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Economic analyses and forecasts

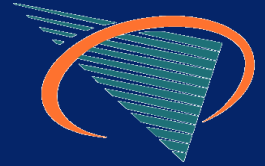
The role of exporters and domestic producers in GVCs

Evidence for Belgium based on extended national supply-and-use tables integrated into a global multiregional input-output table

Bernhard Michel
Caroline Hambÿe
Bart Hertveldt



- Our work for Belgium:
 - Statistical aim: disaggregate Supply-and-Use and Input-Output tables according to exporter status of firms
 - Analytical aim: calculate IO-indicators on the role of exporters and non-exporters in domestic and global value chains
- Demand to investigate other sources of firm heterogeneity within industries defined in terms of product similarity: size, ownership, exporter status → differences in production technology
- Prior work
- Export heterogeneity for Belgium

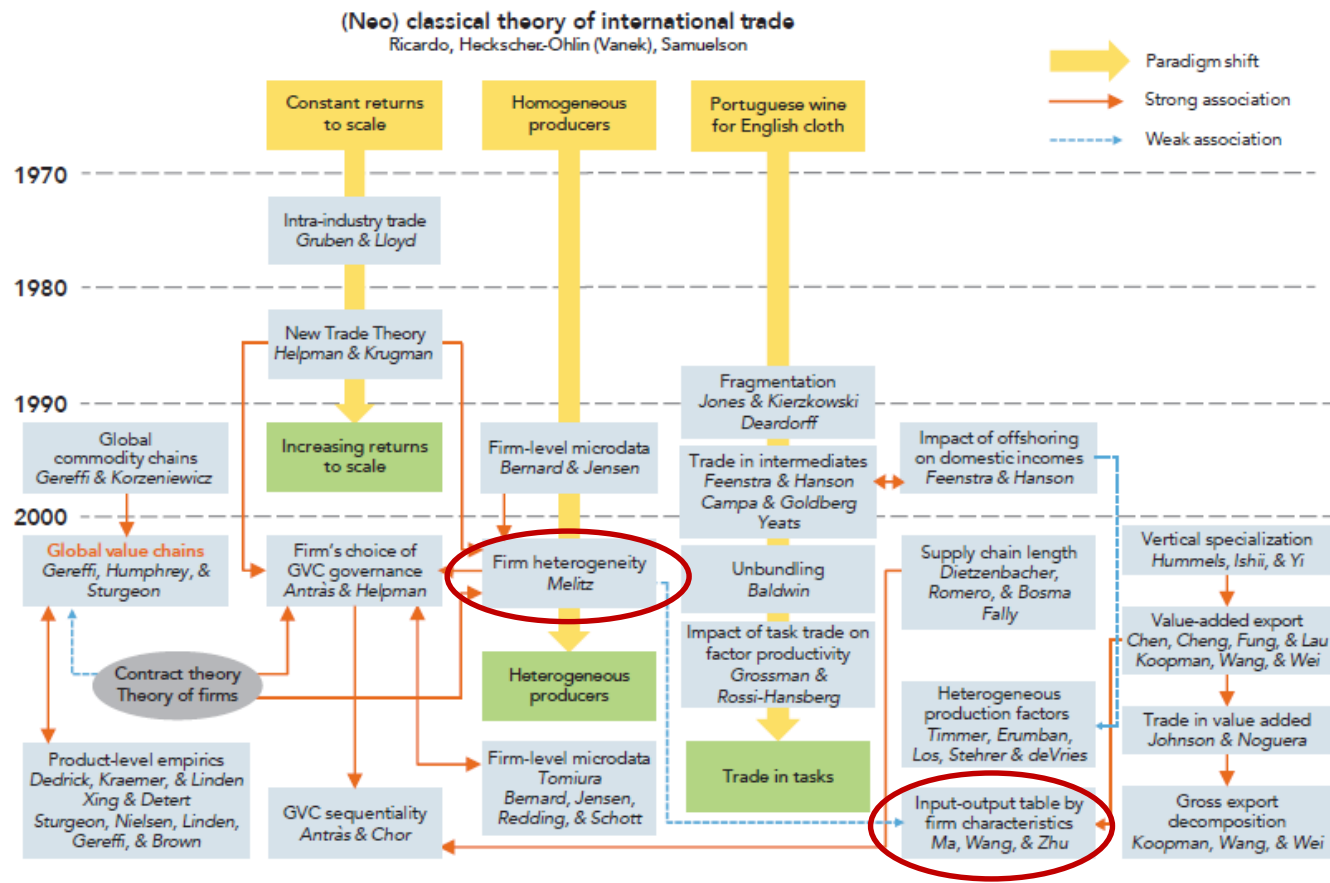


- Bring together two recent trends in int'l trade theory:
 - **Firm heterogeneity** (Melitz, 2003): the most productive firms are exporters due to fixed cost of exporting, exporters rely more on imported inputs (Bas, 2009)
 - **Global value chains** (GVCs): “full range of activities [...] to bring a product from its conception to its end use and beyond” (Gereffi and Fernandez-Stark, 2011), increasingly fragmented across borders or even globally
 - case-study evidence (e.g. textile in Gereffi, 1994, iPod in Dedrick et al., 2010)
 - IOT-based macro-evidence: increasing trade in intermediates (Hummels et al., 2001), offshoring (Feenstra and Hanson, 1996), value-added (in) exports (Johnson and Noguera, 2012; Koopman et al., 2014; Los et al., 2016), value chain length and distance to final demand (Fally, 2012; Antras et al., 2012)

Flow chart overview - Inomata (2017)



FIGURE 1.1 Genealogical map of analytical frameworks for global value chains



Supply table



		Agri- culture	Mining	Manufacturing			Services			Output	Imports	Total supply
				M1	M2	...	S1	S2	...			
Products of agriculture												
Mining products												
Manufactured Products	M1											
	M2											
	M3											
	⋮											
Services	S1											
	S2											
	S3											
	⋮											
Total output by industry												

Use table



		Agri- culture	Mining	Manufacturing			Services			Inter- mediate use	Final uses	Total use
