Offshoring, Learning and Industrialization

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Discussion:
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TIGN
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Outline

1. Overview of the model
2. Mapping theory to data
3. Estimation

Model: A Ricardian Interpretation

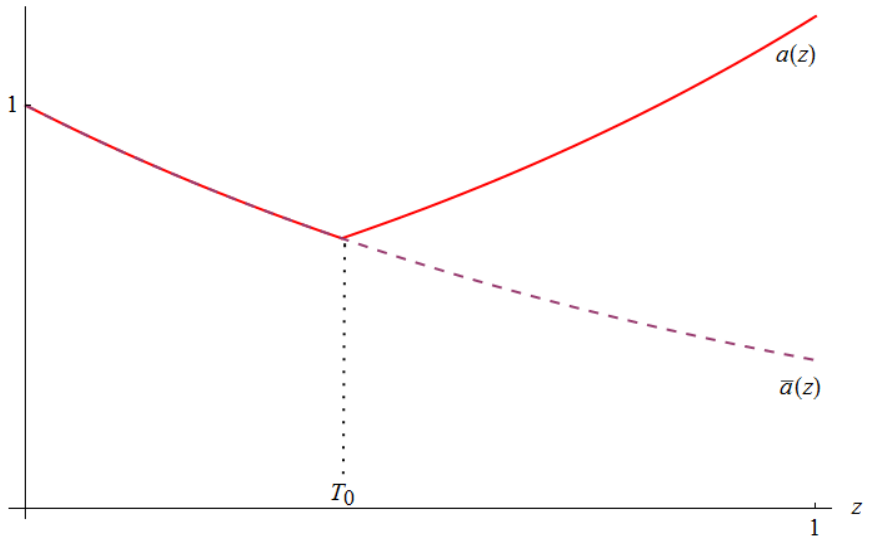
- In any given t, model is isomorphic to a standard Ricardian model with a continuum of goods (DFS, 1977)
- 2 countries (N and S)
- Consumption good requires completing tasks $z \in [0, 1]$

$$\ln Y(t) = \int_0^1 x(z, t)dz$$

- Cross-country differences in technology: Task z produced with unit labor requirements
  - In the North: $\overline{a}(z) = \overline{a}e^{-z}$
  - In the South (at time t): $a(z) = \begin{cases} \overline{a}(z) = \overline{a}e^{-z} & \text{if} \quad z \leq T(t) \\ \overline{a}e^{z-2T(t)} & \text{if} \quad z > T(t) \end{cases}$

Model: A Ricardian Interpretation

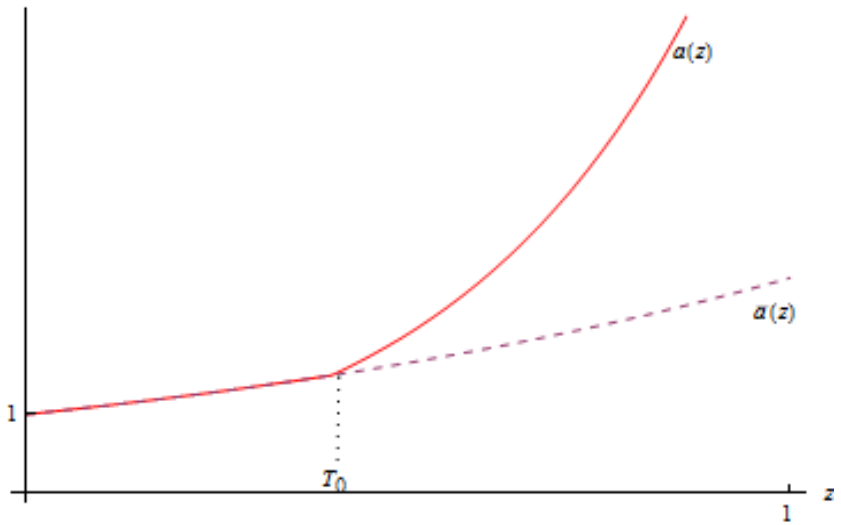
- Graphical representation of technologies



- First comment: Interpretation of z at odds with specification of technology?
- Paper: z interpreted as index of "technological sophistication"
  - But unit costs are *decreasing* in z for N (and nonlinear for S)
  - i.e. in N, more sophisticated goods require relatively *less* labor

