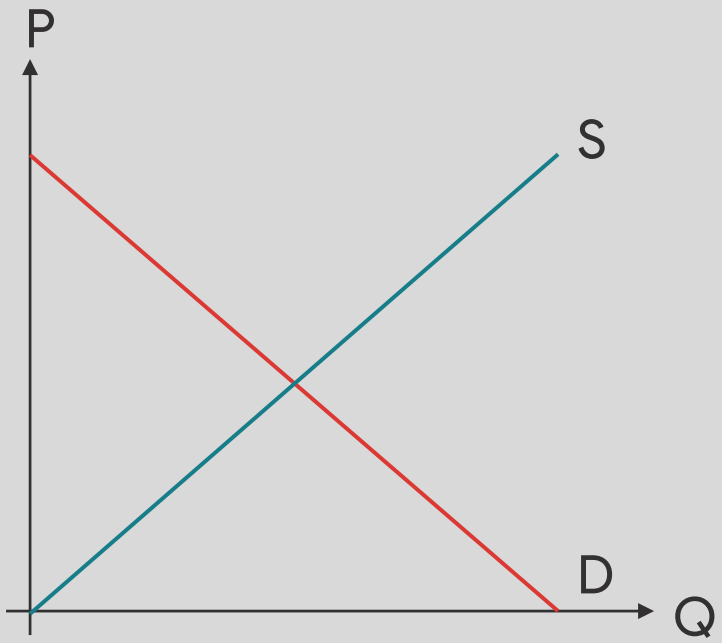
#2 Some vital goods and services price can be too high or low.

#3 Economy can be too active or inactive or needed to be stabilized.

There are several tools to intervene a market such as taxation, price set, etc. This part will focus on the effects of intervention on consumer's, producer's and total surplus.

