2. Demand and Supply

Key Concepts

- Law of *demand* and *supply*
  - *Demand* and *supply* curves
  - Willingness to pay (WTP) and willingness to sell (WTS)
  - Demand *shifters*
    - Income
      - Normal Good (demand increases as income increases)
      - Inferior Good (demand decreases as income increases)
    - Related Goods
      - Substitutes (demand increases as the price of a substitute increases)
      - Complements (demand increases as the price of a complement decreases)
    - Other demand shifters
      - Advertising and consumer tastes
      - Population (e.g. age distribution, demographics)
      - Expectations about future prices and income
- *Consumer* and *producer* surplus
- Demand Function
  - Demand function $Q_X^d(P_X, P_Y, M, H)$
  - Inverse demand function $P_X(Q_X^d)$
- Market *equilibrium* in a competitive market
- Government policies
  - *Excise* tax (fixed amount per unit)
  - *Ad valorem* tax (percentage of price)
  - Price *floors* and *ceilings*
- Supply and demand analysis

Economists use **models** to study economic issues. A model is a **highly simplified representation of a more complicated reality**. The most basic model in economics is the **supply and demand model**.

Supply and Demand

Demand

The **quantity demanded** Q^d of a good is the amount of good that **consumers are willing and able to purchase**.

Law of Demand

The **quantity demanded** of a good **increases** as the **price falls**.
So, **price and quantity demanded are inversely related**.

Supply

Supply

The **quantity supplied** of any good is the **amount that sellers are willing and able to sell**

Law of Supply

The **quantity supplied** Q^s of a good **increases** as the **price rises** (holding all else constant).
So, **price and quantity supplied are directly related**.

Market supply/demand Curve

- illustrates the relationship between the total quantity demanded/supplied and the price of a good
- holding **all other variables constant**
- Q on the **horizontal** axis
- P on the **vertical** axis

Willingness to Pay

Willingness to Pay (WTP)

A consumer's **Willingness to Pay (WTP)** for a good is the **maximum amount the buyer will pay** for that good.
It reflects how much the buyer values the good.

Willingness to Sell

Willingness to Sell (WTS)

A producer's **Willingness to Sell (WTS)** for a good is the **minimum amount the seller will accept** for that good.
It reflects how much the seller values the good.

Changes in Demand and Supply

Changes in Demand/Supply

Changing **only price**:

- Leads to changes in **quantity demanded** Q^d / **quantity supplied** Q^s
- Movement *along* the demand/supply curve

Changing **other variables**:

- Leads to changes in **demand/supply**
- **Shifts** the *entire* demand/supply curve

Demand Shifters

Income

Normal good

A **normal good** is a good for which an **increase in income causes an increase in demand**.

$$\boxed{\text{eman en Income}}$$

E.g. fruits, clothing, electronics

Inferior good

An **inferior good** is a good for which an **increase in income causes a decrease in demand**.

$$\boxed{\text{eman en Income}}$$

E.g. instant noodles, bus rides, used cars

Related Goods

Substitutes

Two goods are **substitutes** if an **increase in the price of one causes an increase in demand for the other**.

$$\boxed{\text{eman of oo A en Price of oo}}$$

E.g. butter and margarine, tea and coffee, Coke and Pepsi

Complements

Two goods are **complements** if an **increase in the price of one causes a decrease in demand for the other**.

$$\boxed{\text{eman of oo A en Price of oo}}$$

E.g. cars and gasoline, printers and ink cartridges, smartphone and apps

Other demand shifters

- Advertising and consumer tastes
- Population (e.g. age distribution, demographics)
- Expectations about future prices and income

Supply Shifters

- Input prices
  - Wage
  - Price of raw materials
- Technology
- Government regulation
- Number of firms (entry and exit)
- Taxes

Consumer Surplus

Consumer Surplus (CS)

The **consumer surplus** is the difference between the maximum amount a consumer is willing to pay for a good and the amount the consumer actually pays for it.
It measures the benefit to consumers from participating in the market.

$$\boxed{C = (\text{value to buyers}) - (\text{amount pai by buyers})} = \text{buyerss gains from particip}$$

It equals the **area below the demand curve and above the price**, from 0 to Q^d.

