

An Engel Curve for Variety

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Motivations

- ▶ Theoretical benchmark
 - ▶ **Variety**/the number of categories people consume shall be independent from expenditure/income/locations: a horizontal Engel curve for variety if
 - ▶ They are imperfect substitutes
 - ▶ All varieties are freely available
 - ▶ For instance, CES used in macro
 - ▶ But not just CES, as long as the marginal utility from **variety** is higher than marginal utility of **quantity**
- ▶ Evidences (from Indian households) inconsistent with that
 - ▶ An upward Engel curve of variety at given location
 - ▶ Heterogeneity across locations: upward from rural toward urban
 - ▶ More varieties over time
 - ▶ Variety correlated with shopping cost(measured by time spent on shopping)

Model ingredients

- ▶ diminishing marginal utility of quantity(per variety)
- ▶ a cost of variety that varies across locations
- ▶ hierarchical/asymmetric preferences toward variety

CES benchmark

$$\begin{aligned} \max_{q_i} \quad & \left(\sum_{i \in \Omega} z_i^{\frac{1}{\sigma}} q_i^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}} \quad s.t. \sum_{i \in \Omega} p_i q_i \leq X \\ \rightarrow q_j = & \frac{X}{p_j} \left(\frac{p_j}{P(\{p_i | i \in \Omega\})} \right)^{1-\sigma} z_j \\ P(\{p_i | i \in \Omega\}) \equiv & \left(\sum_{i \in \Omega} z_i p_i^{1-\sigma} \right)^{\frac{1}{1-\sigma}} \end{aligned}$$

- ▶ ϵ : EOS, > 1 diminishing marginal utility of quantity
- ▶ p_i : price
- ▶ q_i : quantity
- ▶ z_i : taste shifter/quantity
- ▶ Ω : choice set
- ▶ X : total expenditure

Adding variety cost(VC)

$$VC(n) = Fn^{\epsilon}$$

- ▶ number of varieties n
- ▶ VC as a utility not monetary cost
- ▶ $\epsilon > 0$: increasing variety cost

Parameterized variety hierarchy

Index the variety by descending benefit on a continuum of $[0, n]$

$$z_i p_i^{1-\sigma} \equiv \left[1 + \frac{1-\sigma}{\theta}\right] b i^{\frac{1}{\theta}})^{1-\sigma}$$

- ▶ Pareto distribution of varieties
- ▶ ranked by relative expenditure shares
 - ▶ varieties i and j : $z_i p_i^{1-\sigma} / z_j p_j^{1-\sigma}$
 - ▶ the inverse of the relative rank $(i/j)^{\frac{\sigma}{\theta}}$
- ▶ θ : relative asymmetry of the rank
 - ▶ bigger θ : lower value from the marginal variety
 - ▶ $\theta \rightarrow \infty$: totally symmetric and identical shares

Price aggregator

$$P(n) = bn^\psi$$
$$\psi \equiv \frac{1}{\sigma - 1} - \frac{1}{\theta}$$

- ▶ ψ : price elasticity with respect to n
 - ▶ $\psi \downarrow$ with CES elasticity
 - ▶ $\psi \downarrow$ in variety symmetry
- ▶ b : price level shifter

Household problem: two stage budgeting

- ▶ 2nd step: same as before taking n as given
- ▶ 1st step: variety choice

$$\max_n U = \frac{X}{bn^{-\psi}} - Fn^\epsilon$$

$$\rightarrow n^* = \left(\left\lfloor \frac{X}{b} \right\rfloor \frac{\psi}{F\epsilon} \right)^{\frac{1}{\epsilon - \psi}}$$

$$\log(n^*) = \left\lfloor \frac{1}{\epsilon - \psi} \log\left(\frac{\Psi}{bF\epsilon}\right) \right\rfloor + \frac{1}{\epsilon - \psi} \log(X)$$

- ▶ $X \uparrow \rightarrow n^* \uparrow$ along the variety Engel curve
- ▶ $\psi \uparrow \rightarrow n^* \uparrow$: upward shift of variety Engel curve and also changes intensive margin
- ▶ $\epsilon \downarrow \rightarrow n^* \uparrow$, an upward shift of variety Engel curve but has no intensive margin effect

Comments

- ▶ A model that can be used in other more interesting contexts: say a Maslow demand?
- ▶ Whenever there is adjustment cost that is incurred when expanding choice set
- ▶ The cost is not necessarily physical, but mental
- ▶ Explanation of the rise of Niche/long-tail consumption: heterogenous hierarchical preferences order toward varieties (Neiman and Vavra, 2019)

Neiman, B. and Vavra, J. S. (2019). The rise of niche consumption. Technical report, National Bureau of Economic Research.