The formation of supplier-buyer linkages: survey evidence from Hungary, Romania and Slovakia

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We know very little about how firms interact

- Firm-firm interactions are key to several interesting and policy relevant questions
  - How firms trade, how partners are selected (trade policy, export promotion)
  - How firms learn from closeby companies (ie. spillovers, benefits of agglomeration)
  - Firm-level reactions to macro shocks, and aggregate consequences (granularity)
  - competition and co-operation
- Little data on firm-firm linkages. Most information comes from:
  - Aggregate statistics (Hungary exports x% of total exports to German car industry)
  - Firm level statistics (a firm exports x% of its sales)
  - Input-output tables

Our approach: the first CEE supplier survey

- Our aim was to learn about exact relationships, network of customers and suppliers
- Carried out a survey on 1400 Hungarian, Romanian and Slovakian firms
- Manufacturing firms with at least 10 employees in 2014, in key industries (e.g. auto, electronics, chemicals, machinery)
- Joint project: Central European University, Hungarian Academy of Sciences, Gfk Hungaria
  - Financed by EU's ERC grant, MTA Momentum grant
  - 2 year-long project, with pilots, translation issues etc.
  - High data protection: anonymization, secure storage, only scientific use, available for participants only.

Key aspects of the survey

- 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
  - Here the level of observation is the respondent-partner dyad
  - variables: identity of partner, length of relationship, share in sales/material cost, innovation and cooperation measures

Outline

1. Buyer and supplier portfolios
2. The geography of relationships
3. How relationships form?
4. Relationships and performance
5. Conclusions

Outline

Number of observations

	Country			
	Hungary No.	Romania No.	Slovakia No.	Total No.
Number of employees				
less than 20	203	214	166	**583**
21-50	135	167	93	**395**
51-250	185	170	80	**435**
more than 250	35	37	43	**115**
Total	**558**	**588**	**382**	**1,528**
Ownership				
Domestic	410	446	236	**1,092**
Foreign	148	142	146	**436**
Total	**558**	**588**	**382**	**1,528**
Industry				
20. Manuf. of chem. and chem. prod.	19	25	17	**61**
21. Manuf. of basic pharm. prod. and pharm. prep.	3	6	4	**13**
22. Manuf. of rubber and plastic prod.	67	80	50	**197**
23. Manuf. of other non-metallic mineral prod.	37	70	35	**142**
24. Manuf. of basic metals	13	19	7	**39**
25. Manuf. of fabr. metal prod., except machin. and equip.	251	235	121	**607**
26. Manuf. of comp., electr. and optical prod.	24	23	27	**74**
27. Manuf. of electr. equip.	36	28	42	**106**
28. Manuf. of machinery and equip. n.e.c.	78	61	46	**185**
29. Manuf. of motor vehicles, trailers and semi-trailers	26	25	26	**77**
30. Manuf. of other transp. equip.	4	16	7	**27**
Total	**558**	**588**	**382**	**1,528**