∑ Consumer Surplus (CS)

$$\boxed{C = P - P}$$

Total Consumer Value

Sum of the WTP's at different quantities.

$$\text{Total Consumer alue} = \int_0^{Q^d} P(Q)\, dQ$$

Total Expenditure

Per-unit market price times number of units purchased.

$$\text{Total Expeniture} = P\ Q^d$$

∑ Consumer Surplus as Total Consumer Value minus Total Expenditure

$$\boxed{C = \text{Total Consumer alue} - \text{Total Expeniture}}$$

Two reasons for fall in CS when price rises:

1. Some consumers leave the market (lower Q^d)
2. Remaining consumers pay a higher price (higher P)

Producer Surplus

Producer Surplus (PS)

The **producer surplus** is the amount producers receive in excess of the amount necessary to induce them to produce the good.

$$\boxed{P = (\text{amount receive by sellers}) - (\text{cost to sellers})} = \text{sellerss gains from particip}$$

It equals the **area above the supply curve and below the price**, from 0 to Q^s.

Two reasons for fall in PS when price falls:

1. Some sellers leave the market (lower Q^s)
2. Remaining sellers receive a lower price (lower P)

Total surplus

Total Surplus (TS)

The **total surplus** is the total gains from trade in a market.

$$\boxed{= C + P = (\text{value to buyers}) - (\text{cost to sellers})}$$

- We use total surplus as a measure of **society's well-being** or **social welfare**.
- We consider whether the market's allocation is **efficient** = **maximizes total surplus**.

Rule

The market's allocation is **efficient** if it **maximizes total surplus**.

Demand Function

Linear Demand Function

A linear demand function has the form:

$$\boxed{Q_X^d = {}_0 + {}_X P_X + {}_Y P_Y + {}_M M + {}_H H}$$

Where

- Q_X^d = quantity demanded of good X
- P_X = price of good X
- Y = **related good**
- P_Y = price of related good Y
- M = **income**
- H = value of **any other variable affecting demand** (demand shifter)

Inverse Demand Function

If we express

$$\boxed{P_X \text{as a function of} Q_X^d}$$

we obtain the **inverse demand function**.

Supply Function

Linear Supply Function

A linear supply function has the form:

$$\boxed{Q_X^s = {}_0 + {}_X P_X + \ + P + {}_H H}$$

- Q_X^s = number of units of good X produced
- P_X = price of good X
- = **price of an input**
- P = price of a **technologically related goods**
- H = value of **any other variable affecting supply** (supply shifter)

Inverse Supply Function

If we express

$$\boxed{P_X \text{as a function of} Q_X^s}$$

we obtain the **inverse supply function**.

Taxes

Excise Tax

An **excise tax** is a tax that is a **fixed amount per unit sold**.
E.g. tax on cigarettes

Ad Valorem Tax

An **ad valorem tax** is a tax that is a **percentage of the price of the good**.
E.g. VAT (value-added tax)

Market Equilibrium

Market Equilibrium

A market is in **equilibrium** when the **quantity demanded equals the quantity supplied**.

$$\boxed{Q = Q^d = Q^s}$$

A price and quantity such that there is **no shortage** and **no surplus** (excess supply) in the market.
The equilibrium price P is the price at which the quantity demanded equals the quantity supplied.

Forces that drive market demand and supply are balanced: there is no pressure on prices or quantities to change.

Market Equilibrium Maximizes Total Surplus

The market equilibrium maximizes total surplus, and therefore the **allocation of resources is efficient**.

Price ceilings and Price floors

Price Ceiling

A **price ceiling** is a legal maximum on the price at which a good can be sold.
E.g. rent control

Price Floor

A **price floor** is a legal minimum on the price at which a good can be sold.
E.g. minimum wage

Changes in demand

E.g. flowers and chocolates on Valentine's Day

Increase in demand only:

- Equilibrium price P increases
- Equilibrium quantity Q increases

Decrease in demand only:

- Equilibrium price P decreases
- Equilibrium quantity Q decreases

Changes in supply

E.g. egg crisis in the US

Increase in supply only:

- Equilibrium price P decreases
- Equilibrium quantity Q increases

Decrease in supply only:

- Equilibrium price P increases
- Equilibrium quantity Q decreases

Competitive Market

Competitive Market

A **competitive market** is a market with many buyers and sellers, each of whom has a negligible impact on the market price.