

Inside the GVC: Supplier-buyer relationships and firm performance

Evidence from a new survey

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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 relatively little about the governance modes of relationships within GVCs
 - 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.

Governance structures in GVCs

- A key focus in the literature was comparing vertical integration and outsourcing ([Antràs 2003](#), [Lafontaine & Slade 2007](#), [Gibbons 2005](#), [Alfaro et al. 2019](#), [Atalay et al. 2014](#)).
- However, as [Schmitt & Van Biesebroeck \(2020\)](#) writes: *"... a choice to buy rather than make, is not the end of the story. Sourcing relationships are not one-size fits all and are often tailored to the specific situation."*
- Building on GVC and transaction costs literature ([Schmitt & Van Biesebroeck \(2020\)](#), [Gereffi et al. \(2005\)](#)) we distinguish 3 key governance mechanisms:
 - Market
 - Relational (different types based on "power" within the relationship)
 - Hierarchical (vertical integration)

Determinants of the choice of governance structure

- According to [Schmitt & Van Biesebroeck \(2020\)](#) the main forces are:

	Complexity of transaction	Codifiability	Capability of supplier
Market-based	Low	High	High
Relational	High	Low	High
Hierarchical	High	Low	Low

- Additional factors
 - Dominant marginal returns from a specific investment, technological complexity ([Acemoglu et al. 2010](#), [Nunn & Trefler 2013](#))
 - Knowledge flows, elasticity of demand, productivity ([Atalay et al. 2014](#))

What we do: Overview

- Use a unique survey to distinguish market, relational and vertical relationships
 - 1543 manufacturing firms (small and large) in Hungary, Romania and Slovakia
 - Linked to financial/ownership data from Orbis
 - Ask about their partner portfolio and the main features of their relationship with their largest (key) buyers and suppliers
- Based on this information on **actual cooperation**, we classify each of the respondent's supplier relationships into **market**, **relational** and **within business group** (vertically integrated).
- Research questions:
 - ① How prevalent are these three key relationship types?
 - ② What factors are associated with having a relational or vertically integrated relationship?
 - ③ Is the type of relationship related to firm performance?

What we do: Some key results

① Prevalence

- About 75% of the transaction value in a GVC is not market-based
- For firms who are part of any business group, Within business group sales amount to 30-40% of all sales.

② Choice of relationship type hinges on industry, supplier and buyer characteristics

③ Relationship type and performance

- Firms with more relational than market-based 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 are more important than location.

The Business Relations Survey: Concept

- Aim is to learn about the type of relationships between customers and suppliers
- Carried out a survey on over 1543 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, carried out in 2016-2017, matched with Orbis in 2020.
 - High data protection: anonymization, secure storage, only scientific use, available for participants only.

More about the survey can be found with an [OVERVIEW HERE](#). Also, you may get the [SURVEY HERE](#).

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
 - Respondents and their buyers - 3611 supplier-buyer relationships:

Linking to financial data

- Respondents reported the name, country, size category and broad industry of their key partners. We had Orbis ID.
- We matched key partners to Orbis, based on this information both with text matching algorithms and manually.
- For sales and other level variables, the year 2015 is used.
- TFP is created using country- industry level coefficients for K and L estimates from full Orbis based on COMPNET.
- Sales growth is future average annual growth (winsorized) for 2015-2018.

Defining the relational transactions

We define relational transaction based on actual cooperation between the firms that yielded a buyer specific or buyer needed product.

- ➊ **Partner specific product:** Considering the main product sold to the buyer, it IS impossible/hard to sell to someone else this product (41%).
- ➋ **Innovation to modify - recently :** The company had to modify its product or the production process *recently* (in the past two years) to satisfy the needs of this buyer (23%).
- ➌ **Innovation to modify - at start:** The company had to modify its product or the production process *at the start* of the relationship to satisfy the needs of this buyer (32%).

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

Market vs relational vs vertical integration

- We define three seller (supplier) - buyer relationship categories:
- **Vertical integration:** the seller and buyer are in the same business group (survey+ORBIS GUO information).
- **Relational:** the seller and buyer are not in the same business group, and:
 - the main product sold to the buyer can **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:** the seller and the buyer are not in the same business group, and:
 - 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 supplier buyer relationships

Considering all reported relationships for 1543 firms, about 3611 supplier-buyer relationships:

Relationship type	Count share (%)	Value share(%)
Market-based	35%	25%
Relational	51%	32%
Vertical Integration	14%	43%

In GVCs relational and vertical transactions dominate

Relationship type	Count share (%)	Value share(%)
Market-based	35%	25%
Relational	51%	32%
Vertical Integration	14%	43%

- In terms of value, we observe that 75% of reported transactions are not market-based:
 - Upward biased: as we do not observe small transactions, likely market based.
 - Downward biased: our sample does not include the largest companies like Audi Hungaria, that are mostly likely to have relational and vertically integrated transactions.

Calculating within group sales

- We only have information on 56% of all the transactions. We need to make an assumption. Three possibilities:
 - ① Lower bound: unobserved transactions are all outside of the business group.
 - ② Representativeness: unobserved transactions have the same likelihood to be vertically integrated. Probably upward biased.
 - ③ Upper bound: unobserved transactions are all within the business group.

Share of within group sales for firms that are part of business groups:

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 is around 1/3

Comparing relationship types

Relative values (and frequencies) of key variables by relationship types

Relationship type	Length (ys)	share (%)	export (%)	resp foreign (%)
Market-based	8.4	18	21	18
Relational	9.5	19	34	25
Vertical integration	10.2	36	53	53

- Little difference in terms of length.
- In vertical integration transaction, the average size is twice as high.
- Export and foreign firms: relational and vertical types are more and more frequent.

Selection into relational transactions

Focus on relational vs market-based and vertical vs market-based comparisons.

- Distance (now: export) - proxy for contractual incompleteness and communication cost
- Size and length of transaction - proxy for potential return of specific investments
- Number of buyers, ownership - proxy for supplier quality
- Industry controls for complexity and codifiability

Simple linear probability models, market is base.

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-based transactions. Includes 2-digit industry dummies.

Depvar:	(1) Relational	(2) Vertical
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

- Investigate whether
 - Supplier capabilities makes non-market transactions more likely
 - Having non-market relationships is associated with better performance *in the future*
- Measurement
 - 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)
Vertically integrated	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 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

Standard errors, clustered at respondent level, are in parentheses

Summary

- Relationships that are longer, with partners abroad and in manufacturing industry, and respondents with more many buyers tend to be relational.
- Having a larger number of relational partners matters for both TFP and growth.
- Interestingly, TFP premium is above exporter premium.
- Firms with a higher share of vertical relationships tend to be more productive - even with same export, ownership structure.

Conclusions

- When we look at firms in GVC, the type of the relationship matters: compared to market, relational and vertical integration both positively correlated with TFP and future growth.
- Relational partnership is especially important for longer, industry-to-industry, and export transactions.
- Transactions within vertically integrated firms are important and amount to around one-third of total volume.

Appendix

Some additional descriptive table and references

Respondents

	Country			Total %
	Hungary No.	Romania No.	Slovakia No.	
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-based	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

Relational linkages

Our unit of observation is a supplier-buyer relationship (dyad).

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

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)

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