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


  - 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.


- 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 $y = \lambda p^{-1/(1-\alpha)}$, $0 < \alpha < 1$.

• Technology: $y = \left( \frac{h}{\eta} \right)^{\eta} \left( \frac{m}{1-\eta} \right)^{1-\eta}$, where $h$ and $m$ are inputs.

• A higher $\eta$, 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 $f \cdot g (c_h, c_m)$.

• 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: $\beta$ 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: $\beta_V = \delta^\alpha + \beta [1 - (\delta)^\alpha] > \beta O = \beta$.

- Infinitely elastic supply of operators; outside option $\overline{U}$. 
Program P1

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

\[
\max_{k \in \{ V, O \}} \pi_k = R(h_k, m_k) - c_h \cdot h_k - c_m \cdot m_k - f \cdot g(c_h, c_m) - \bar{U}
\]

s.t.
\[
h_k = \arg \max_h \left\{ \beta_k R(h, m_k) - c_h \cdot h \right\}
\]
\[
m_k = \arg \max_m \left\{ (1 - \beta_k) R(h_k, m) - c_m \cdot m \right\}
\]

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 $\hat{\eta} \in (0, 1)$ such that for all $\eta > \hat{\eta}$, integration dominates outsourcing ($k^* = V$), while for all $\eta < \hat{\eta}$, 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 $\eta$ low, $m$ has a relatively high marginal product → optimal to assign the residual rights of control to $M$ (outsourcing) to alleviate the underinvestment in $m$.
- If $\eta$ 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., $\ell$ 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 $c_h, c_m, f, \overline{U}, \beta_O, \beta_V, R(\cdot)$, 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 $\ell^*$ now solve:

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

$$- f_k^\ell \cdot g^\ell \left( c_h^\ell, c_m^\ell \right) - \bar{U}^\ell$$

s.t.

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

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

- 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 $\eta_Y > \eta_Z$.

- $\beta_{hk}^\ell$ is independent of $\ell$, and same $\beta$ and $\delta$ in $Y$ and $Z$; $\overline{U}^\ell = 0$.

- $h$ is capital-intensive relative to $m$ (cost-sharing in capital expenditures). Extreme factor intensity: $c_{hk}^\ell = r^\ell$ and $c_{mk}^\ell = w^\ell$.

- $g_j^\ell (r^\ell, w^\ell) = (r^\ell)^{\eta_j} (w^\ell)^{1-\eta_j}$ 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 $\tilde{y} = \theta y$, where $\theta$ 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.

• $\eta_j$ 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 $\beta_k^\ell$ are independent of $\ell$ and $j$; $\overline{U}^\ell = 0$.
- $f_S^V > f_S^O > f_N^V > f_N^O$.

- 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 $\theta$).
  
  - Control: integration improves efficiency of variable production when $\eta$ is high (Prop. 1), but involves higher fixed costs (effect of both $\eta$ and $\theta$).
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 \( \eta \), but also with higher productivity dispersion (lower \( z \)), and higher \( \tau \).
  – higher \( w^N/w^S \) or lower \( \tau \) 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 $\beta^S_V \leq 3/4$, there exist two thresholds $\bar{\eta}$ and $\underline{\eta}$ with $\bar{\eta} \geq \underline{\eta}$ such that: (i) if $\eta > \bar{\eta}$, it is optimal to produce input $m$ in the North; (ii) if $\bar{\eta} > \eta > \underline{\eta}$, 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 $\eta$ 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.