

Inside the GVC: Supplier-buyer relationships and firm performance - evidence from a new survey

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ERWIT 2020

Look inside GVC

- ① Global value chains (supply chains) are important ...
 - Being part of GVCs as integration into international production chains is considered evidence of competitiveness.
 - But also fear of globalization and asymmetric relationships
- ② We know little about the way firms solve coordination problems within these relationships
 - Vertical integration
 - Market-like transactions
 - Cooperative *relational* transactions between these two extremes
- ③ Policies often aim at helping SMEs become part of GVCs (promotion agency, clusters, fairs).
 - If relational and market-like transactions differ in terms of knowledge transfer and other outcomes, policy needs to look beyond making matches

Does organizational solution help trade and performance?

- (Atalay et al. 2014) looks at vertical integration in the US and finds that integration is not there to help inter-firm trade. Median shipment is very small.
- We will argue that organizational solutions do indeed help trade and also related to firm performance

This paper

- Uses a unique survey to distinguish between market, relational and vertical relationships
 - 1500 manufacturing firms in Hungary, Romania and Slovakia
 - Ask about their partner portfolio and the main features of their relationship with their largest (key) buyers and suppliers
 - Product specificity
 - Innovation and cooperation
 - Linked to financial data from ORBIS
 - Based on this, we classify the respondent's each supplier relationship into **market**, **relational** and **within-group** (vertically integrated)
- Research questions:
 - ① How important are these key three relationship types?
 - ② What factors are associated with this choice?
 - ③ Is the type of relationship related to firm performance?

Relational linkages

As we think about what goes in a GVC, we look at the supplier-buyer relationship (dyad)

- A supplier-buyer **relationship** is a (series of) sales transactions that the seller deems important
- A **relational** relationship occurs when partners invest into creating buyer specific products and processes often involving meetings or technology transfer.
- **Vertical integration** is when the buyer and the seller are integrated through (majority) ownership directly or indirectly.

Our relationship classification

- Typical approach to capture linkages
 - Consider intermediate goods
 - Differentiate by destination: domestic sales or export
 - Differentiate by short and long duration
- These typically cannot measure the actual the cooperation within the relationship
- Our approach
 - A starting point is [Gereffi, Humphrey, Sturgeon \(2005\)](#) classification of relationships in a GVC: Market, Modular, Relational and Captive
 - We simplify to Market vs non-Market (and call it "relational") and separate vertical integration from relational
 - Use the actual type of cooperation to classify relationships independently from being (i) domestic of export; (ii) short or long; (iii) share from seller's sales

Market vs relationship vs vertical integration

- We differentiate three categories by type of relationship
- **Vertical integration** when the seller and buyer are in the same business group
- **Relational** when two firms who are not in the same business group but buyer specific product is made and/or developed
- **Market-based** when two firms who are not in the same business group / not relational

Look inside GVC: empirical literature

① Administrative firm-level data on transactions

- sources of firm-size heterogeneity (Bernard, Moxnes & Saito 2019)
- effects of international trade on costs (Tintelnot et al. 2018)
- outsourcing (Bernard, Dhyne, Magerman, Manova & Moxnes 2019)

② Survey data on firm-level transactions

- financial constraints and participation in GVCs (Minetti et al. 2018)
- knowledge spillovers from FDI (Newman et al. forthcoming), (Javorcik 2008)
- interfirm relationships in automobile industry (Schmitt & Van Biesebroeck 2020)

③ Studies of vertical integration with firm-level data

- share of trade within vertically integrated firms (Atalay et al. 2014)
- technology and vertical integration (Acemoglu et al. 2010)
- firm's boundary choices along the value chain (Alfaro et al. 2019)
- output prices and vertical integration (Alfaro et al. 2016)

What we do: This talk

- ① Describe the survey
- ② Categorize supplier-buyer connection: market, relational, vertically integrated
- ③ Results
 - How important are the different relationship types?
 - Which firms choose which type of relationship?
 - How the type of relationship is related to firm performance?