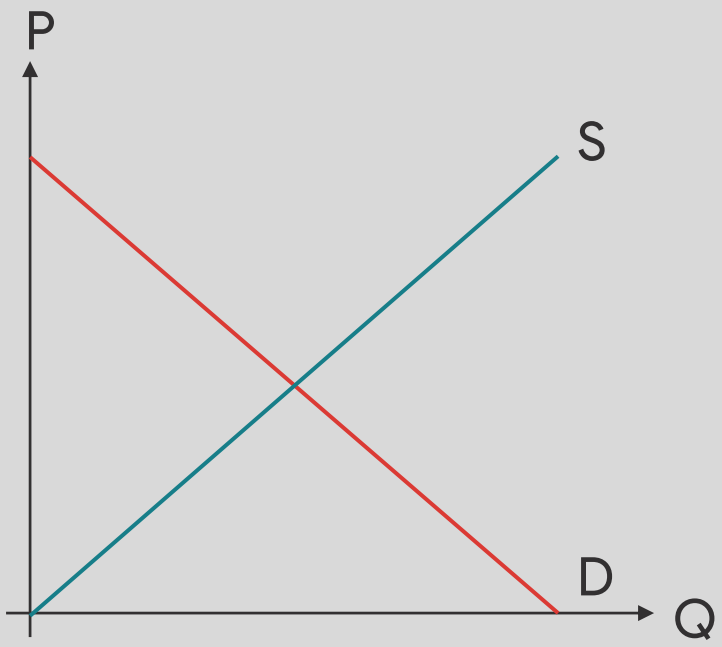
6. Market Intervention

6.1 Price ceiling

Price ceiling <u>higher</u> than market price	Effect on market
	

6. Market Intervention

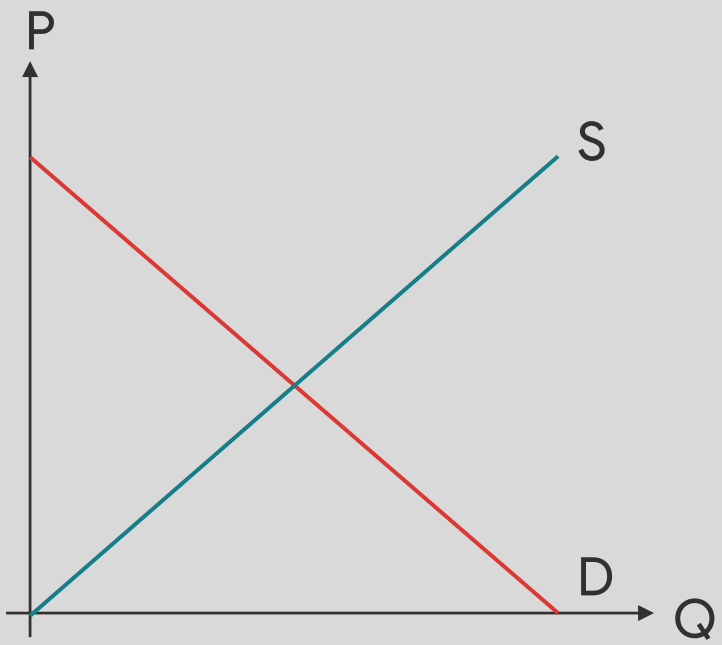
6.1 Price ceiling

Price ceiling lower than market price	Effect on market
	• Excess demand or supply? • Total surplus

6. Market Intervention

6.1 Price ceiling

Case study: rental rooms



Effect on market

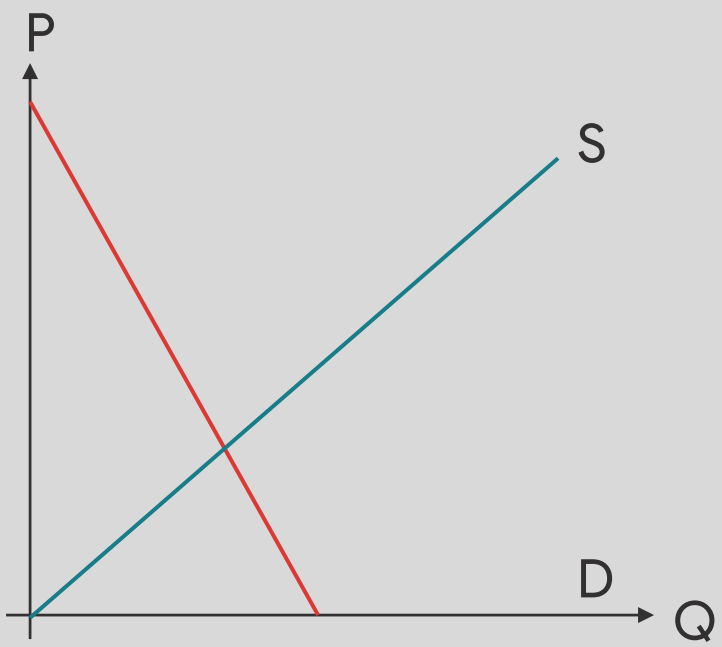
- Excess demand or supply?
- Side effects and additional policy

