ECON G6905

Topics in Trade

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Today: Non-homothetic preferences in trade

- Are income levels relevant for consumer expenditure allocations?
- Non-homothetic preferences: The income elasticity of demand differs from one
- Harrigan (2001): "The assumption of identical homothetic preferences is implausible, and uninteresting in the sense that there is no real theory behind it"
- Linder posited that income composition affects demand composition, which is what every household budget study finds (Deaton and Muellbauer 1980)
- There may not be a representative consumer when income distribution matters
- This heterogeneous demand might predict intersectoral or intrasectoral variation in trade flows
- High-income economies might have comparative advantage in income-elastic goods due to a coincidental correlation or a causal home-market effect

Today

- Caron, Fally, Markusen (2014): Intersectoral differences and correlation
- Matsuyama (2019): Intersectoral differences and causation
- A tangent: Structural transformation in closed and open economies
- Dingel (2017): Intrasectoral (quality) differences and causation

Caron, Fally, Markusen (2014)

"International Trade Puzzles - A Solution Linking Production and Preferences"

1. The factor content of a country's production and consumption are very similar (factor-service trade is too small; Trefler's "case of the missing trade")
2. Aggregate trade-to-GDP ratios are low ("home bias puzzle").
3. Bilateral trade between countries with similar incomes is higher than predicted by supply-driven theories.
4. Trade-to-GDP ratios are higher in higher-income countries.

Income elasticities can help explain these patterns

- Sectoral income elasticity and skill intensity are positively correlated: countries have comparative advantage in what they demand (explains 1, 2, 3)
- Sectoral income elasticity and tradability are positively correlated: high-income countries have higher trade-to-GDP ratios

Caron, Fally, Markusen (2014): Coincidental correlation

- Constant relative income elasticity (CRIE) preferences (Hanoch 1975):

$$U = \sum_k \alpha_{1,k} Q_k^{\frac{\sigma_k - 1}{\sigma_k}} \implies x_{nk} = \lambda_n^{-\sigma_k} \alpha_{2,k} P_{nk}^{1-\sigma_k}$$

- EK-CDK-CP multi-sector production with intermediates (no HME)
- Sectoral gravity (with EK notation for X_{ni} subscript order):

$$\frac{X_{nik}}{X_{nk}} = \frac{S_{ik} d_{nik}^{-\theta_k}}{\Phi_{nk}}; \quad \Phi_{nk} = \sum_i S_{ik} d_{nik}^{-\theta_k}$$

- Gravity with zero trade costs ($d_{nik} = 1$) and no intermediates shows interaction of supply and demand characteristics

$$\frac{X_{ni}}{X_n} = \sum_k \frac{X_{nik}}{X_{nk}} \frac{X_{nk}}{X_n} = \sum_k \underbrace{\left(\frac{S_{ik}}{\sum_j S_{jk}} \right)}_{\text{supply shifters}} \underbrace{\left(\frac{\alpha_{4,k} \lambda_n^{-\sigma_k}}{\sum_{k'} \alpha_{4,k'} \lambda_n^{-\sigma_{k'}}} \right)}_{\text{demand shifters}}$$

Caron, Fally, Markusen (2014): Demand estimation

- Need estimated model to distinguish roles of trade costs and nonhomotheticity
- Use GTAP data on 94 countries and 56 broad sectors (and 5 factors of production)
- Sectoral gravity to obtain structural proxy for Φ_{nk}

$$\ln X_{nik} = \underbrace{\ln S_{ik}}_{ik \text{ FE}} - \theta_k \underbrace{\ln d_{nik}}_{\text{proxies}} + \underbrace{\ln\left(\frac{X_{nk}}{\Phi_{nk}}\right)}_{nk \text{ FE}} \Rightarrow \hat{\Phi}_{nk} = \sum_i \exp\left(\widehat{\ln S_{ik}} - \hat{\theta}_k \ln d_{nik}\right)$$

- Price indices closely related to inward MR, $P_{nk} = \alpha_{3,k}\Phi_{nk}^{-1/\theta_k}$
- Sectoral expenditures to identify $\{\sigma_k, \lambda_n, \alpha_{5,k}, \theta_k\}$ via constrained NLS

$$\ln x_{nk} = -\sigma_k \ln \lambda_n + \ln \alpha_{5,k} + \frac{\sigma_k - 1}{\theta_k} \ln \hat{\Phi}_{nk} + \epsilon_{nk}$$

$$\sum_k \exp\left[-\sigma_k \ln \lambda_n + \ln \alpha_{5,k} + \frac{\sigma_k - 1}{\theta_k} \ln \hat{\Phi}_{nk}\right] = e_n$$

Caron, Fally, Markusen (2014): Application to puzzles

- Compute factor intensities as the ratio of skilled labor, capital, or natural resources to total labor input
- Correlation between a good's income elasticity of demand and its skilled-labor intensity in production is about 50%
- Income-elastic goods are systematically more traded (variation in the elasticity of trade costs to distance rather than θ_k)
- Quantitative account of the four puzzles (missing factor content, income-openness relationship, etc.)

