Handout 4

1 Welfare Analysis

- Assumption: perfectly competitive markets (everyone is *price taker* and sell *identical* goods).
- Resources allocation:
  - Which producers make it?
  - Which consumers buy it?
  - How much of each good is produced?
- Willingness to pay
  - A buyer's willingness to pay for a good is the maximum amount the buyer will pay for that good.
  - Measures how much the buyer values the good.

1.1 Consumer Surplus (CS)

- The amount a buyer is *willing to pay* minus the amount the buyer *actually pay*.
- CS = WTP - P
  = value to buyers - amount paid by buyers
  = buyers' gains from participating in the market

1.2 Producer Surplus (PS)

- Cost:
  - Measure of willingness to sell.
  - The value of everything a seller must give up to produce a good.
  - Includes cost of all resources used to produce good, including value of the seller's time.
- The amount a seller is paid for a good minus the seller's cost.
- PS = P - Cost
  = amount received by sellers - cost to sellers
  = sellers' gains from participating in the market

1.3 Total Surplus

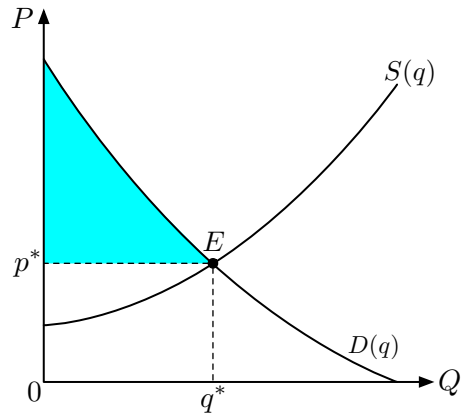
- TS = CS + PS
  = total gains from trade in a market
  = value to buyers - cost to sellers
- We use total surplus as a measure of society's well-being, and we consider whether the market's allocation is efficient.

1.4 Efficiency

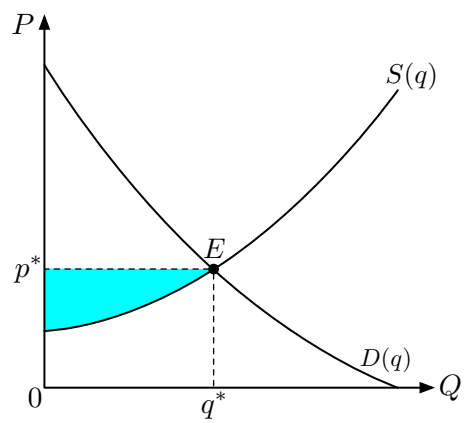
- An allocation of resources is efficient if it maximizes total surplus.
- The goods are consumed by the buyers who value them most highly.
- The goods are produced by the producers with the lowest costs.
- **Raising or lowering the quantity of a good would not increase total surplus.**

2 A Mathematics Representation

- $D(q)$ is the inverse[1] demand function (curve): $P = a - bQ$
- Consumer Surplus (CS) = $\int_0^{q^*} D(q)\, dq - p^* q^*$



- $S(q)$ is the inverse supply function: $P = c + dQ$
- Producer Surplus (PS) = $p^* q^* - \int_0^{q^*} S(q)\, dq$



3 Market Failure

- Occurs when market fails to allocate resources efficiently.
- When agent (buyer or seller) has market power[2].
- Exist externalities: Transactions have **side effects** or frictions that affect other agents.

[1] The demand curve represent the relationship between price and demand. Particularly, what is the quantity demanded at a **given** price: $Q = a - bP$. The inverse demand curve asks the question: what is the price that the producers is willing to sell given the quantity demanded: $P = a - bQ$. In both cases, they all present a **negative relationship** between price(P) and quantity(Q). The same logic applies to the supply side.

[2] Market Power refers to the ability to affect the market price (e.g. Monopoly firm).