Customer and supplier portfolios

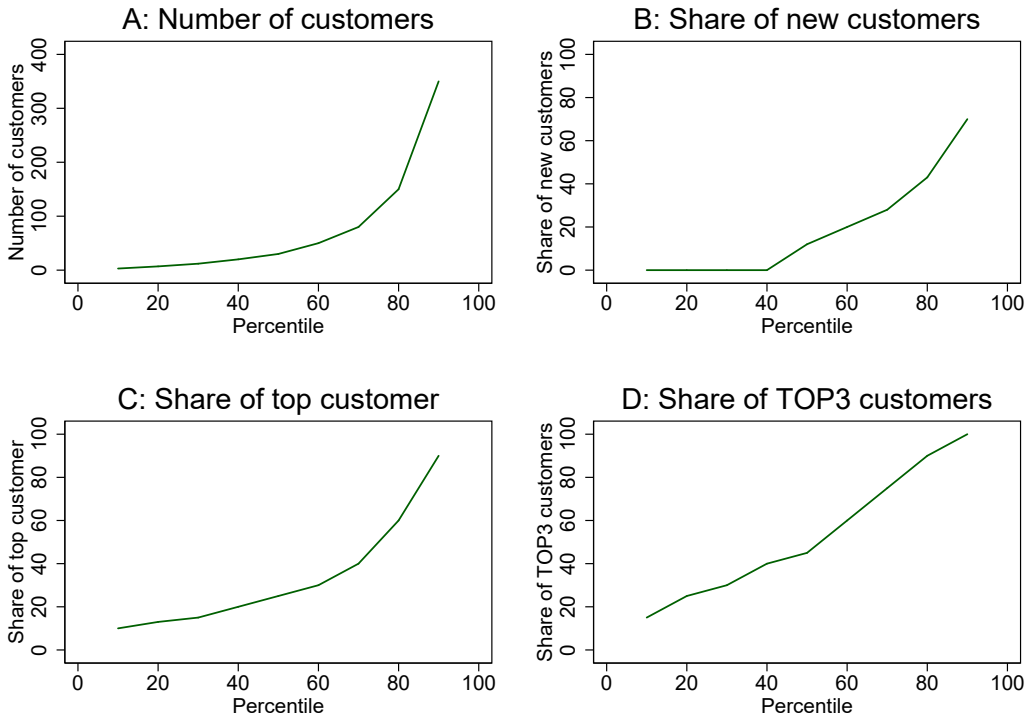
- Firms have somewhat more customers than suppliers, many of which are returning (especially suppliers). Both sales and input purchases are quite concentrated.
- Hungarian and Romanian firms are similar, while Slovakian firms have fewer partners. Key relationships of Hungarian firms exist for 10 years while they are shorter in the other two countries.

Country	Buyer/Supplier	Number	Returning	TOP3	Length
Hungary	B	30	20	47	10
Hungary	S	18	15	40	10
Romania	B	30	20	60	7
Romania	S	20	15	59	8
Slovakia	B	26	12	40	6
Slovakia	S	10	9	43.5	7

The table shows median numbers at the firm level for the number of suppliers, customers, the number of returning partners, the share of the TOP3 partners in sales/material costs and the average length of key relationships.

Heterogeneity in customers

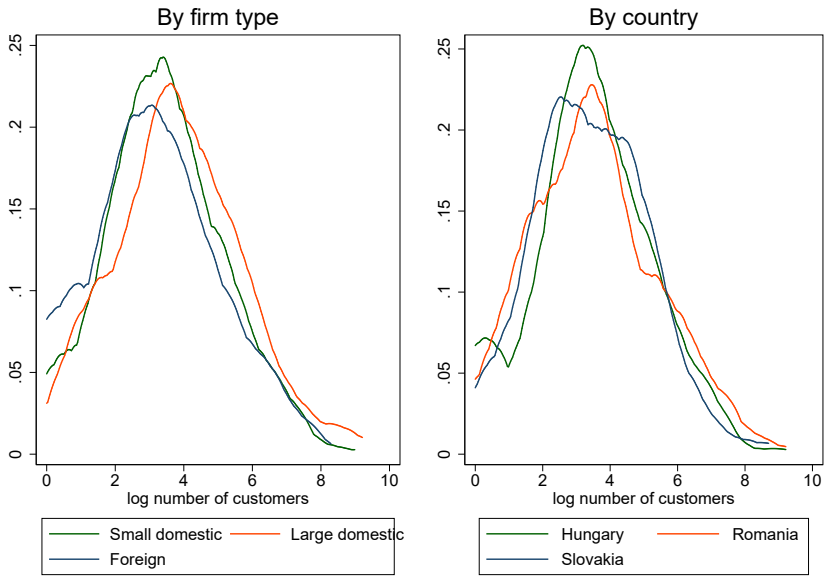
- 'Happy few' in terms of partners. Large heteroegenity in partner turnover and concentration.



