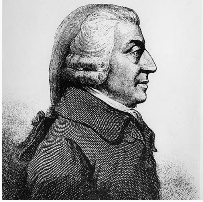
Consumer Theory and Demand

Javier Tasso

Marginal Utility

Paradox of Value

"Nothing is more useful than water: but it will purchase scarcely anything; scarcely anything can be had in exchange for it. A diamond, on the contrary, has scarcely any use-value; but a very great quantity of other goods may frequently be had in exchange for it."



Adam Smith

- Adam Smith notices **Value in Use** and **Value in Exchange** tend to be different.
- **Total Utility** of water is huge, but its price does not seem to reflect this fact.

Marginal Utility

Marginal Utility. The marginal utility (MU) of any good is the increase in total utility (TU) that the consumer gets from an additional unit of it.

- It isn't the total utility what determines the value, it is the marginal utility.
- Under standard conditions the MU of water is lower than the MU of diamonds.

Law of Diminishing Marginal Utility

Carl Menger

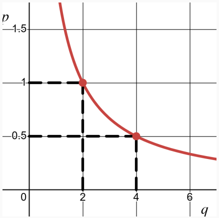
- As you consume more of a good, the additional utility derived from each successive unit decreases.
- Key idea of the Marginal Revolution. Carl Menger, William Stanley Jevons, and Leon Walras.
- MU of water decreases fast relatively to the MU of diamonds.

Utility and Demand

- Consumers try to maximize total utility.
- They are constrained by their income m and face prices $p_1, p_2, \ldots$
- Try to buy whatever good gives you the highest marginal utility per dollar spent.
- Demand is the result of this maximization.
- Because MU is typically decreasing, I will demand more units if you charge me a lower price.

Example

q_1	$u(q_1)$	q_2	$u(q_2)$
0	0	0	0
1	120	1	60
2	180	2	120
3	220	3	180
4	250	4	240
5	274	5	300



- q_1 and q_2 are two goods.
    1. q_1 is the good I want to find the demand.
    2. Let q_2 be a composite good that combines every other good.
- Assume $p_1 = 1$ and $p_2 = 1$ are their prices and you have $m = 4$ to spend. Find the demand.
- Repeat if $p_1 = 0.5$.

Marginal Utility per Dollar

$$\frac{\mathrm{MU}_1}{p_1} = \frac{\mathrm{MU}_2}{p_2}$$

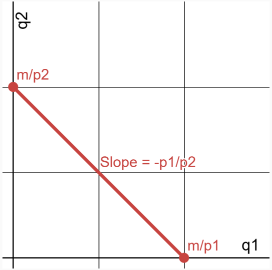
At the best choice:

1. Marginal utility per dollar is equal for all goods.
2. The consumer spends all her money.

Utility Maximization & Demand

Budget Constraint

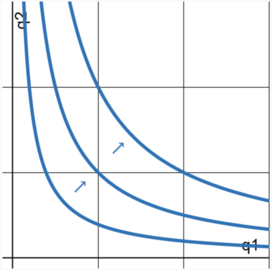
Budget Constraint: $p_1 q_1 + p_2 q_2 = m$



- Defines which bundles of goods 1 and 2 the consumer can buy. What's affordable and what's not.
- Change to m.
- Change to p_1.
- Plot for our previous example.

Indifference Curves

Indifference Curve. Combinations of (q_1, q_2) that give you the same total utility.



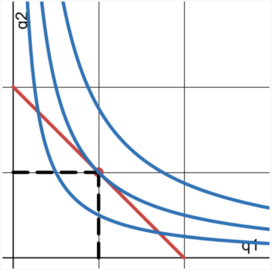
- Set $\text{TU} = 180, 300$ and plot the indifference curves in our example.
- Any combination on the indifference curve gives you the same total utility.
- Bundles in different indifference curves give you different total utility.

Indifference Curves - Characteristics

Marginal Rate of Substitution. The slope of the indifference curve. The rate at which a consumer is willing to give up one good in exchange for an additional unit of the other good.

1. Negative slope.
2. Convex shape.
3. They do not cross each other.
4. They grow to the northeast.
5. $\text{MRS} = -\frac{\text{MU}_1}{\text{MU}_2}$.

Optimal Choice



- Reach the highest indifference curve possible given the budget constraint.
- In the optimal solution the indifference curve is tangent to the budget constraint. This is a restatement of the Marginal Utility per Dollar rule: $|\text{MRS}| = \frac{p_1}{p_2}$.
- Illustrate with previous example with $p_1 = 1$ and $p_1 = 0.5$.

