

AAE635: Applied Microeconomic Theory

Discussion Section 8

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October 27, 2025

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Today's goal

- Analyze consumer decision making under a budget constraint, deriving Marshallian demand and the indirect utility function.

Consumer Theory

So far we have explored the production behavior of cost minimizing firms and profit maximizing firms. The production behavior (and its comparative statics) under optimization gives the supply side story of the market, and for the demand side story, we need to examine the consumption behavior by rational consumers.

Setup

Consider a household choosing n consumption goods $\mathbf{x} = (x_1, \dots, x_n)^T$. The household has preferences represented by a utility function $u(\mathbf{x})$. It faces the budget constraint: $\mathbf{p}^T \mathbf{x} \leq y$, where $y > 0$ is household income, and $\mathbf{p} = (p_1, \dots, p_n)^T$ is a n -price vector for $\mathbf{x}$, $p_i > 0$ denoting the market price of x_i , $i = 1, 2, \dots, n$.

From utility maximization problems, we obtain Marshallian demand functions and then an indirect utility function:

$$V(p, y) = \max_x \{U(x) : p^T x \leq y, x \geq 0\} = U(x^*(p, y)) \quad (1)$$

Note:

- $x^*(p, y)$ are utility maximizing decision rules for household consumption. They are also called Marshallian demand functions.
- The function $V(p, y)$ in 1 is the indirect utility function.

Non-satiation Assumption

We will assume that the non-satiation assumption holds.

- Non-satiation: More is better.
- Non-satiation means that the household can always increase its utility by increasing the consumption of some commodity. This implies that the budget constraint is necessary binding at the optimum x^* : $p^T x^*(y, p) = y$.

Practice Question

Consider a household choosing two consumption goods $x = (x_1, x_2)'$. The household has preferences represented by the Cobb-Douglas utility function:

$$U(x_1, x_2) = \frac{1}{2}(x_1 x_2)^2$$

The household budget constraint is $p_1 x_1 + p_2 x_2 \leq y$, where $y > 0$ represents income and $p = (p_1, p_2)'$ is the market price vector.

1. Set up the households utility maximization problem. Does CQ hold? Why?
2. Derive the Marshallian demand functions and the associated Lagrange multiplier.
3. Verify the Cournot and Engel aggregation restrictions.
4. Verify that the Marshallian demand functions are homogeneous of degree 0 in (p, y) for $i = 1, 2$.
5. Show that the indirect utility function $V(p, y)$ is homogeneous of degree 0 in (p, y) .