The table shows the percentages (1-99) of the distribution of the above variables.

Distribution of the ln(number of customers) across countries and type of firms

- Foreign-owned firms have fewer customers than domestic firms. Slovakian firms have fewer customers, while Romanian firms have a 'fat tail'.

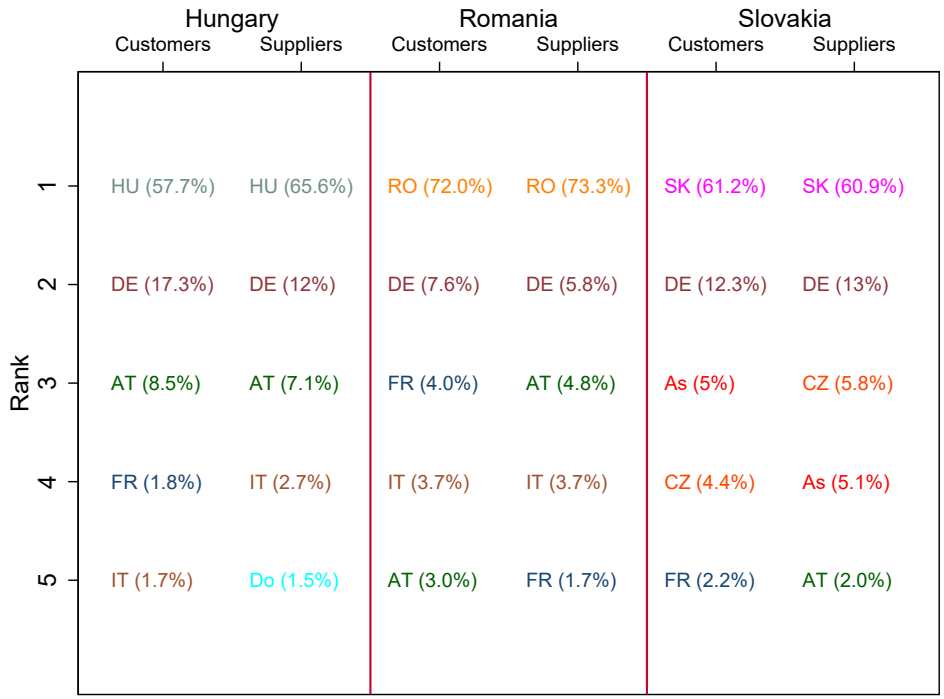


The table shows kernel densities of the ln number of customers. Small: <=50 employees, large otherwise. Foreign: foreign controlled.

Outline

Customer and supplier countries

- The countries of key suppliers and buyers are similar. Domestic firms play a key role (60-72%, in line with country size). Other partners follow gravity.