				M1	M2	...	S1	S2	...			
Domestic												
Products of agriculture												
Mining products												
Manufactured Products	M1											
	M2											
	⋮											
Services	S1											
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Imports												
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Manufactured Products	M1											
	M2											
	⋮											
Services	S1											
	S2											
	⋮											
Total use by industry												
Net taxes on products												
Value added												
Output												

Heterogeneous supply table



		Agri- culture	Mining	Manufacturing					Services			Output	Imports	Total supply	
				M1		M2		...	S1	S2	...				
				X	non X	X	non X	...							
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Value added															
Output															

In practice...



- Belgian SUT for 2010 (most recent input-output reference year)
 - 133 industries (based on NACE Rev.2)
 - 350 product categories (based on CPA2008)
- Disaggregate manufacturing industries (58 industries, NACE Rev.2 2-digit industries 10-33) into exporters and non-exporters
- Data sources:
 - Business register
 - Balance sheets
 - Periodical VAT declarations
 - Structural business survey (SBS) + extra questionnaires
 - Industrial production (prodcom)
 - VAT transaction dataset
 - Merchandise trade and trade in services

Disaggregating industry-level output and inputs



- 46876 manufacturing firms in 2010 business register:
- 40194 of these manufacturing firms have data on turnover and total purchases in balance sheet, periodical VAT declarations or structural business statistics
 - full sample
- Identify exporters based on exports to turnover ratio:
 - a firm is export-oriented if ratio $> 25\%$
- Sample split to disaggregate industry-level output and intermediate inputs (see NA, column totals SUT) based on shares of exporters in turnover and total purchases

Sample characteristics



	Number of firms	Turnover (billion euros)	Average size (million euros)	Exports (billion euros)
Full sample ¹				
All firms	40194	229.7	5.7	101.3
Export-oriented firms ³	2428 (6.0%)	171.9 (74.8%)	70.7	88.3 (87.2%)
Restricted sample ²				
All firms	1710	181.2	105.9	85.9
Export-oriented firms ³	978 (57.2%)	103.5 (57.2%)	105.8	74.0 (86.1%)