Surplus	Before	After	Diff
CS			
PS			
Total			

6. Market Intervention

6.1 Price ceiling

Inelastic demand

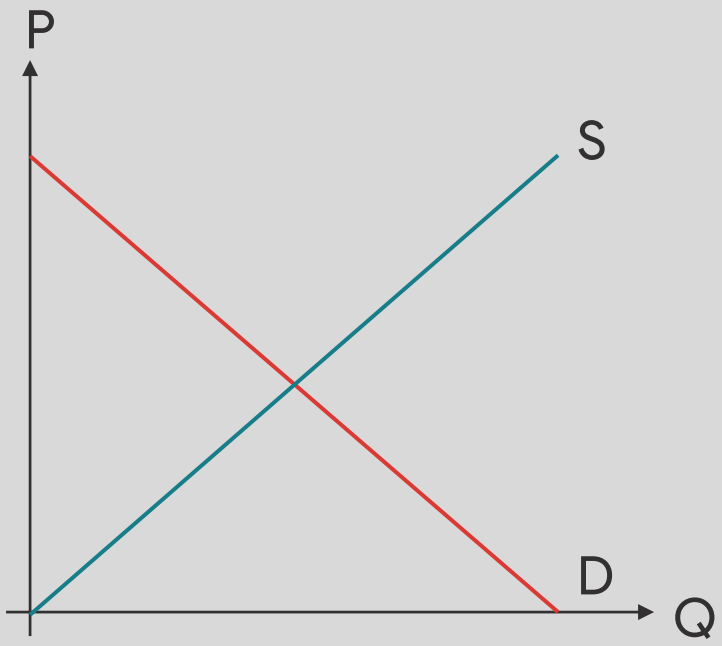


Effect on consumers

Surplus	Before	After	Diff
CS			

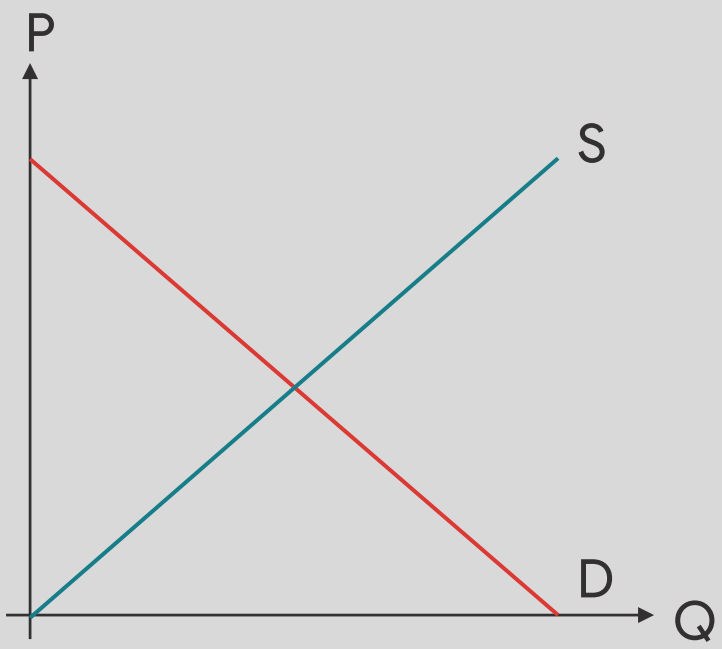
6. Market Intervention

6.2 Price floor

Price floor lower than market price	Effect on market
	

6. Market Intervention

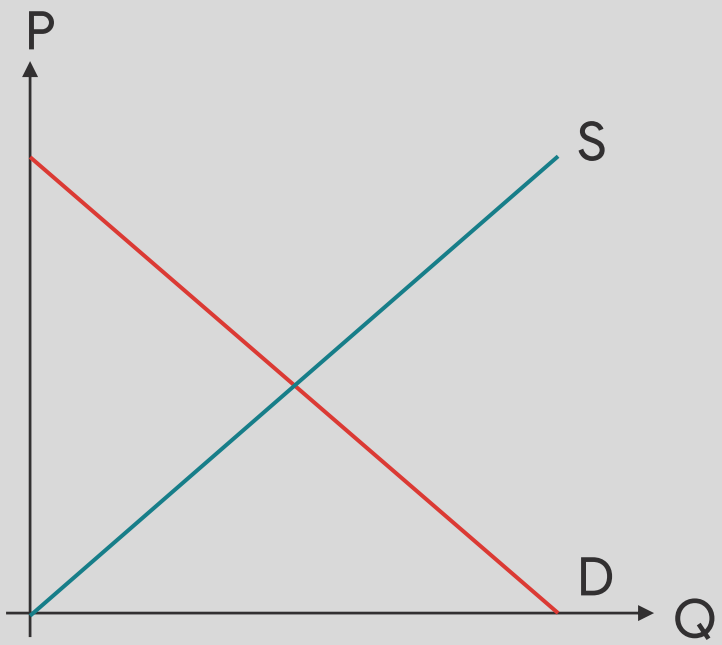
6.2 Price floor

Price floor lower than market price	Effect on market
	• Excess demand or supply? • Total surplus

