

Governing Global Value Chains: Evidence from Automotive Trade Data

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Overview

A large literature finds that global value chains (GVCs) are a key source of competitive advantage for firms and for nations (Gereffi, Sturgeon, etc.)

- GVC practices are a key reason why firms such as GM and Chrysler filed for bankruptcy while Toyota and Honda did not

To test theories of vertical governance, we use U.S. Customs microdata of vehicle manufacturers covering all import transactions

- Typical value-chain analysis is based on case studies and small datasets of a select number of firms or countries

U.S. Customs Data

We use Longitudinal Firm Trade Transactions Database (LFTTD): 2007-2015

- For vehicle manufacturing firms (VMs) assembling cars and trucks in the U.S.
- Detailed 10-digit HTS categories (e.g., 'Vulcanized gaskets', 'washers and other seals', 'Mountings, fittings and similar articles, of base metal')

We can identify the VM that imported every component into the U.S. and the foreign manufacturer that supplied it. We can measure,

- How many suppliers of a given component a VM imports from
- How frequently a VM switches suppliers of that component

We pool VMs into U.S.-owned and Japanese-owned and omit the rest

- We exclude purchases from the VM's home country

[Since we do not have data on purchases from U.S. suppliers for U.S.-owned VM's (or anyone else), we exclude purchases from Japan for Japanese-owned VMs]

Theories of Vertical Governance

Transaction-based theories (TB) [Williamson, Grossman-Hart-Moore]

- Analyze supplier/customer relation on transaction-by-transaction basis
- All firms undertaking a transaction with similar attributes govern the transactions in the same way (e.g., both Japanese- and U.S.-owned VMs would have large numbers of suppliers of hoses, a commodity/non-differentiated product, and they would turn over quickly)

Organization-based theories (OB) [Nishiguchi, Dyer, Jacobides, Helper]

- Attributes of the transactors affect governance of relationships
- A firm governs relationships with all its suppliers in the same way (e.g., Toyota is cooperative with all)

Implications of the Theories

When do firms do "spot buying" instead of relational contracts?

- Implications of TB
 - Fewer suppliers if products are more firm-specific, more innovative
 - Multi-period relations allow for possibility of future payoff: encourage increased buyer-specific investment and effort (Joskow; Baker, Gibbons, Murphy)
- Implications of OB
 - There are spillovers across relationships: If firm has relational contract with one supplier, we are likely to observe relational contracts with other suppliers also
 - Fixed costs of establishing supplier relationships: collaborative relation with some and arm's-length with others may not be easy

Why might a firm buy different components in a similar way?

- Reputational spillovers across different components that VMs buy
- Spillovers across functions in buyer's organization
 - Just-in-time in internal and supplier operations (Dyer)
- Complementarities in adoption of practices
 - Just-in-time and "visual control" (Helper and Levine), and learning to write good contracts (Argyres)

Empirical Strategy

Regressions using longitudinal data: Outcome variables to measure different theories of spot versus relational contracts are,

- Number of suppliers
- Hirschman-Herfindahl index
- Length of relationship

TB: Outcome variables should be explained by product features

- HTS codes, Advertising- R&D intensity index (Kugler-Verhoogen 2012) that reflects the scope for quality differentiation in a supplier's sector

OB: Outcome variables should be explained by VM dummies

- Exchange rate shifts and longevity of suppliers: Are Japanese-owned VMs less responsive to price change?

Results

Support for transaction-based theories (TB)

- Product FE, advertising dummy highly significant

Support for organization-based theories (OB)

- Across all products, Japanese-owned VMs have fewer suppliers, purchases concentrated in a subset of their suppliers, are less price-sensitive (switch suppliers less if exchange rate rises)

All results economically significant, robust to many specs

- e.g., with and without controls for extent of purchases from related parties, supplier country FE, supplier country characteristics

	N-supplier	HHI	Longevity
Japanese VMs	-1.375***	2,473.000***	0.128**
Share of total imports	4.432***	-138.300***	0.281
Low/middle income country	3.874***	-3,556.000***	-0.065**
Japan × (Low/middle income country)	0.390***	-299.600**	-0.021*
R&D and advertising intensity	1.210***	-2,297.000***	0.270
Japan × (R&D and advertising intensity)	-0.346***	-935.700***	0.042*
Exchange rate appreciation	-0.002*	0.687	--
Japan × (Exchange rate appreciation)	0.002*	1.845**	--
Share of related party	0.006**	7.663***	0.001*
Japan × (Share of related party)	-0.018***	-8.379***	0.0003
Year FE	yes	yes	--
Product FE	yes	yes	yes
Supplier country FE	yes	yes	yes
Observations	78500	21500	53500
R-squared	0.369	0.350	0.245
RMSE	3.925	2016.000	0.234
S.E. cluster	VM-year	VM-year	VM

Notes: (a) N-supplier = number of suppliers, HHI = Hirschman-Herfindahl index, Longevity = (number of years supplied by a suppliers)/(number of years purchased by VM). (b) N-supplier and HHI regressions are at VM-country-HTS10-year level, Longevity regression is at supplier-VM-HT10 level (time-invariant). (c) The N-supplier (and HHI) sample has 190 HTS-10 products (imported by both VMs) while the Longevity sample has 1015 HTS-10 products (imported by both U.S. and Japanese-owned VMs in a given year). (d) 23 countries in each sample (both U.S. and Japanese-owned VMs imported from these countries every year).

Future Extensions / Future Research

How do we determine which theory is more helpful in explaining vertical governance?

- Share of variance explained? Oaxaca decomposition?

The relationships between the outcome variables used here and measures of performance of the VMs (productivity, profitability, etc.)

From supplier's point of view: differences in networks (e.g., a supplier supplying to both U.S. & Japanese VMs versus only to Japanese VMs)

Disclaimer

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