1 The full sample comprises all firms with data on turnover and total purchases

2 The restricted sample comprises firms with supplementary SBS questionnaires

3 Export-oriented firms are those with an export to turnover ratio above 25%

Disaggregating the output and input structure



- Industry-level output and inputs by product category in columns of the supply and the use table
- SBS extra questionnaire on product detail of turnover and purchases: every 5 years for all firms with at least 50 employees plus smaller firms for 50% minimum turnover coverage at 4-digit industry-level, 1710 manufacturing firms in 2010
 - restricted sample
- Corrections:
 - For turnover: complement with prodcom data and compare to exports
 - For purchases: cross-check with imports and VAT transactions
- Disaggregate output and input structures into exporters and non-exporters
- Issues of sample sizes and proportionality: data-based split of industries vs lower threshold for exporter definition
- RAS to match official tables

Sample characteristics



	Number of firms	Turnover (billion euros)	Average size (million euros)	Exports (billion euros)
Full sample ¹				
All firms	40194	229.7	5.7	101.3
Export-oriented firms ³	2428 (6.0%)	124.8 (54.3%)	51.4	88.3 (87.2%)
Restricted sample ²				
All firms	1710	181.2	105.9	85.9
Export-oriented firms ³	978 (57.2%)	103.5 (57.2%)	105.8	74.0 (86.1%)

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Further steps



- Disaggregate imports of intermediate inputs based on import data for exporters and non-exporters
- Disaggregate use of domestically-produced goods according to whether they are produced by exporters or non-exporters: proportional except for exports
- Derive national export heterogeneous IOT
- Integrate into a global multi-country IO table (WIOD 2010)

Results: heterogeneous IO table



	Manufacturing exporters	Manufacturing non-exporters	Other industries	Domestic final demand	Commodity exports	Service exports	Total output
Manufacturing exporters	15,335	3,866	11,482	12,446	101,566	4,609	149,304
Manufacturing non-exporters	6,900	5,697	14,730	13,278	8,975	2,888	52,467
Other industries	28,279	13,379	170,886	258,311	18,180	60,303	549,337
Imports	65,941	13,397	65,053	42,667	75,686	0	
Value added	32,848	16,128	287,186				
Total output	149,304	52,467	549,337				

