Property Rights and the International Organization of Production

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Introduction

- Recent remarkable increase in the way firms organize production on a global scale.
- Global sourcing strategies:
  - Firms decide on where to **locate** different stages of value chain,
  - but also on the extent of **control** they want to exert over these processes.
- The latter is the classical "make-or-buy" decision in IO (Intel Corporation vs. Nike).
- Internalization is crucial for understanding multinational firms (Caves' definition of MNE).

Literature

- Technological theories of the MNE - Helpman (1984); Markusen (1984); Markusen and Venables (1998, 2000)
- Internalization modelled in Ethier (1986), Ethier and Markusen (1996), McLaren (2000), and Grossman and Helpman (2002, 2004).
  - Focus on modeling the **costs of arm's-length** transacting stemming from informational asymmetries, knowledge dissipation, contractual frictions, and costly search.
  - The **costs of internalization** are much less understood.
- In my 2003 M.I.T. Ph.D. thesis: property-rights models of the multinational firm.

The Property-Rights Approach: GH (1986)

- Main idea: Ownership of physical assets is a source of power when contracts are incomplete.
- Residuals powers (unforeseen contingencies) affect ex-post division of surplus.
- This in turn affects ex-ante relationship-specific investments (e.g., integration reduces incentives to invest of integrated party).
- Both the benefits and the costs of integration are endogenous.
- Salient result: Residual rights of control should be assigned to the party whose investment contributes most to the relationship.

A Simple Model of Firm Behavior

- Producer of good y faces demand $y = \lambda p^{-1/(1-\alpha)}, \quad 0 < \alpha < 1.$
- Technology: $y = \left(\frac{h}{\eta}\right)^{\eta} \left(\frac{m}{1-\eta}\right)^{1-\eta}$, where h and m are inputs.
- A higher η, means a more intensive use of h in production.
- Two agents engaged in production:
  - a final-good producer H who supplies h at marginal cost c_h;
  - operator of a manufacturing plant M who supplies m at marginal cost c_m;
- Fixed costs equal to $f \cdot g\left(c_h, c_m\right)$.
- Inputs are specialized (useless outside the relationship).

A Simple Model of Firm Behavior (cont.)

- Consider first closed economy, so focus on control decision:
  - Does H integrate production of m?
- Setting of incomplete contracts - parties cannot sign ex-ante enforceable contracts specifying the purchase of specialized intermediate inputs for a certain price;.
- The surplus is divided ex-post. Bargaining weights: β of ex-post gains for H, $1-\beta$ for M.

A Simple Model of Firm Behavior (cont.)

- Ex-post bargaining takes place both under outsourcing and under insourcing, but firm boundaries affect outside options (GH, 86).
- Outsourcing: 0 outside options.
- Integration: M has 0 outside option, but H retains a fraction $\delta > 0$ of final-good production.
- Implied distribution of revenue: $\beta_V = \delta^{\alpha} + \beta\left[1 - (\delta)^{\alpha}\right] > \beta_O = \beta$.
- Infinitely elastic supply of operators; outside option $\overline{U}$.

Program P1

- $k^* \in \{V, O\}$ solves:

$$\max_{k \in \{V,O\}} \quad \pi_k = R(h_k, m_k) - c_h \cdot h_k - c_m \cdot m_k - f \cdot g(c_h, c_m) - \overline{U}$$

$$s.t. \quad h_k = \arg\max_h \{\beta_k R(h, m_k) - c_h \cdot h\}$$

$$m_k = \arg\max_m \{(1 - \beta_k) R(h_k, m) - c_m \cdot m\}$$

where $R(h, m) = \lambda^{1-\alpha} \left(\frac{h}{\eta}\right)^{\alpha\eta} \left(\frac{m}{1-\eta}\right)^{\alpha(1-\eta)}$

- Underinvestment relative to first best.

Optimal Ownership Structure

Proposition 1 *There exists a unique threshold* $\widehat{\eta} \in (0,1)$ *such that for all* $\eta > \widehat{\eta}$*, integration dominates outsourcing* ($k^* = V$)*, while for all* $\eta < \widehat{\eta}$*, outsourcing dominates integration* ($k^* = O$)*.*

- Ex-ante efficiency dictates that residual rights should be controlled by the party undertaking a relatively more important investment.
- If η low, m has a relatively high marginal product $\rightarrow$ optimal to assign the residual rights of control to M (outsourcing) to alleviate the underinvestment in m.
- If η high, H will optimally tilt the bargaining power in its favor (vertical integration) to alleviate underinvestment in h.

Open Economy

- Firms are allowed to locate different parts of the production process in either 'the North' or 'the South'
- Denote by L the set of possible locational decisions and by $\ell \in L$ a particular one (e.g., ℓ could entail production of h and y in the North and of m in the South).
- Different locational choices will in general entail different values of c_h, c_m, f, $\overline{U}$, β_O, β_V, $R(\cdot)$, and $g(\cdot)$.
- It is also natural to allow the fixed cost parameter f to depend on the ownership structure k.