6. Market Intervention

6.2 Price floor

Case study: Rice subsidy program



Effect on market

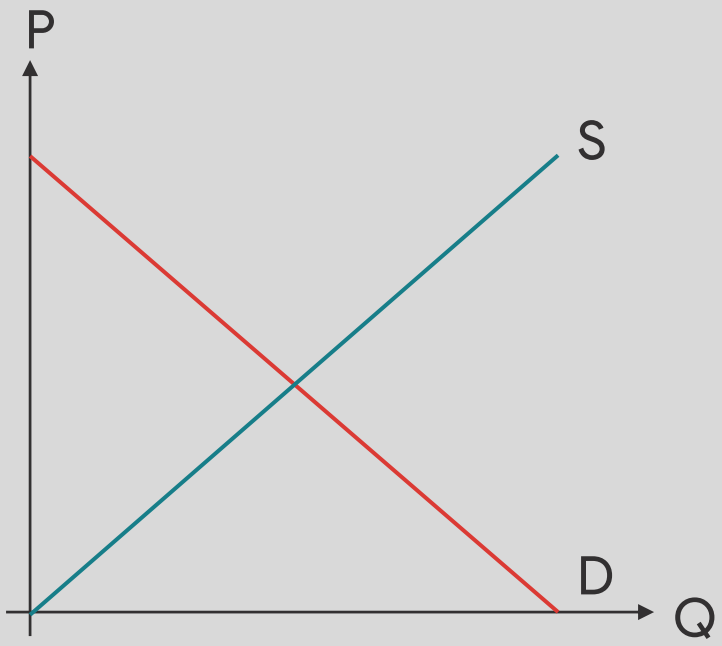
- Excess demand or supply?
- Side effects and additional policy

