Lecture 4

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Herrendorf et al (2013), Comin et al (2021)

Supply vs demand driven stories

- Based on Herrendorf, Rogerson, Valentinyi "Two Perspectives on Preferences and Structural Transformation" (AER, 2013)
- How do these stories measure in the data?
- Integrate both into preferences:

$$u\left(c^A, c^M, c^S\right) = u\left(\left(\sum_{i\in\{A,M,S\}} \omega_i^{1/\sigma}\left(c^i + \bar{c}^j\right)^{\frac{\sigma-1}{\sigma}}\right)^{\frac{\sigma}{\sigma-1}}\right)$$

with $\bar{c}^M = 0$

Supply vs demand driven stories

- Let C be total consumption expenditures
- Allocation of demand within sectors, conditional on C, solves static problem

$$\max\left(\sum_{i\in\{A,M,S\}}\omega_i^{1/\sigma}\left(c^i+\bar{c}^j\right)^{\frac{\sigma-1}{\sigma}}\right)^{\frac{\sigma}{\sigma-1}}$$

s.t.

$$\sum_i p^i c^i = C$$

- Expenditure shares

$$s^i \equiv \frac{p^i c^i}{C} = \frac{\omega_i\left(p^i\right)^{1-\sigma}}{\sum_j \omega_j\left(p^j\right)^{1-\sigma}}\left(1+\sum_j \frac{p^j\bar{c}^j}{C}\right)-\frac{p^i\bar{c}^i}{C}$$

Supply vs demand driven stories

- By observing data on p_t^i, C_t, c_t^i can estimate all structural parameters using standard demand estimation methods
- What are c^A, c^M, c^S in the data?

Supply vs demand driven stories

- By observing data on p_t^i, C_t, c_t^i can estimate all structural parameters using standard demand estimation methods
- What are c^A, c^M, c^S in the data?
- Different ways to conceptualize them
  - final expenditure: purchases of food store $= A$, restaurant meals $= S$
  - sectorial value added: VA of both types of food purchases created in A, M, S, can back them out using sectorial VA data
  - I will focus on final expenditure, see the paper for sectoral VA

Final expenditures: shares

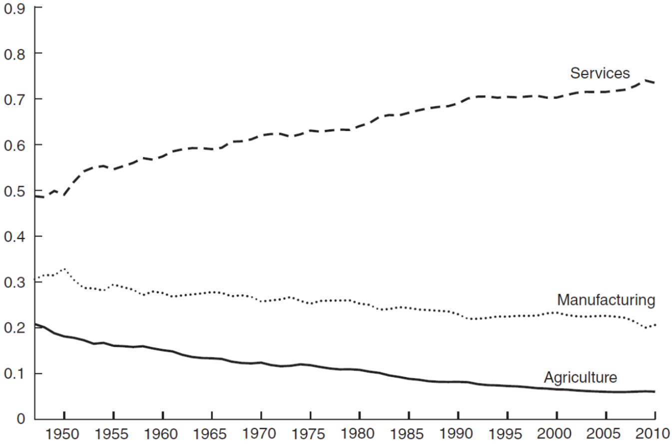


Figure 1. Expenditure Shares

Final expenditures: prices

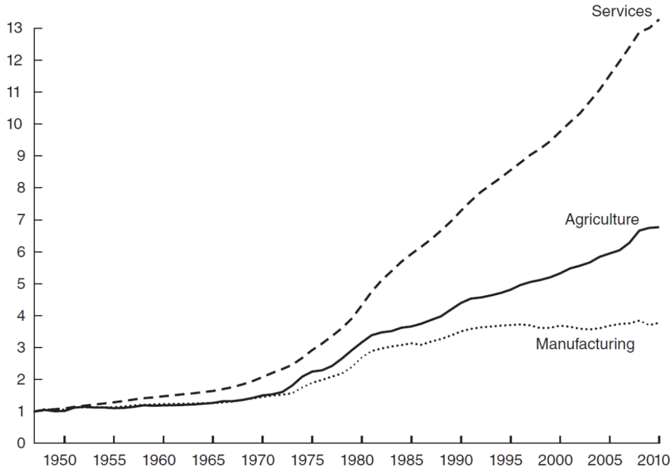


Figure 2. Price Indices (1947 = 1)