Some key results

① Prevalence

- About 75% of the transaction value in GVC are not market-based
- Within business group sales are about 30-40% of all sales for firms in the group.

② Choice of relationship type

③ Relationship type and performance

- Firms with a relational connection are more productive and grow faster
- The TFP premium of relational connection is comparable to the export premium
- The quality of buyers and the relationship more important than location

The Business Relations Survey: Concept

- Aim to learn about relationships between customers and suppliers
- Carried out a survey on over 1500 Hungarian, Romanian and Slovakian firms [More info](#)
- Manufacturing firms with at least 10 employees in 2015, in key industries (e.g. auto, electronics, chemicals, machinery)
- Joint project: Central European University, Hungarian Academy of Sciences, GfK Hungaria
 - Started in 2015, survey in 2016-2017, matched with Orbis in 2020 (have growth not just Xsec)
 - High data protection: anonymization, secure storage, only scientific use, available for participants only.

The Business Relations Survey: Key Variables

- Respondent level variables
 - Location, main activity, number of customers, suppliers, share of new buyers, suppliers, type of typical buyer (industrial, wholesale)
 - Number of employees and key financial variables
- Relationship-specific variables
 - Respondents were asked additional questions about their 3 most important (key) customers and suppliers + anyone with 10% share of sales
 - Here the level of observation is the respondent-partner dyad
 - variables: identity of partner, length of relationship, share in sales, information about co-operation
 - We have information about both the respondents' suppliers and buyers. Today: focus on buyers.

Linking to financial data

- We surveyed firms based on their BvD ids and, therefore, financial data is available for them
- Respondents provided us the name, country, size category and broad industry of their key partners
 - We matched key partners to Orbis, based on this information both with text matching algorithms and manually
 - 80% of reported key partners could be identified
- Variables we use
 - Both for respondent and buyers
 - Orbis financial accounts, 40+ countries
 - 2015 is used for levels
 - TFP is created using country- industry level coefficients for for K and L estimates from full Orbis based on COMPNET
 - Sales growth is log difference, winsorized, 3 year total - 2018/2015

Variables measuring whether the transaction is relational

- 1 **Partner specific product:** It is impossible/hard to sell the main product sold to this buyer, to someone else.
- 2 **Recent innovation to modify :** The company has had to modify its product or production process *recently* (in the past two years) to satisfy the needs of this buyer.
- 3 **At start innovation to modify:** The company had to change its product or production process *at the start* of the relationship to satisfy the needs of this buyer.

The specific questions and definitions come from the Community Innovation Survey and the EFIGE survey

Market vs relationship vs vertical integration

- We differentiate three categories by type of relationship
- **Vertical integration** is when the seller and buyer is in the same business group (survey+ORBIS GUO information)
- **Relational** when two firms who are not in the same business group:
 - The main product sold to the buyer could **not** be easily sold to someone else, it is buyer specific
 - The seller has carried out innovation to modify products or processes for the buyer, either at the start of the relationship or recently
- **Market-based** when two firms who are not in the same business group:
 - The main product sold to the buyer could be easily sold to someone else
 - The seller has not carried out innovation to modify products or processes for the buyer

Types of key partners (dyadic)

rel. type	Count share (%)	Value share(%)
Market	35%	25%
Relationship	51%	31%
Vertical Integration	14%	43%

In GVCs relational / vertical transactions dominate

- In terms of value, we observe that 75% of transactions are not market based
 - Upward biased for firms in this sample: as we do not observe small transactions, likely market based.
 - Downward biased for economy: our sample does not include the largest companies like Audi Hungaria, that would mostly have relational and vertical transactions.