Surplus	Before	After	Diff
CS			
PS			
Total			

6. Market Intervention

6.3 Price support

Case study: Agricultural price support



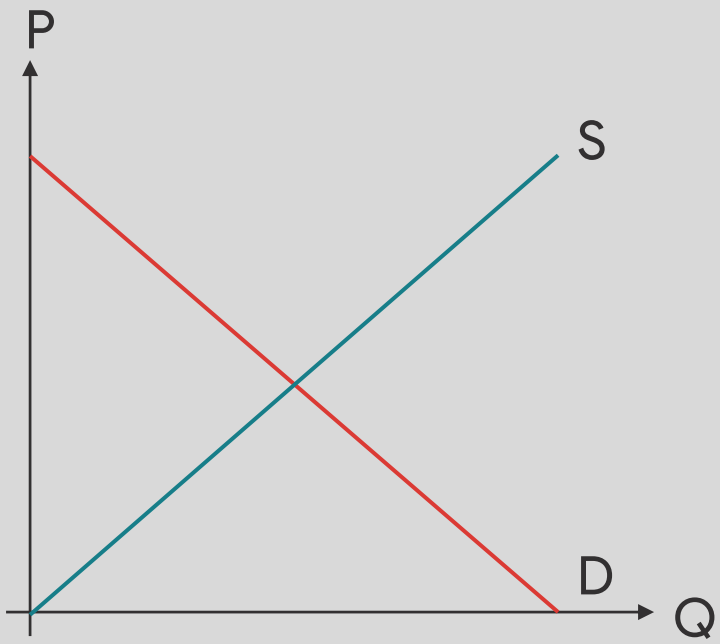
Effect on market

- Excess demand or supply?
- Side effects and additional policy

Surplus	Before	After	Diff
CS			
PS			
Total			
Public expenditure			

6. Market Intervention

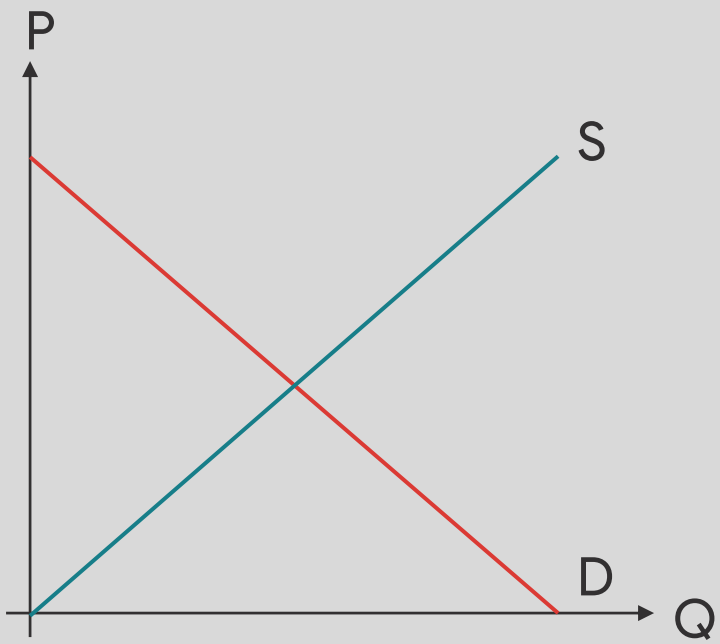
6.4 Unit tax

Imposing on sellers	Effect on supply curve
	

6. Market Intervention

6.4 Unit tax

Imposing on sellers