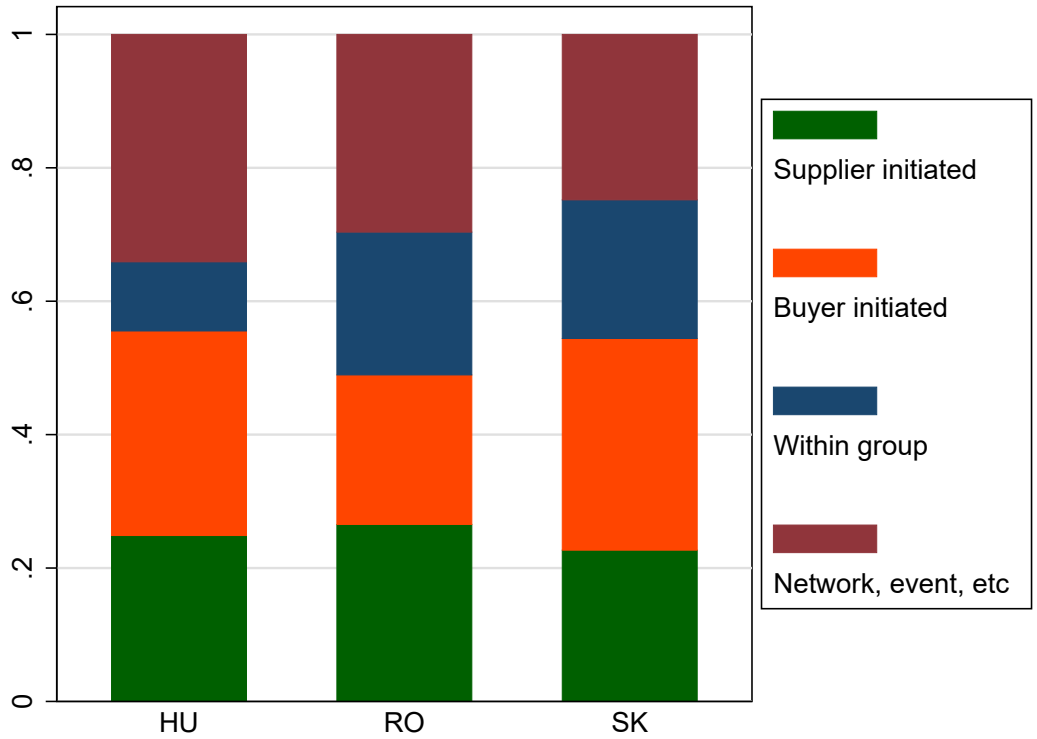


The table shows the distribution of headquarters of the key partners. One observation is one key relationship.

Outline

How firms find customers - by country

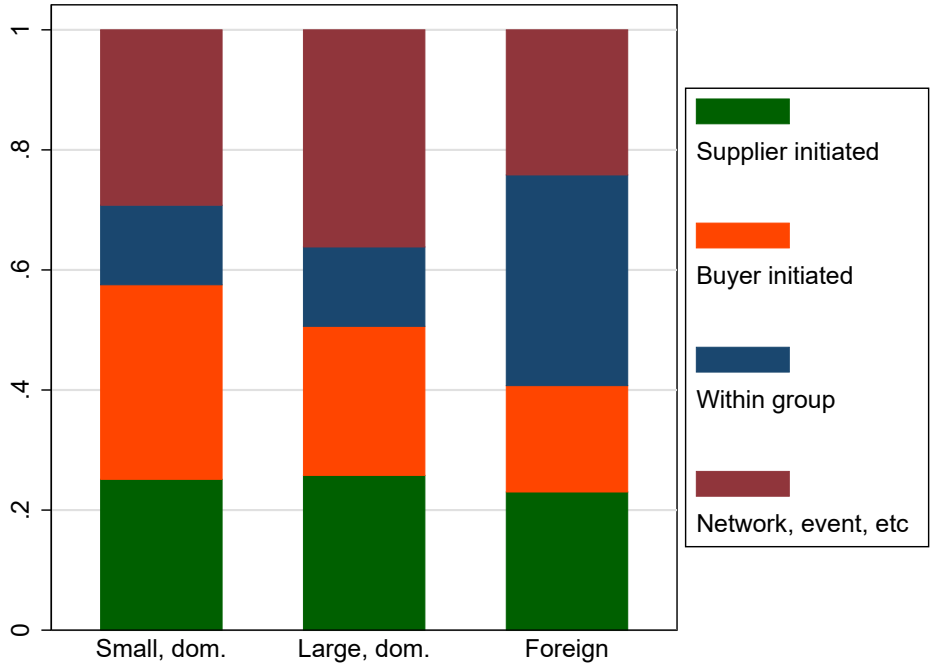
- Within-group is more important in RO and SK while networks and events are more important in HU.



The figure shows the distribution of the answers to 'how the relationship started?' for key relationships (each such relationship when respondent is supplier is one observation).