Model: A Ricardian Interpretation

- FIX: allow unit costs to increase in z, in both countries, without changing *relative* costs
- Specify:
  - In the North: $\overline{a}(z) = \overline{a}e^{z}$
  - In the South (at time t): $a(z) = \begin{cases} \overline{a}(z) = \overline{a}e^{z} & \text{if} \quad z \leq T(t) \\ \overline{a}e^{3z-2T(t)} & \text{if} \quad z > T(t) \end{cases}$



- Note: Specialization pattern depends on relative costs (no change)

Model: A Ricardian Interpretation

- Equilibrium: 2 conditions (efficiency and trade balance)

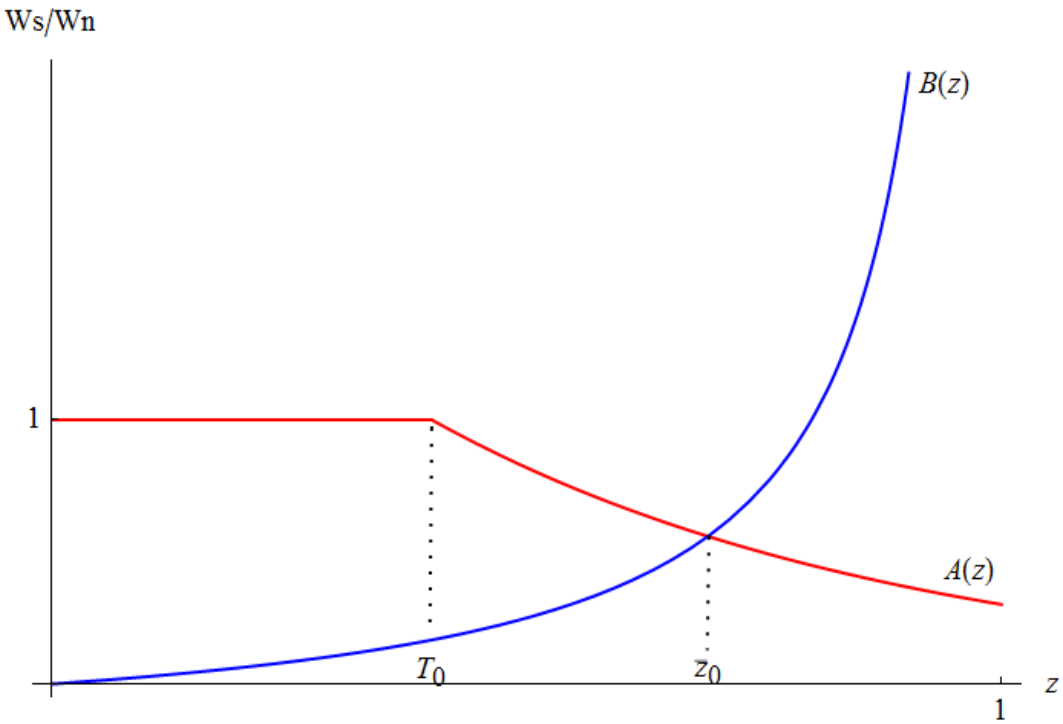
1. Tasks are freely tradable. z is produced in S iff $a(z)w_S \leq \bar{a}(z)w_N$
   - Given w_S/w_N, S produces tasks $z \in [0, \bar{z}]$ s.t.

$$\frac{w_S}{w_N} = \frac{\bar{a}(\bar{z})}{a(\bar{z})} \equiv A(\bar{z})$$

2. Trade balance pins down w_S/w_N: Given $\bar{z}$, TB requires

$$\frac{w_S}{w_N} = \frac{\bar{z}}{(1-\bar{z})}\frac{L_N}{L_S} \equiv B(\bar{z})$$