Calculating within group sales

- We only know 56% of transactions, we need to make assumptions
 - ① Lower bound: assume non-observed transactions are all outside the business group.
 - ② Representativeness: assume not observed transactions have the same likelihood to be vertically integrated. Probably upward biased.
 - ③ Upper bound: assume not observed transactions are all within the business group

Assumption type	Simple share	Sales weighted share
Lower bound	23%	28%
Representativeness assumed	33%	43%
Upper bound	66%	75%

- The share of within group transactions in value is around 1/3 of sales
- Higher for export sales, higher for foreign groups

Relationship type and key descriptives

- Relationship level correlations

rel. type	Freq (%)	Length (ys)	share (%)	share of industry partner
Market	35	8.3	19.2	43
Relationship	51	9.5	19.2	61
Within group	14	10.2	39.3	56

Selection into relational transactions

Focus on relational vs market and vertical vs market

- Cost of management: Distance (now: export)
- Fixed cost of modification: Size and length of transaction
- Complexity of the product - (now: industry)
- Ownership

Selection into relational transactions

In terms of products (industries):

- *Relational/VI*: auto/vehicles, equipment, electronics.
- *Market*: non-metallic (cement, glass), chemicals (plastics)

Notes: Linear probability models, base is market transactions. Includes 2-digit industry dummies.

Depvar:	(1) Non-market	(2) Relational
Export sale	0.138*** (0.0240)	0.404*** (0.0641)
Res: Independent w/ foreign owner	0.0144 (0.0383)	0.284*** (0.0833)
Res: Group: Domestic	-0.300*** (0.0549)	-0.0975 (0.0844)
Res: Group: Foreign	0.0472 (0.0420)	0.717*** (0.0938)
Res: Has 5 or more buyers	0.106** (0.0416)	-0.229*** (0.0744)
Buyer length: Medium (5-14 ys)	0.00347 (0.0263)	0.110** (0.0548)
Buyer length: Long (15ys+)	0.109*** (0.0339)	0.241*** (0.0767)
Buyer: commerce	-0.110*** (0.0280)	-0.0749 (0.0629)
Buyer: service	-0.0959*** (0.0330)	0.224*** (0.0772)
Observations	2,845	1,593
R-squared	0.109	0.225

Standard errors, clustered at respondent level in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Firm performance and buyers

- OLS regression of performance measures and relationship.
- Industry controls
- Weighted by relative share of transactions
- Filter a few respondents, where we know too little. (about 5%) where the sum of transactions is below 10% of total sales

Performance and relationship type

Performance: Non-market firms are larger, more productive and grow faster

Notes: OLS, weighted by relative sales share. Includes respondent's 2-digit industry dummies.

Dep var:	(1) Log sales	(2) TFP	(3) Growth rate (3ys)
Relational	0.215** (0.0881)	0.237*** (0.0570)	0.107*** (0.0415)
Within group	0.874*** (0.130)	0.448*** (0.0858)	0.0776 (0.0555)
Observations	3,266	3,113	3,090
R-squared	0.146	0.191	0.011

Standard errors, clustered at respondent level, are in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Performance - comparing more similar firms

Performance: Non-market firms are larger, more productive and grow faster - even when taking into account key selection variables.

Notes: OLS, weighted by relative sales share. Includes share, length; respondent FOE, partner industry included as well as respondent's 2-digit industry dummies.

Dep var:	(1) Log sales	(2) TFP	(3) Growth rate (3ys)
Relational	0.0956 (0.0838)	0.219*** (0.0549)	0.0990** (0.0437)
Vertically integrated	0.180 (0.124)	0.192** (0.0841)	0.0775 (0.0639)
Export sale	0.382*** (0.0802)	0.0540 (0.0535)	0.0388 (0.0364)
Resp: Independent: Has foreign owner	1.148*** (0.134)	0.550*** (0.0877)	0.0403 (0.0583)
Resp: Group: Domestic	0.343* (0.179)	-0.267** (0.111)	-0.129 (0.102)
Resp: Group: Foreign	1.656*** (0.154)	0.886*** (0.0983)	0.0720 (0.0645)
Resp: Has 5 or more buyers	0.604*** (0.114)	0.388*** (0.0808)	0.132** (0.0632)
Rel length: Medium (5-14 ys)	0.333*** (0.0982)	0.128* (0.0669)	0.0330 (0.0540)
Rel length: Long (15ys+)	0.651*** (0.120)	0.189** (0.0765)	-0.0432 (0.0648)
Buyer in commerce	0.129 (0.0894)	0.201*** (0.0622)	0.0257 (0.0421)
Buyer in service	-0.0802 (0.120)	-0.00383 (0.0772)	-0.0209 (0.0575)
Observations	3,142	2,992	2,972
R-squared	0.309	0.307	0.027

