A Behavioral Update of Basic Microeconomics: Consumer Theory, Arrow-Debreu

Based on Gabaix (2014)

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Introduction

- Presentation of a behavioral version of basic microeconomics focused on limited attention.
- Applicable to a broad set of behavioral models.
- Independent of the specifics of attention endogenization.

5.1 Textbook Consumer Theory

- Exploration of how textbook consumer theory adapts to a partially inattentive agent.
- Examination of Marshallian demand in the context of behavioral economics.

5.1.1 Basic Consumer Theory: Marshallian Demand

- Rational consumer's Marshallian demand:

$$\boldsymbol{c}(\boldsymbol{p}, w) := \arg\max_{\boldsymbol{c} \in \mathbb{R}^n} u(\boldsymbol{c}) \text{ subject to } \boldsymbol{p} \cdot \boldsymbol{c} \leq w$$

- Notation: $\boldsymbol{c}$ and $\boldsymbol{p}$ are the consumption and price vectors.
- Comparison between traditional rational model and behavioral agent demand.

Price Perception

- Price perception for behavioral agents:

$$p_i^s(m) = m_i p_i + (1 - m_i)\, p_i^d$$

- Discussion of how perceived prices are formed.

Proposition 5.1: Marshallian Demand

Given the true price vector $\boldsymbol{p}$ and the perceived price vector $\boldsymbol{p}^s$, the Marshallian demand of a behavioral agent is:

$$\boldsymbol{c}^s(\boldsymbol{p}, w) = \boldsymbol{c}^r\left(\boldsymbol{p}^s, w'\right)$$

- Explanation of the as-if budget w'.

Examples of Demand I

- Example 2: Demand by a behavioral agent with quasi-linear utility.

$$c_i^s(\boldsymbol{p}) = c_i^r\left(\boldsymbol{p}^s\right)$$

- Example 3: Demand proportional to wealth.

$$c_i^s(\boldsymbol{p}, w) = \frac{c_i^r\left(\boldsymbol{p}^s, w\right)}{\boldsymbol{p} \cdot \boldsymbol{c}^r\left(\boldsymbol{p}^s, 1\right)}$$

- Example 4 (Demand by behavioral Cobb-Douglas and CES agents).

$$c_i^s(\boldsymbol{p}, w) = \frac{\alpha_i}{p_i^s} \frac{w}{\sum_j \alpha_j \frac{p_j}{p_j^s}}$$

And for CES: $c_i^s(\boldsymbol{p}, w) = \left(p_i^s\right)^{-\eta} \frac{w}{\sum_j p_j \left(p_j^s\right)^{-\eta}}$

Examples of Demand II

The Slutsky Matrix

- The Slutsky matrix encodes elasticities of substitution and welfare losses from distorted prices.
- Definition of the Slutsky matrix element:

$$S_{ij}(\boldsymbol{p}, w) := \frac{\partial c_i(\boldsymbol{p}, w)}{\partial p_j} + \frac{\partial c_i(\boldsymbol{p}, w)}{\partial w} c_j(\boldsymbol{p}, w)$$

- Traditional symmetry in the Slutsky matrix: $S^r_{ij} = S^r_{ji}$.

Proposition 5.2: Behavioral Slutsky Matrix

- Behavioral Slutsky matrix S^s evaluated at default price:

$$S^s_{ij} = S^r_{ij} m_j$$

- Highlights the dampened sensitivity to "non-salient" price changes.
- Illustrates the asymmetry of the Slutsky matrix in behavioral consumers.

Proposition 5.3: Estimation of Limited Attention

- Recovery of the attention vector m from choice data:

$$m_j = \bar{m} \prod_{i=1}^{n} \left(\frac{S_{ij}^s}{S_{ji}^s} \right)^{\gamma_i}$$

- Empirical estimation of rational matrix S_{ij}^r and its symmetry.
- Potential for testing predictions about attention and consumer behavior.

5.2 Textbook Competitive Equilibrium Theory

- Introduction to competitive equilibrium with less than fully rational agents.
- Notation and definitions:
  - Agent a with endowment $\boldsymbol{\omega}^a$.
  - Wealth as $\boldsymbol{p} \cdot \boldsymbol{\omega}^a$.
  - Economy's excess demand function $\boldsymbol{Z}(\boldsymbol{p})$.
  - Equilibrium prices and allocations.
- Reference to Debreu (1970) for equilibrium existence conditions.

5.2.1 First and Second Welfare Theorems

(In)efficiency of Equilibrium

- Discussion on the efficiency of Arrow-Debreu competitive equilibrium.
- Assumptions: Interior competitive equilibria and local non-satiation.

Proposition 5.6: (In)efficiency of Competitive Equilibrium

- An equilibrium is Pareto efficient iff the perception of relative prices is identical across agents.
- Equilibrium efficiency condition:

$$\frac{u^a_{c_i}}{u^a_{c_j}} = \frac{u^b_{c_i}}{u^b_{c_j}}$$

- Requirement of equal perceived relative prices for efficiency.

Proposition 5.7: Second Theorem of Welfare Economics Revisited

- The second welfare theorem generally fails in a behavioral economy.
- Conditions for failure: More than two consumers or two goods.
- Relationship between the failure of the first and second welfare theorems.

5.2.2 Excess Volatility of Prices in a Behavioral Economy

- Analysis of price volatility with a single representative agent in a behavioral economy.
- Focus on the impact of supply shocks on price changes.
- Assumptions:
  - One representative agent.
  - Infinitesimal changes in price due to supply shock.
  - Positive salience factor m_i for all goods.

Proposition 5.8: Excess Volatility of Prices

- Bounded rationality leading to excess price volatility:

$$dp_i^{[s]} = \frac{dp_i^{[r]}}{m_i}$$

- Price movements in behavioral economy amplified compared to rational economy.
- Higher volatility for non-salient goods.
- Implication: Higher price volatility in goods like commodities due to inattention.

5.3 What is Robust in Basic Microeconomics?

- Analysis of robustness in basic microeconomic theory with a focus on sparsity-seeking agents.
- Contrast between traditional (classical) model and a behavioral model with inattention.

Non-Robust Propositions in Traditional vs. Behavioral Models

- Money Illusion:
  - Traditional: No money illusion.
  - Behavioral: Presence of money illusion.
- Slutsky Matrix Symmetry:
  - Traditional: Slutsky matrix is symmetric.
  - Behavioral: Asymmetry due to inattention.
- Competitive Equilibrium and Price Level:
  - Traditional: Allocation independent of price level.
  - Behavioral: Different allocations at different price levels.

Robustness and Welfare Theorems

- Welfare Maximization and Competitive Equilibrium:
  - Traditional: Maximization of objective welfare; equilibrium is efficient.
  - Behavioral: Maximization in default situations; inefficiencies away from the default price.
- Sign Predictions:
  - Traditional: Accurate sign predictions.
  - Behavioral: Sign predictions remain robust under sparsity.