Final expenditures: quantities

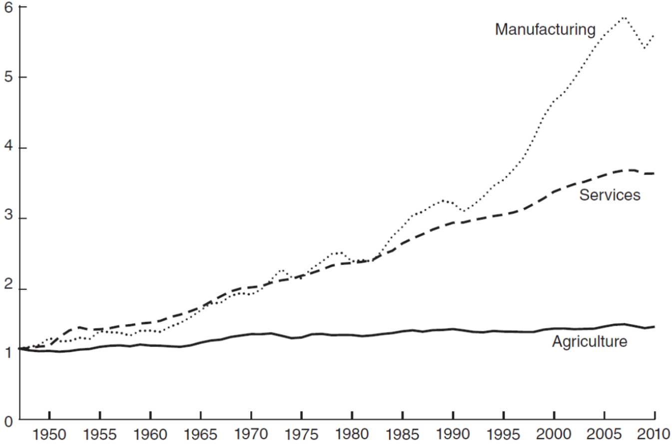


FIGURE 3. QUANTITY INDICES (2005 *chained dollars*, 1947 = 1)

Some observations

- Differential trends in prices/productivity

$$\frac{\dot{p}_t^S}{p_t^S} > \frac{\dot{p}_t^A}{p_t^A} > \frac{\dot{p}_t^M}{p_t^M}$$

- Non-homotheticity must play a role
  - to simultaneously have c_t^S / c_t^A increasing when p_t^S / p_t^A are also increasing

Final expenditures: estimations

TABLE 1—RESULTS WITH FINAL CONSUMPTION EXPENDITURE

	(1)	(2)	(3)
σ	0.85**	1	0.89**
	(0.06)	—	(0.02)
$\overline{c}_a$	−1,350.38**	−1,315.99**	
	(31.18)	(26.48)	
$\overline{c}_s$	11,237.40**	19,748.22**	
	(2,840.77)	(1,275.69)	
ω_a	0.02**	0.02**	0.11**
	(0.001)	(0.001)	(0.005)
ω_m	0.17**	0.15**	0.24**
	(0.01)	(0.004)	(0.03)
ω_s	0.81**	0.84**	0.65**
	(0.01)	(0.005)	(0.01)
$\chi^2(\overline{c}_a = 0, \overline{c}_s = 0)$	3,866.73**	4,065.33**	
AIC	−932.55	−931.35	−666.03
RMS E_a	0.004	0.004	0.040
RMS E_m	0.009	0.009	0.022
RMS E_S	0.010	0.011	0.061

Notes: χ^2 is the Wald Test Statistics for the hypothesis that $\overline{c}_a$ and $\overline{c}_s = 0$ are jointly zero. AIC is the Akaike information criterion, *RMS* E_i is the root mean squared error for equation i. Robust standard errors in parentheses.

Final expenditures: estimations

- Both demand and supply stories are supported by the data
  - demand: $\bar{c}^A < 0, \bar{c}^S > 0$
  - supply: $\sigma < 1$
- Horserace between supply and demand stories?

Counterfactual: relative prices unchanged

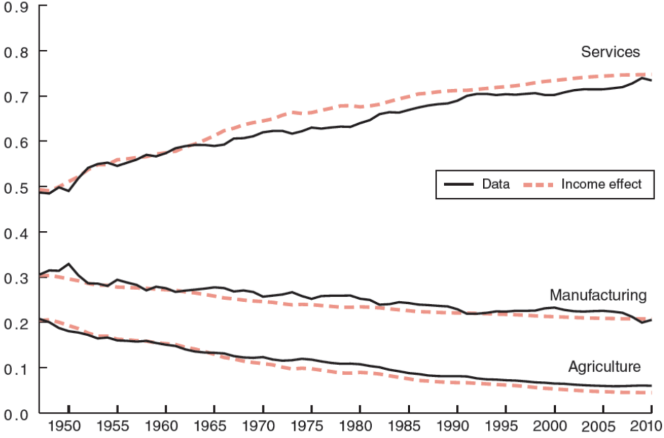


FIGURE 6. FIT OF COLUMN 1 WITH RELATIVE PRICES FIXED AT 1947 VALUES

Final expenditures: estimations

- Non-homotheticicities/income effects are the driving force
- Technical progress (i.e. price growth rates) are very different across sectors, but has relatively modest role quantitatively
- Even though the "knife-edge" condition