How firms find customers - by type of firms

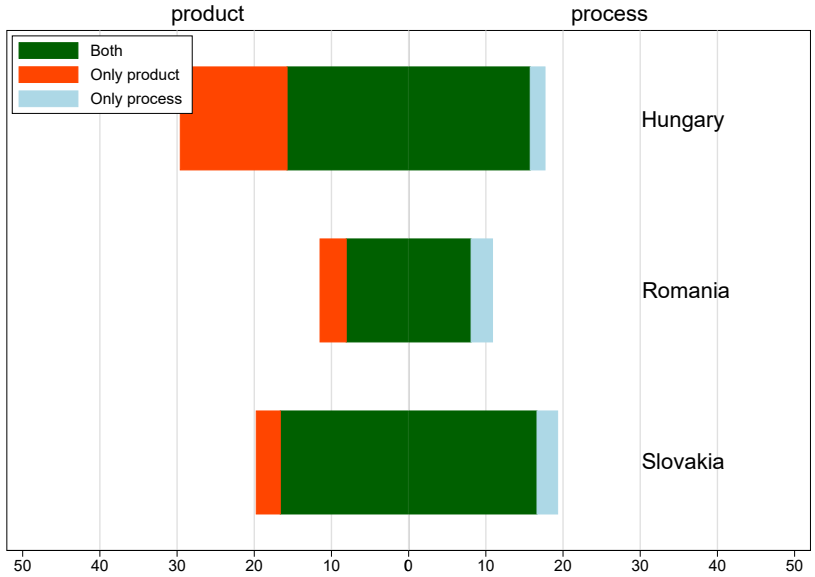
- Key relationships of smaller firms are often initiated by the buyer, while networks and events are more important for larger firms and within group for foreign-owned firms.



The figure shows the distribution of the answers to 'how the relationship started?' for key relationships (each such relationship when respondent is supplier is one observation).

Prevalence of supplier innovation at the start of the relationship - by country

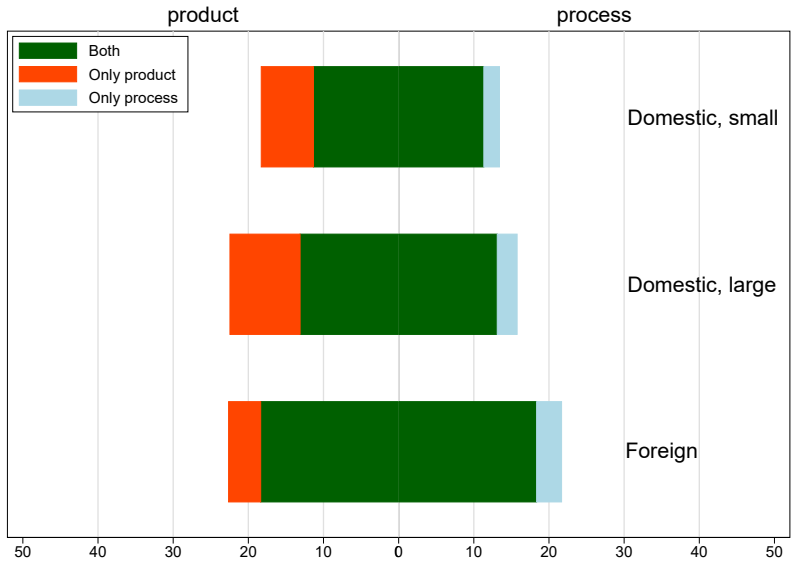
- Significant part of supplier relationships starts with innovation. Product and process innovation are complementary. Large country differences.



The figure shows the distribution of the answers to 'did the firm has to improve its product/process for the relationship at the beginning' for key relationships (each such relationship when respondent is supplier is one observation).

Prevalence of supplier innovation at the start of the relationship - by type of firms

Large and foreign firms are somewhat more likely to innovate when starting to supply a new customer.



The figure shows the distribution of the answers to 'did the firm has to improve its product/process for the relationship at the beginning' for key relationships (each such relationship when respondent is supplier is one observation).