Causal HME in theory: Matsuyama (2019)

- Matsuyama (2019): Intersectoral specialization, causal home-market effect
- Continuum of SDS sectors – lower tier looks like Krugman (1980)
- Direct implicitly additive CES utility with sector-specific income elasticity parameters (see Hanoch 1975 or Matsuyama's Canon lecture)
- Ranking sectors by income elasticities, the economy with higher standard of living is a net exporter in higher-ranked sectors
- Comparative statics for productivity improvements and trade costs

Brief discussion of implicit additive separability

- Recall utility functions $U(x)$ and indirect utility $V(p, y)$
- Explicitly additively separable function $U : \mathbb{R}_+^J \to \mathbb{R}$ is $U(x) = \sum_j u_j(x_j)$
- Bergson ([Burk] 1936): If U is quasi-concave, increasing, and explicitly additively separable, then it is homothetic if and only if $u_j(x_j) = \alpha_j \frac{x_j^\rho}{\rho} + \beta_j \ \forall j$
- Pigou's Law (1910) (Deaton 1974): If the (direct) utility function is additively separable, then the income elasticity of a good is (approximately) proportionate to the price elasticity of that good
- An implicitly additively separable utility function is $\sum_{j=1}^J f_j\left(x_j; U\right) = 1$
- Kimball (1995) preferences are popular example:

$$\min_{y_j} \int_0^1 p_j y_j \mathrm{d}j \text{ s.t. } \int_0^1 \Upsilon\left(\frac{y_j}{Y}\right) \mathrm{d}j = 1 \quad \Upsilon(1) = 1, \Upsilon' > 0, \Upsilon'' < 0$$

Matsuyama (2019): Non-homothetic CES preferences

"Non-homothetic CES" is an implicitly additive direct utility function with a constant elasticity of substitution (Hanoch 1975). Popularized by Comin, Lashkari, Mestieri (2021)

$$\left[\int_I (\beta_s)^{1/\eta} \left(\tilde{U}^k\right)^{\frac{\epsilon(s)-\eta}{\eta}} \left(C_s^k\right)^{\frac{\eta-1}{\eta}} \mathrm{d}s\right]^{\frac{\eta}{\eta-1}} \equiv 1 \qquad \beta_s > 0, \eta > 0, \eta \neq 1, \frac{\epsilon(s)-\eta}{1-\eta} > 0$$

$\epsilon(s) = 1 \ \forall s$ is homothetic CES.

$\epsilon(s)$ increasing in s means $(\beta_s)^{1/\eta} \left(\tilde{U}^k\right)^{\frac{\epsilon(s)-\eta}{\eta}}$ is isoelastic in $\tilde{U}^k$ and LSM in $(s, \tilde{U}^k)$

Other applications:

- Finlay and Williams "Housing Demand, Inequality, and Spatial Sorting" (2023)
- Comin, Mestieri, Danieli "Income-driven Labor Market Polarization" (2020)

Go to Matsuyama's 2018 slide deck

Structural transformation in closed and open economies

A warning to empiricists (Matsuyama *JEEA* 2009)

> *This paper presents a simple model of the world economy, in which productivity gains in manufacturing are responsible for the global trend of manufacturing decline, and yet, in a cross-section of countries, faster productivity gains in manufacturing do not necessarily imply faster declines in manufacturing. In doing so, it aims to draw attention to the common pitfall of using the cross-country evidence to test a closed economy model, and argues for a global perspective; in order to understand cross-country patterns of structural change, one needs a world economy model in which the interdependence across countries is explicitly spelled out.*

Matsuyama (*JET* 1992) overview

"Agricultural productivity, comparative advantage, and economic growth"

- Model of endogenous growth driven by learning by doing in the manufacturing sector
- Income elasticity of demand for agricultural output < 1
- Closed economy: Agricultural productivity raises growth
- Small open economy: Agricultural productivity lowers growth

Matsuyama (1992) setup/mechanics

Learning by doing in manufacturing

$$X_t^A = AG(1-n_t) \quad X_t^M = M_t F(n_t) \quad \dot{M}_t = \delta X_t^M \quad \delta > 0$$

$$AG'(1-n_t) = p_t M_t F'(n_t) \tag{4}$$

Stone-Geary preferences with necessity γ where $AG(1) > \gamma L > 0$.

$$C_t^A = \gamma L + \beta p_t C_t^M \tag{7}$$

Closed-economy has $C_t^M = X_t^M$ and $C_t^A = X_t^A$. Combining with equations (4) and (7), equilibrium n_t satisfies

$$\phi(n_t) \equiv G(1-n_t) - \beta G'(1-n_t) F(n_t)/F'(n_t) = \gamma L/A$$

Unique solution $n_t = v(A)$ with $v'() > 0$.

Higher A raises *level* of manufacturing and thus economic growth *rate*

Matsuyama (1992): small open economy

World economy has A^* and M_0^*. World relative price satisfies

$$A^* G'(1 - n^*) = p_t M_t^* F'(n^*)$$

SOE allocation must satisfy

$$AG'(1 - n_t) = p_t M_t F'(n_t)$$

Take ratio, set $t = 0$, find $n_0 \lesseqgtr n^*$.

Growth rate result: When the Home initially has a comparative advantage in manufacturing, its manufacturing productivity will grow faster than the rest of the world and accelerate over time.

"a caution to the readers of the recent empirical work, which, in order to test implications of closed economy models of endogenous growth, uses cross-country data and treats all economies in the sample as if they were isolated from each other"

Quality specialization

- High-income countries export products at higher prices
- High-income countries import products at higher prices
- Is it correlated comparative advantage or a causal home-market effect?
- Dingel (2017) extends Fajgelbaum, Grossman, Helpman (2011) to empirically pursue this question

Next week

Up next: Agglomeration economies