$$\bar{p}_t^A \bar{c}^A + \bar{p}_t^S \bar{c}^S = 0$$

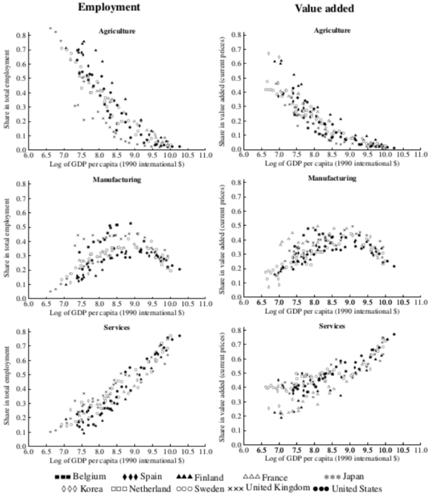
  does not hold, model fits the data well
  - although BGP does not exist in a literal sence, equilibrium behaves approximately as such

Cross-country evidence

- Recent paper by Comin, Lashkari, Mestieri (Econometrica, 2021) does similar excercise for many (poor, middle income, rich) countries
  - use both household consumption data (U.S. and India) and aggregagate date
  - use more general version of preferences than Stone-Geary
  - four parameters: common elasticity σ, three sector-specific income effects $\{\epsilon_i\}_{i \in \{M,S,A\}}$
- Estimate these preferences in the data
  - restrict to common parameters for all countries
  - see how much can structural transformation can be explained using country-specific data on prices and income
- Reject Stone-Geary specification $\Longrightarrow$ non-homotheticities do not disappear

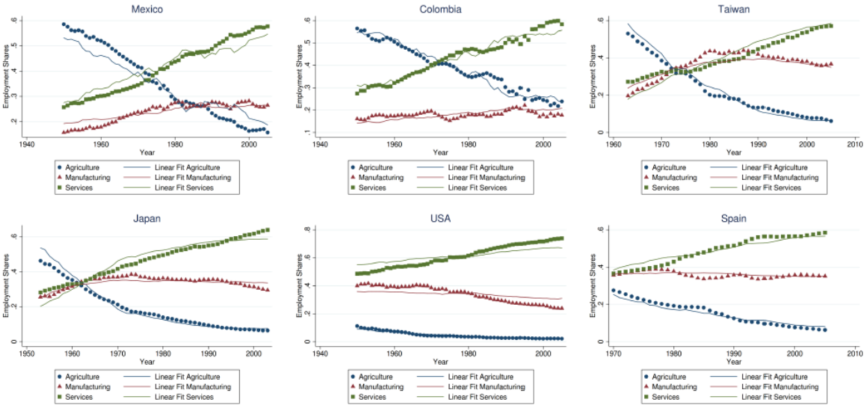
Cross-country data

Figure 1: Sectoral Shares of Employment and Value Added –
Selected Developed Countries 1800–2000



Cross-country data

Figure 2: Baseline fit with common preference parameters $\{\sigma, \epsilon_a - \epsilon_m, \epsilon_s - \epsilon_m\}$ for six countries



Cross-country data

TABLE IV

ACCOUNTING FOR STRUCTURAL CHANGE, BASELINE ESTIMATES[a]

	$\log(\frac{\text{Agriculture}}{\text{Manufacturing}})$	$\log(\frac{\text{Services}}{\text{Manufacturing}})$
Explained over Total Variance	0.97	0.57
Within over Explained Variance	0.46	0.61
	Within-Country Variance Decomposition	
Price Effects	0.02	0.27
Income Effects	0.98	0.84
Both Effects	1.00	1.00

[a] Explained over Total Variance is computed as $\mathrm{Var}[\widehat{\log(\frac{L_{it}^n}{L_{mt}^n})}]/\ \mathrm{Var}[\log(\frac{L_{it}^n}{L_{mt}^n})]$. Within over Explained Variance is computed as $\mathrm{Var}[(1-\hat{\sigma})\log(\frac{p_{it}^n}{p_{mt}^n}) + (1-\hat{\sigma})(\hat{\epsilon}_i - 1)\widehat{\log C_t^n}]/\ \mathrm{Var}[\widehat{\log(\frac{L_{it}^n}{L_{mt}^n})}]$.

Income effects drive most structural change, especially from A to M