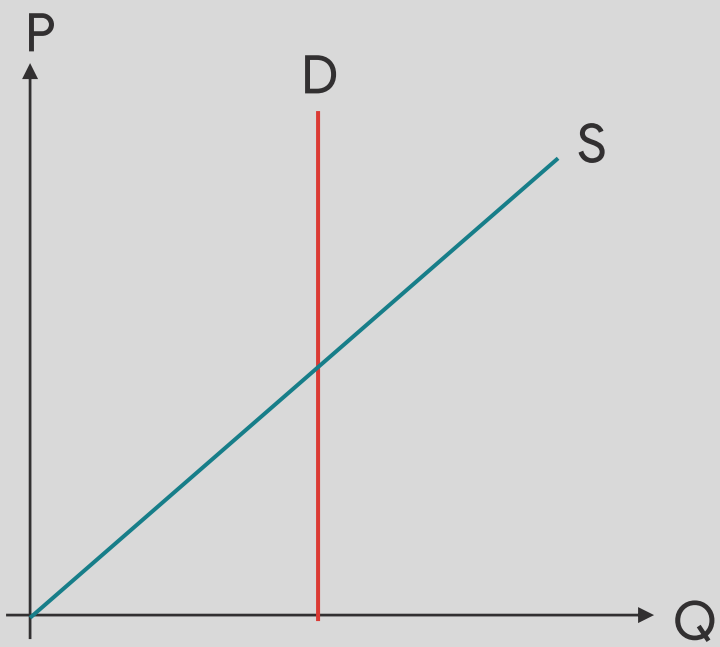
Effect on market

- Equilibrium price and quantity
- Tax burden

Surplus	Before	After	Diff
CS			
PS			
Government			
Total			

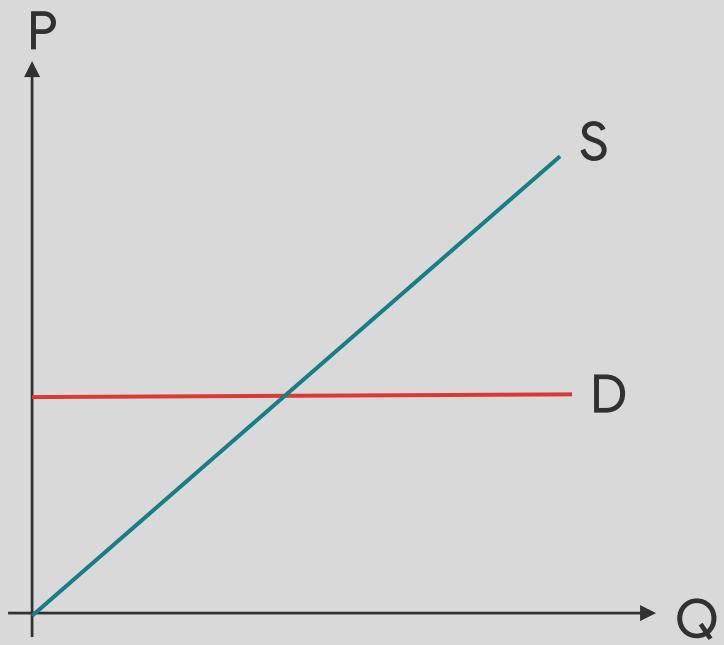
6. Market Intervention

6.4 Unit tax

Perfectly inelastic demand	Effect on market
	• Equilibrium price and quantity • Tax burden

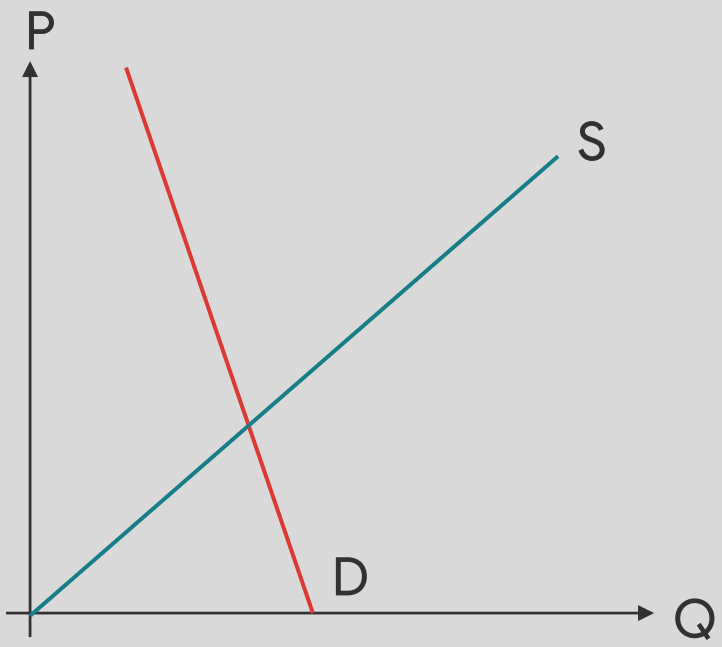
6. Market Intervention

6.4 Unit tax

Perfectly elastic demand	Effect on market
	• Equilibrium price and quantity • Tax burden