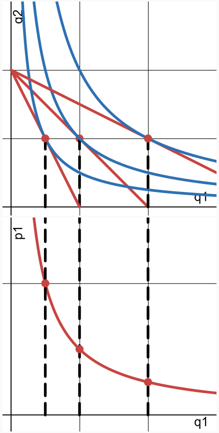
MRS and Relative Price

$$|\text{MRS}| = \frac{p_1}{p_2}$$

At the best choice:

1. Marginal rate of substitution is equal to the relative price.
2. The consumer spends all her money.

Demand



- Solve the utility maximization problem for different prices and take notes of the solution.
- Plot in the plane (q_1, p_1). This is the individual demand for good 1.
- Changes in $p_1 \rightarrow$ Movement along the curve.
- Changes in p_2, m, or preferences $\rightarrow$ Shift the demand curve.

Classification of Goods

Robert Giffen

- According to its own price p_1:
  - Typical.
  - Giffen.
- According to income m.
  - Normal.
  - Inferior.
- According to the price of another good p_2:
  - Substitutes.
  - Complements.

Income & Substitution Effects

Basic Idea

- When the price of a good changes, it affects the consumer through two distinct mechanisms:
    1. Substitution Effect.
    2. Income Effect.
- We dive deep into understanding of how consumers make choices.
- Help us understand not intuitive behavior (like Giffen goods).

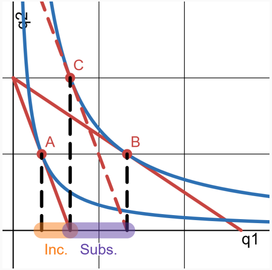
Substitution Effect

- Occurs because the change in relative prices makes one good relatively cheaper or more expensive compared to others.
- Consumers typically substitute away from the more expensive good towards the cheaper alternative.
- Always works in the direction of buying more of the cheaper good.

Income Effect

- Results from the change in the purchasing power of the consumer's income due to a change in the good's price.
- The direction of the income effect depends on whether the good is normal or inferior:
    1. Normal Good: Price decrease leads to higher demand (positive income effect).
    2. Inferior Good: Price decrease may reduce demand (negative income effect).

Graphically



- Find initial and final situations. Before (B) and after (A) the price change.
- Compensate (C) the consumer with more (less) money. So she can reach the original utility.
- B to C: Substitution Effect.
- C to A: Income Effect.

Applications of Consumer Theory

$$c_0 + \frac{c_1}{1+r} = m$$

Increasing the interest rate may reduce savings:

- Substitution effect induces you to save more.
- Income effect induces you to consume more (today and tomorrow).

Applications of Consumer Theory II

$$c + wh = 24w$$

Increasing the wage may reduce labor supply:

- Substitution effect induces you to work more/enjoy less leisure.
- Income effect induces you to enjoy more leisure.

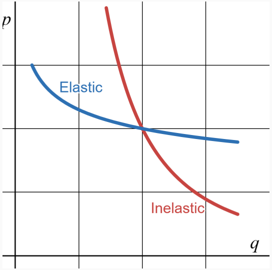
Elasticity

Elasticity

$$\varepsilon = \frac{\%\Delta q}{\%\Delta p} = \frac{\Delta q/\bar{q}}{\Delta p/\bar{p}}, \quad \text{with} \quad \bar{q} = \frac{q_1 + q_2}{2}, \quad \bar{p} = \frac{p_1 + p_2}{2}$$

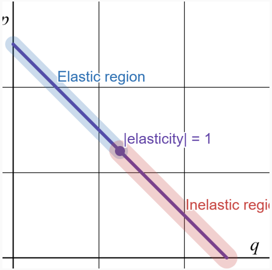
- Where $\Delta q = q_2 - q_1$ and $\Delta p = p_2 - p_1$.
- Measure sensibility of demand to price changes.
- Demand elasticity is negative. Why?
- It's common to consider $|\varepsilon|$.

Classification



- If $|\varepsilon| > 1$, we say demand is elastic.
  - A small increase in the price produces a large drop in the quantity.
- If $|\varepsilon| < 1$, we say demand is inelastic.
  - An increase in the price, produces little effect on the quantity.
- If $|\varepsilon| = 1$, we say demand has unit elasticity.

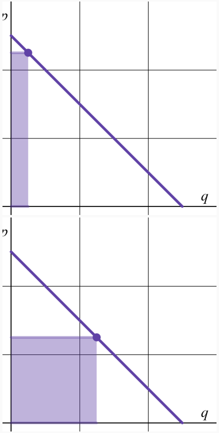
Linear Demand



$$q(p) = 12 - p$$

- Shortcut notation.
- Calculate elasticity between $p_1 = 9$ and $p_2 = 10$.
- Repeat between $p_1 = 1$ and $p_2 = 2$.
- Linear demands exhibit the three types of elasticity depending on the region.

Elasticity and Total Revenue



- Total revenue ($\text{TR} = p \cdot q$) is maximum when the elasticity is $|\varepsilon| = 1$.
- Elastic region: If I lower the price, there is a big increase in quantity. Leading to higher revenue.
- Inelastic region: If I increase the price, quantities do not fall that much. Leading to higher revenue.

Summary

Marginal Utility

Utility Maximization & Demand

Income & Substitution Effects

Elasticity