Static Equilibrium

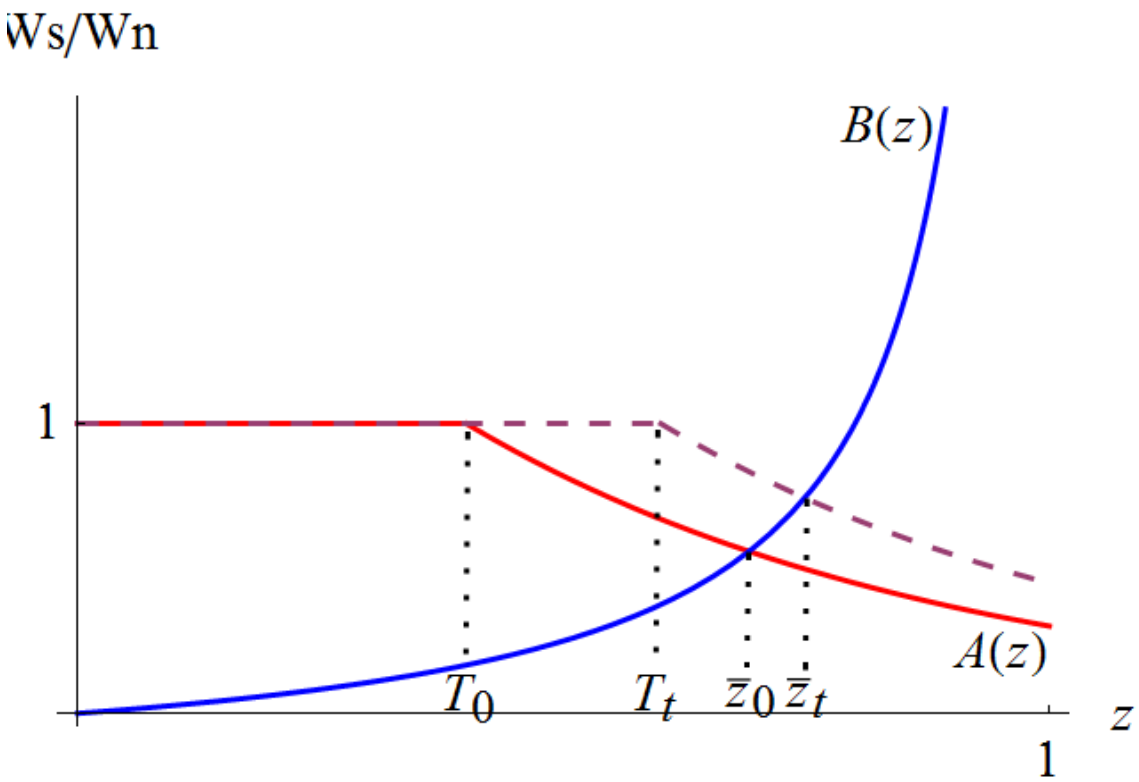


- Interpretation: Tasks $[0, \bar{z}]$ produced in S by MNEs from N

Static Equilibrium

- Difficulties:
  - Should we interpret tasks $[\overline{z}, 1]$ as produced by MNEs from S?
  - Think about tasks that can only be produced by firms in N, some of them outsourced?
    - Why impose TB?
    - How to interpret cross-country differences in technology?
  - There's no role for multinationals (more generally, firms) in the model
- Theory applies to trade in intermediate / final goods? (not specific to outsourcing)

Dynamic Equilibrium (Learning-by-doing)



- Leaning-by-doing: Technology improvement in MNE subsidiaries
- **Prediction**: $\bar{z}$ increases over time, at a decreasing rate (increasing in learning ability)

From Theory to Data

- In theory: $\overline{z} = \frac{w_S L_S}{w_S L_S + w_N L_N} = \frac{VA_S}{VA_S + VA_N}$
- In data: $\overline{z} \simeq VR \equiv \frac{\widehat{VA}_S}{PY_S} = \frac{PY_S - P_M M}{PY_S}$
- Note difference in denominator
- Profits and other factors in data: $PY_S = \pi + r_K K_S + w_S L_S + P_M M$
  - $VR = \frac{\pi + r_K K_S + w_S L_S}{\pi + r_K K_S + w_S L_S + P_M M}$
  - Trends in factor prices, profits or factor intensities driving VR?

From Theory to Data II

- One step further: decompose VR into within- and between-firm components

$$\triangle \overline{z} \simeq \triangle VR = \triangle \left(\sum_f \lambda_f VR_f \right) = \sum_f \left(VR_f \triangle \lambda_f + \lambda_f \triangle VR_f \right)$$

  - Interesting (new?) empirical exercise
  - Intuitively: within-firm component is a better proxy for task upgrading
  - sensible, but ad-hoc
  - e.g. discussion on endogenous task reallocation and bias in $\triangle VR$ hard to follow

From Theory to Data II

- Estimation equation for indutry i, year t:

$$\triangle VR_{it} = \alpha_1 VR_{it-1} + \alpha_2 T_t + \alpha_3 TRAIN_{it} + \rho_i + \varepsilon_{it}$$

- Two potential concerns:

1. Endogeneity of $TRAIN_{it}$? unobserved productivity shocks
2. Dynamic panel data model

$$VR_{it} = (1 + \alpha_1) VR_{it-1} + \alpha_2 T_t + \alpha_3 TRAIN_{it} + \rho_i + \varepsilon_{it}$$

  - FE estimator is necessarily inconsistent‘
  - Arellano and Bond (1991), Blundell and Bond (1998)