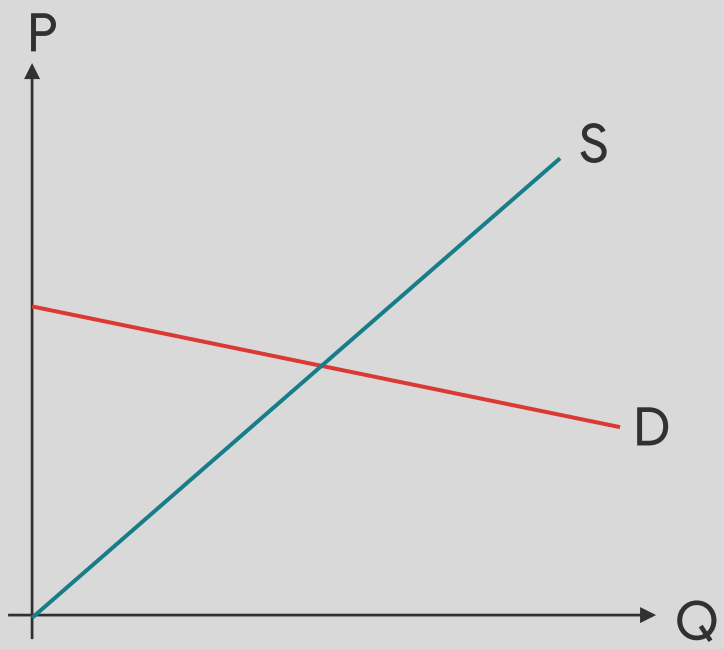
6. Market Intervention

6.4 Unit tax

Inelastic demand	Effect on market
	• Equilibrium price and quantity • Tax burden

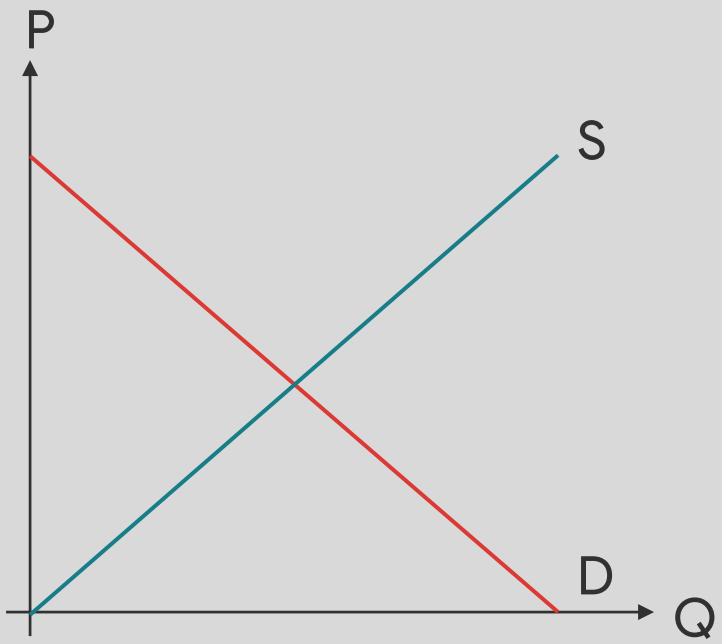
6. Market Intervention

6.4 Unit tax

Elastic demand	Effect on market
	• Equilibrium price and quantity • Tax burden

6. Market Intervention

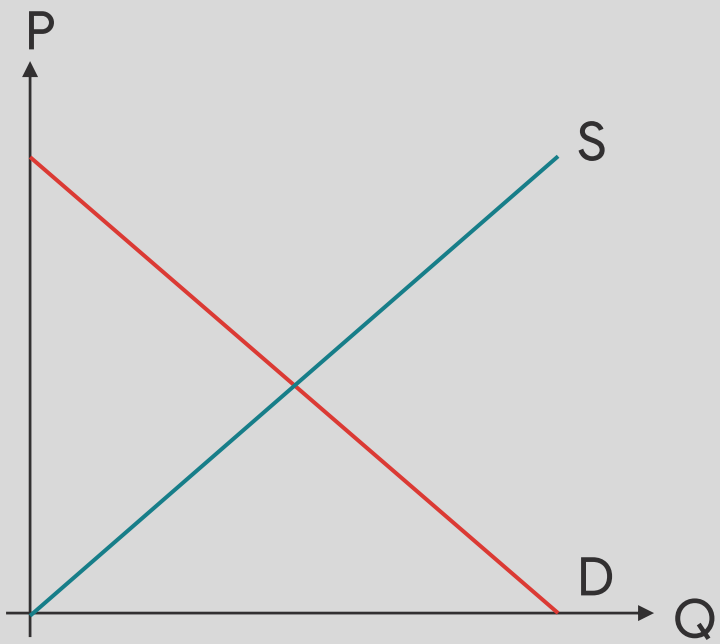
6.4 Unit tax

Imposing on buyers	Effect on demand curve
	

6. Market Intervention

6.4 Unit tax

Imposing on buyers



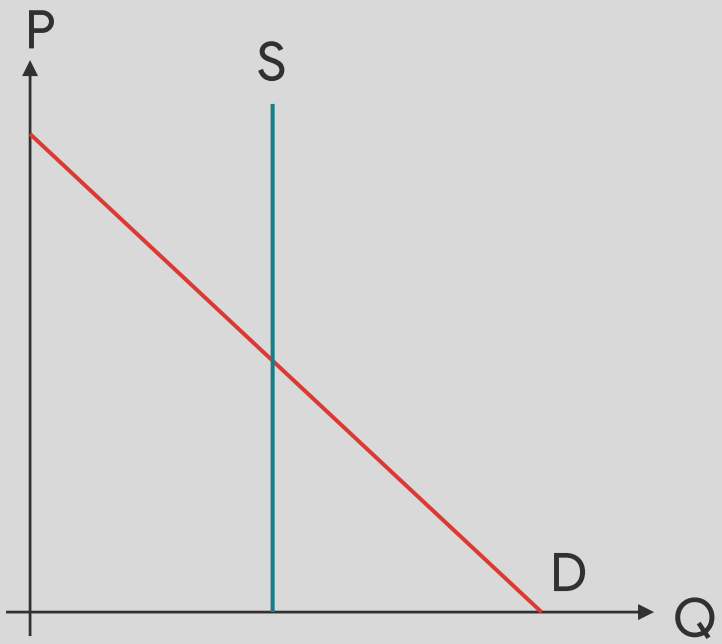
Effect on market

- Equilibrium price and quantity
- Tax burden

Surplus	Before	After	Diff
CS			
PS			
Government			
Total			

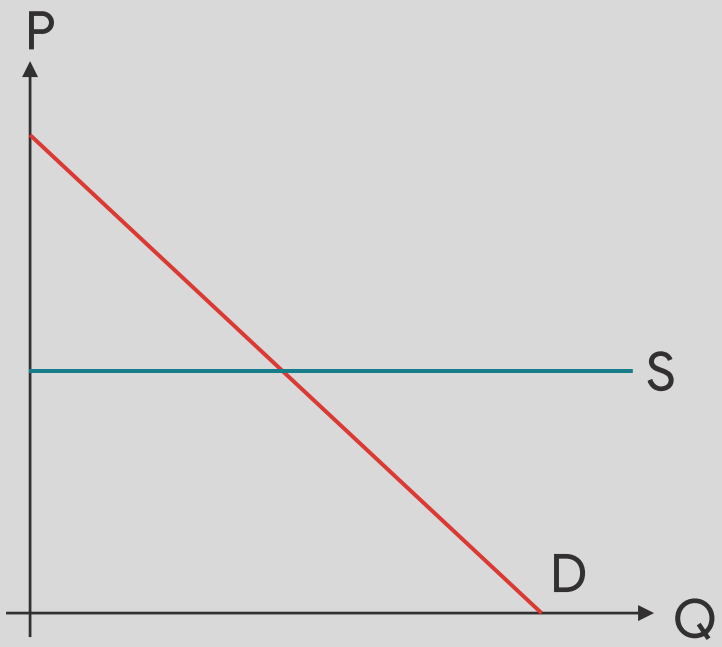
6. Market Intervention

6.4 Unit tax

Perfectly inelastic supply	Effect on market
	• Equilibrium price and quantity • Tax burden

6. Market Intervention

6.4 Unit tax

Perfectly elastic supply	Effect on market
	• Equilibrium price and quantity • Tax burden

6. Market Intervention

Proposition – Surplus and Market Intervention

2.6

- Total surplus sometimes refers to total 'welfare' of a market.

- Elasticity plays a big role determining surplus and surplus loss when a market is intervened.

- Market intervention usually decrease surplus and create 'deadweight loss', while taxing can increase government revenue.

- Many side effects should not be overlooked when a public policy is implemented as seen from the rental rooms case.