Results: heterogeneous IO table



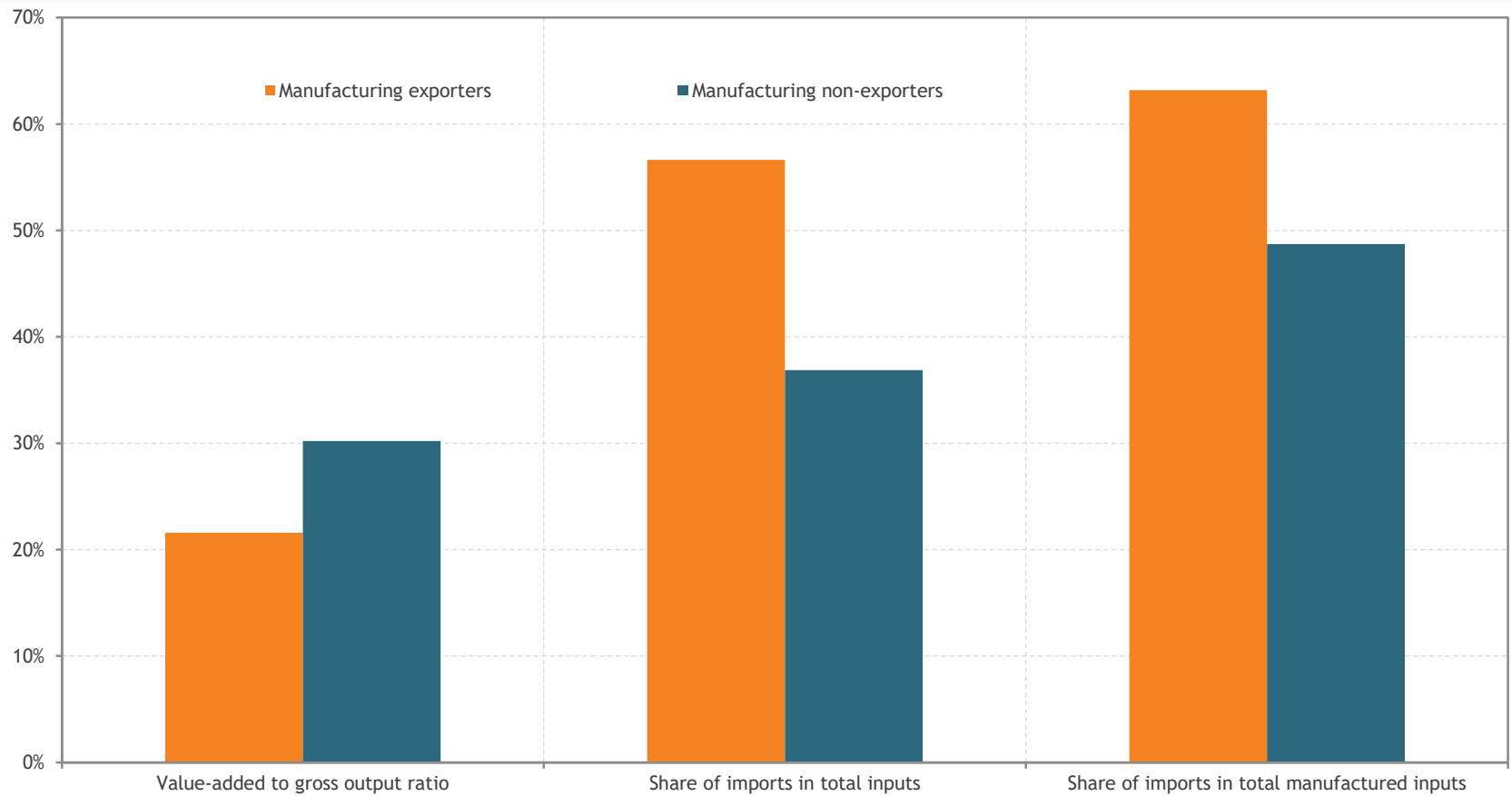
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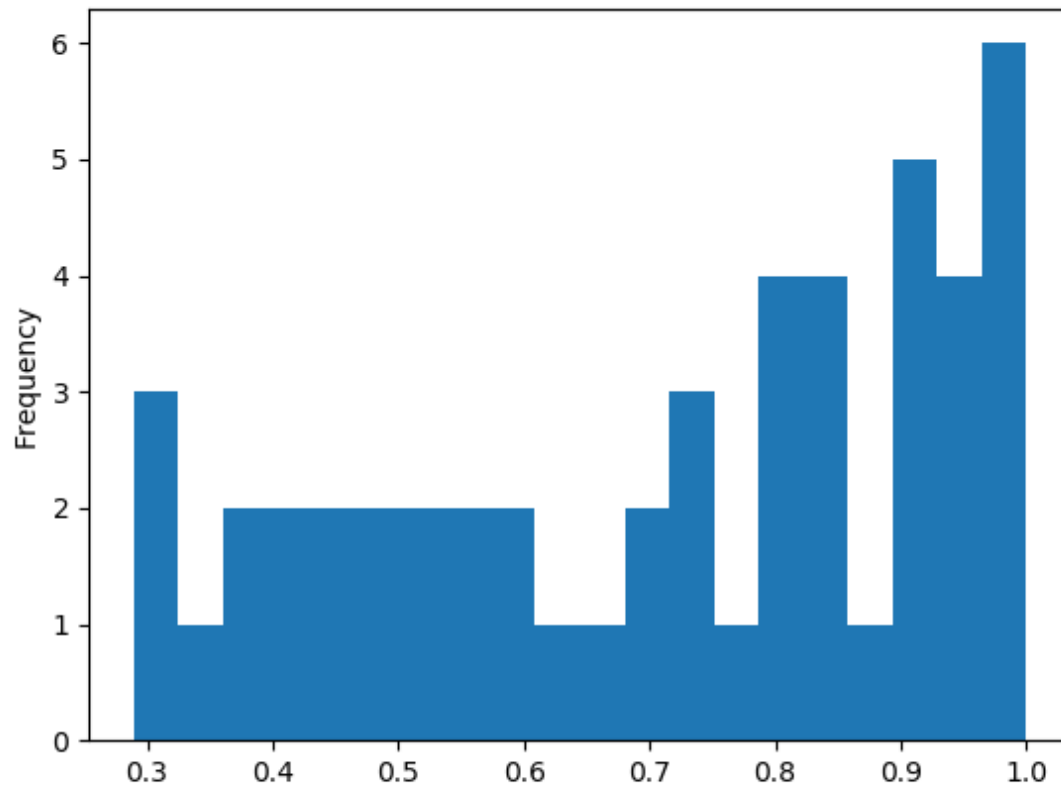