Program P2

- How do these generalizations affect the way firms organize production? k^* and ℓ^* now solve:

$$\max_{k\in\{V,O\},\ell\in L} \quad \pi_k^\ell = R^\ell\left(h_k^\ell, m_k^\ell\right) - c_h^\ell \cdot h_k^\ell - c_m^\ell \cdot m_k^\ell - f_k^\ell \cdot g^\ell\left(c_h^\ell, c_m^\ell\right) - \overline{U}^\ell$$

$$s.t. \quad h_k = \arg\max_h \left\{\beta_k R\left(h, m_k\right) - c_h \cdot h\right\}$$

$$m_k = \arg\max_m \left\{\left(1-\beta_k\right) R\left(h_k, m\right) - c_m \cdot m\right\}$$

- This is the basis for the three applications of the property-rights approach discussed below.

Firms, Contracts, and Trade Structure

- Production of differentiated varieties is as above but h and m are nontradable. y produced in North.
- Two sectors Y and Z. Tradable composite input is produced in North or South ($\ell \in \{N, S\}$) according to Cobb-Douglas technology with $\eta_Y > \eta_Z$.
- β_k^ℓ is independent of ℓ, and same β and δ in Y and Z; $\overline{U}^\ell = 0$.
- h is capital-intensive relative to m (cost-sharing in capital expenditures). Extreme factor intensity: $c_h^\ell = r^\ell$ and $c_m^\ell = w^\ell$.
- $g_j^\ell\left(r^\ell, w^\ell\right) = \left(r^\ell\right)^{\eta_j}\left(w^\ell\right)^{1-\eta_j}$ for $j = Y, Z$, and $f_k^\ell = f$.

Firms, Contracts, and Trade Structure (cont.)

- Under these assumptions the ownership structure and locational decisions in (P2) can be analyzed separately.
  - Optimal ownership structure in sector $j \in \{Y, Z\}$ solves (P1)
    - Proposition 1 applies;
  - Optimal location decision solves $\min_{\ell} \left\{ \left(r^{\ell} \right)^{\eta_j} \left(w^{\ell} \right)^{1-\eta_j} \right\}$.
- Implications. Share of intrafirm imports in total Northern (U.S.) imports should be higher;
  - the higher the capital intensity of the exporting industry, and
  - the higher the capital-labor ratio of the exporting country.

Global Sourcing (w/ Helpman)

- Motivation: There exists substantial intraindustry heterogeneity in organizational decisions.
- h and y produced only in the North; m is tradable. Hence, again $\ell \in \{N, S\}$, but note different interpretation.
- Final good is produced according to $\widetilde{y} = \theta y$, where θ is firm specific and drawn from a Pareto distribution with shape z.
- Unique factor of production, labor ($w^N > w^S$) used in $J + 1$ sectors.
- η_j is common to all firms within a sector, but varies across sectors.

Global Sourcing (w/ Helpman) (cont.)

- $c_h^N = c_m^N = w^N > \tau w^S = c_m^S$.
- Bargaining weights β_k^ℓ are independent of ℓ and j; $\overline{U}^\ell = 0$.
- $f_V^S > f_O^S > f_V^N > f_O^N$.
- Choice of an organizational form faces two types of tensions:
  - Location: the South entails relatively lower variable costs, but relatively higher fixed costs (effect of θ).
  - Control: integration improves efficiency of variable production when η is high (Prop. 1), but involves higher fixed costs (effect of both η and θ).

Global Sourcing (w/ Helpman) (cont.)

- We show that equilibrium can feature multiple organizational forms within an industry.
- We study the determinants of the relative prevalence of these different organizational forms:
  - share of I-F imports in total imports should be higher in industries with higher η, but also with higher productivity dispersion (lower z), and higher τ.
  - higher w^N/w^S or lower τ increase the amount of international sourcing, but also increase the share of foreign outsourcing in total foreign sourcing.

Incomplete Contracts and the Product Cycle

- Main idea: contracts governing international transactions are relatively less enforceable than contracts governing domestic transactions.
- Same structure as in "Global Sourcing" but with $\theta = 1$, $f_k^\ell = f$, $\tau = 1$.
- Main innovation in the modeling of firm behavior is that when $\ell = N$, contracts specifying the purchase of a particular intermediate input for a given price are fully enforceable.

Incomplete Contracts and the Product Cycle (cont.)

Proposition 2 *If the relative wage w^N/w^S is sufficiently high and $\beta_V^S \leq 3/4$, there exist two thresholds $\overline{\eta}$ and $\underline{\eta}$ with $\overline{\eta} \geq \underline{\eta}$ such that: (i) if $\eta > \overline{\eta}$, it is optimal to produce input m in the North; (ii) if $\overline{\eta} > \eta > \underline{\eta}$, it is optimal to assign the production of m to an integrated supplier in the South, and (iii) if $\eta < \underline{\eta}$, it is optimal to assign the production of m to a nonintegrated supplier in the South.*

- Intuition: incomplete contracts distorts both h and m; benefit of lower wage only affects m.
- Corollary: If η falls through time, the model delivers a three-stage product cycle.

Conclusions

- The models developed above have generated a rich set of predictions regarding the way firms organize production across borders.
- They should thus provide some guidance for future empirical studies on this important topic.
- A limitation of the above analysis has been the focus on only two decisions (location and control) of multinational firms.
- Future efforts should be directed at incorporating additional dimensions of organizational economics into the study of the international organization of production.