Summary

- Relationships that are longer with partners abroad and in industry, and respondents with not just a few partners tend to be more likely relational
- Having more relational partners matters for birth TFP and growth
- Interestingly TFP premium is above exporter premium
- Firms with a higher share of vertical relationships tend to more productive - even with same export, ownership structure

Conclusions

- When we look at firms in GVC, relationships matter: compared to market, relational and vertical integration both positively correlated with TFP and future growth.
- Relational aspect especially important for export transactions and when partner is also in manufacturing
- Transactions within vertically integrated firms is important, around one-third of total volume

Thanks for the attention!

- [More about the survey is available here](#)
- [The survey may be downloaded here](#)

Respondents

	Country			
	Hungary No.	Romania No.	Slovakia No.	Total %
Number of employees				
less than 20	203	214	166	38.2 %
21-50	135	167	93	25.9 %
51-250	185	170	80	28.5 %
more than 250	35	37	43	7.5 %
Ownership				
Domestic	410	446	236	71.5 %
Foreign	148	142	146	28.5 %
Industry				
20. Chemicals	19	25	17	4 %
21. Pharmaceuticals	3	6	4	0.9 %
22. Rubber and plastic	67	80	50	12.9 %
23. Non-metallic mineral	37	70	35	0.93 %
24. Basic metals	13	19	7	2.6 %
25. Fabricated metals	251	235	121	39.7 %
26. Computer, electronic and optical	24	23	27	4.8 %
27. Electrical equipment	36	28	42	6.9 %
28. Machinery	78	61	46	12.1 %
29. Motor vehicles	26	25	26	5 %
30. Other transportation equip.	4	16	7	1.8 %
Total	558	588	382	100 %

The Business Relations Survey: Key Variables

- Buyers' business: Industrial (55%), Commerce (25%), Services (16%)
 - Service: construction is most important
 - Commerce often the wholesale arm of manufacturing multinational
- Buyer is 65% Large company, 35% SME

Respondent: Owners / business groups

Owner type	Count	%
Independent: Only domestic owner	968	63.3%
Independent: Has foreign owner	212	13.9%
Group: Domestic	97	6.3%
Group: Foreign	219	14.3%
No direct holder	33	2.2%

- 20.5% of firms are part of a business group (could be affiliate, head or in the middle)
- 17% if transactions we observe the buyer in same business group

Number of buyers per respondent

- We asked: Top 3 buyers + anyone above 10% market share + special reason
- Most firms offered 1-3 answers, some more.

Number of buyers	Count	%
1	411	26.5%
2	431	28 %
3	482	31.5%
4	150	9.5%
5	55	3.5%

Share of key partners

- Most companies are **not** dependent on a single majority buyer, but 9.2% are
- Largest group by far: 10-24%

b_share_cut	Freq.	Percent
Not important ($\leq 9\%$)	413	13
Important (10-24%)	1732	54.9
Essential (25-50%)	723	22.9
Single majority buyer ($> 51\%$)	289	9.2

Relation level performance means

- Relationship level correlations, (unweighted) average value for respondent with a given buyer type

type	Freq (%)	In sales	emp	TFP	Sales growth
Market	35%	7.3	83	4.04	-0.04
Relationship	51%	7.6	115	4.32	0.08
Within group	14%	8.2	186	4.78	0.00

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