Support for innovation from customers at the start of the relationship

- Buyers, especially domestic ones, often provide assistance for product development: consulting in 1/4, technology transfer in 1/8 and asset transfer in 1/16 of key relationships.

Type of customer	Type of reporting firm (seller)			
	Domestic SME	**Domestic large**	**Foreign-owned**	**Total**
Technology transfer				
Domestic SME	17.6	100	63.6	**20.5**
Domestic large	24.8	25.9	25.7	**25**
Abroad	12.2	26.4	20.7	**12.9**
Total	**15.7**	**27.3**	**26.2**	**16.9**
	Domestic SME	**Domestic large**	**Foreign-owned**	**Total**
Asset transfer				
Domestic SME	6.5	0	63.6	**9.2**
Domestic large	14.7	11.1	15.8	**14.7**
Abroad	4.2	8.3	10.3	**4.5**
Total	**7**	**9.4**	**16.7**	**7.8**
	Domestic SME	**Domestic large**	**Foreign-owned**	**Total**
Regular meetings, consulting				
Domestic SME	24.1	50	54.5	**25.8**
Domestic large	38.7	27.8	34.5	**37.3**
Abroad	23	31.9	29.3	**23.5**
Total	**27**	**30.5**	**34.2**	**27.6**

The figure shows the distribution of the answers to the question about the type of assistance provided by the buyer for product development at the start of the relationship for key relationships (each such relationship when respondent is supplier is one observation). SME: <=50 employees, large otherwise.

Outline

Length of relationships for different types of partners (median)

Key relationships last long, with significant country differences. Larger firms have longer relationships.

	Type of reporting firm (seller)			
	Domestic SME	**Domestic large**	**Foreign-owned**	**Total**
Country of reporting firm				
Hungary	10	15	14	10
Romania	8	10	10	8
Slovakia	6	10	9	6
Total	8	10	10	8
Type of customer				
Domestic SME	8	10	8	8
Domestic large	9	12	10	10
Abroad	8	10	9	8
Total	8	10	10	8

The figure shows the median length of key relationships (each such relationship when respondent is supplier is one observation). SME: <=50 employees, large otherwise.

Labour productivity and customer/supplier characteristics

- Having many suppliers and having buyers from business groups are associated with productivity premia.

VARIABLES	(1) LP	(2) LP	(3) LP
ln(Number of B)	0.011	0.020	0.014
	(0.013)	(0.014)	(0.015)
ln(Number of S)	0.056***	0.056***	0.067***
	(0.017)	(0.017)	(0.019)
B in business group		0.151***	0.167***
		(0.057)	(0.061)
S in business group		-0.044	-0.024
		(0.058)	(0.063)
B foreign		0.006	0.016
		(0.050)	(0.057)
S foreign		-0.096*	-0.076
		(0.050)	(0.057)
Relationship length with B			0.007
			(0.005)
Relationship length with S			-0.005
			(0.005)
ln(Number of employees)	0.128***	0.115***	0.107***
	(0.025)	(0.025)	(0.028)
Country, sector, size dummies	YES	YES	YES
Observations	1,135	1,135	1,002
R-squared	0.319	0.326	0.336

Standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1

The table shows OLS regressions when the dependent variable is ln(labor productivity). One observation is one respondent. Business group and foreign refers to whether the firm has at least one such partner, while length is the average length of key relationships.

Outline

Conclusions

- Survey evidence may unravel important patterns about the formation and operations of supplier-buyer networks.
- 'Happy few' in terms of relationships: foreign firms typically have fewer relationships than domestic firms.
- 60-70% of key partners are domestic. The geography of partners obeys gravity.
- Innovation is key at the beginning of new relationships. Product and process innovation often complement each other. Innovation is often helped by technology transfer from the buyer.
- Having many suppliers and having buyers from business groups are associated with productivity premia.