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Aggregate differences in production processes of exporters and non-exporters



Histogram of correlations between input structures

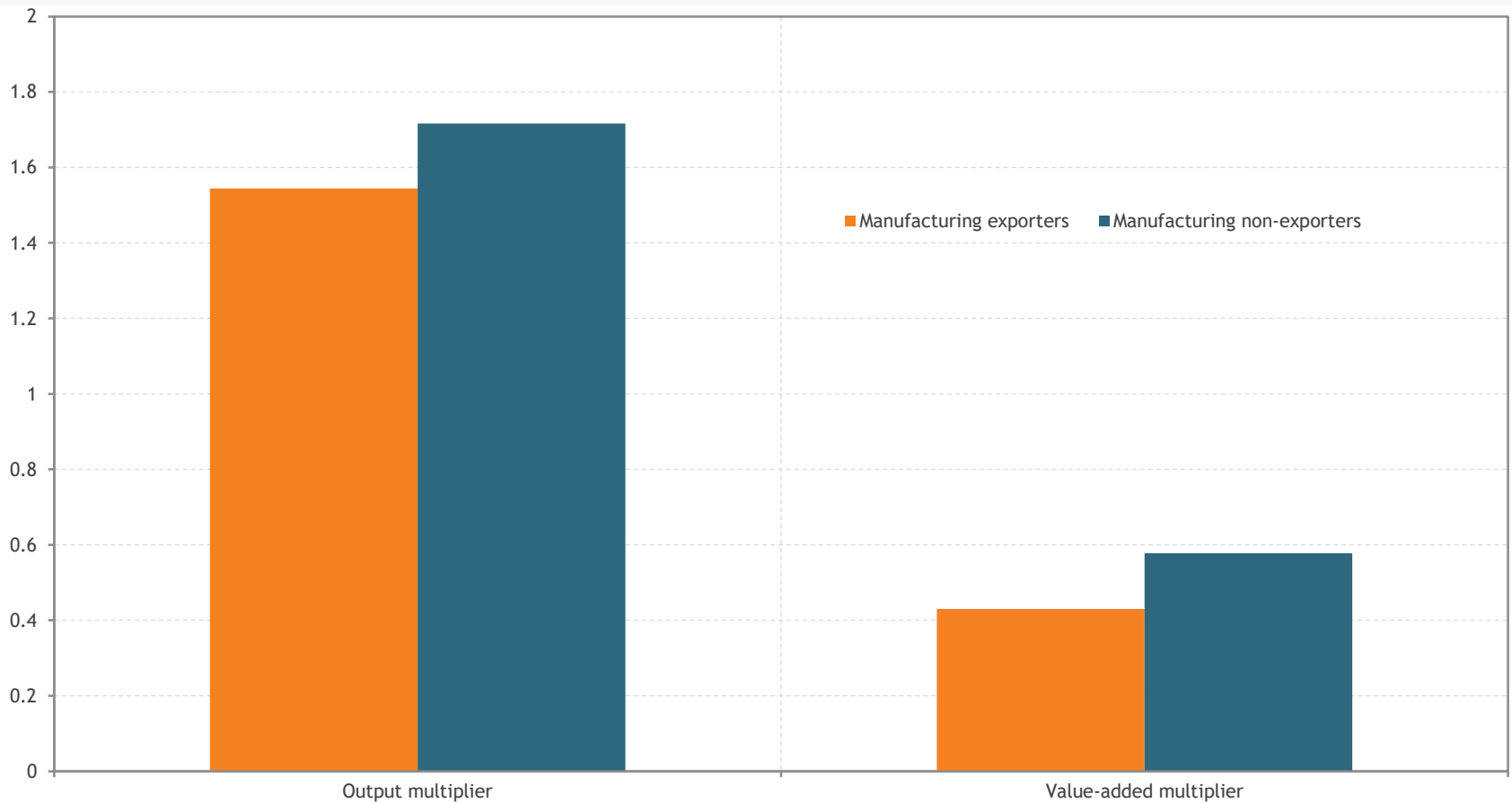


IO Analysis with national table

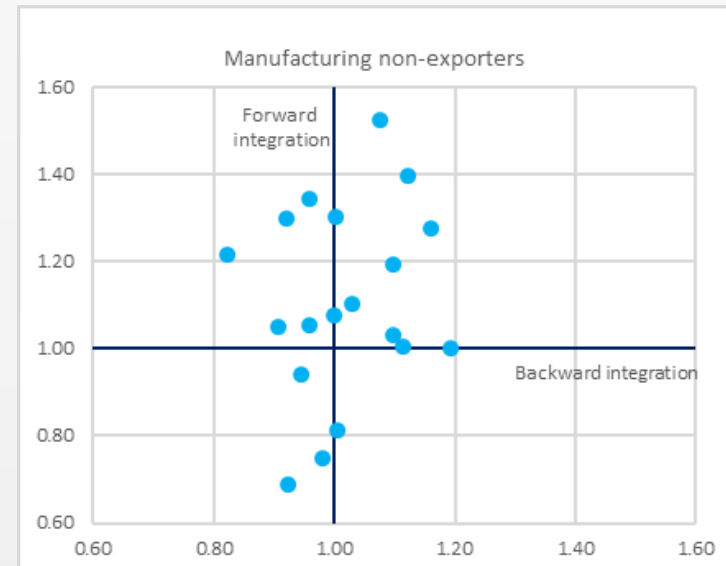
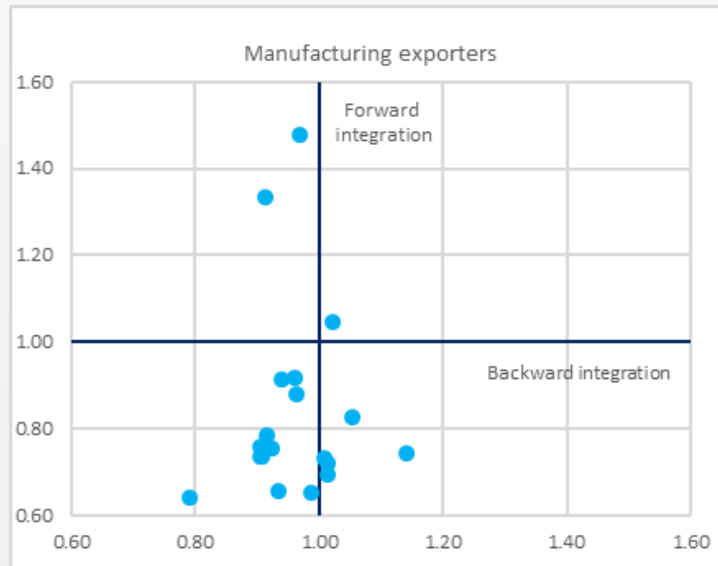


- Purpose of IO analysis:
Take into account direct and indirect intermediate inputs into the production process
- Map all stages of production process (suppliers, suppliers of the suppliers, and so on)
- Leontief inverse matrix
- How much extra output or value-added is generated by a shock to demand for an industry's output?

Multipliers for exporters and non-exporters



Backward and forward linkages of exporters



Value added in exports and vertical specialisation



Value-added \ exports	Manufacturing exporters	Manufacturing non-exporters	Other industries	Total
Manufacturing exporters	34,457	329	799	35,585
Manufacturing non-exporters	3,134	5,170	1,300	9,604
Other industries	22,628	3,139	74,689	100,456
Total	60,220	8,637	76,789	145,646

Overall share of domestic value-added in exports (Koopman et al., 2010):

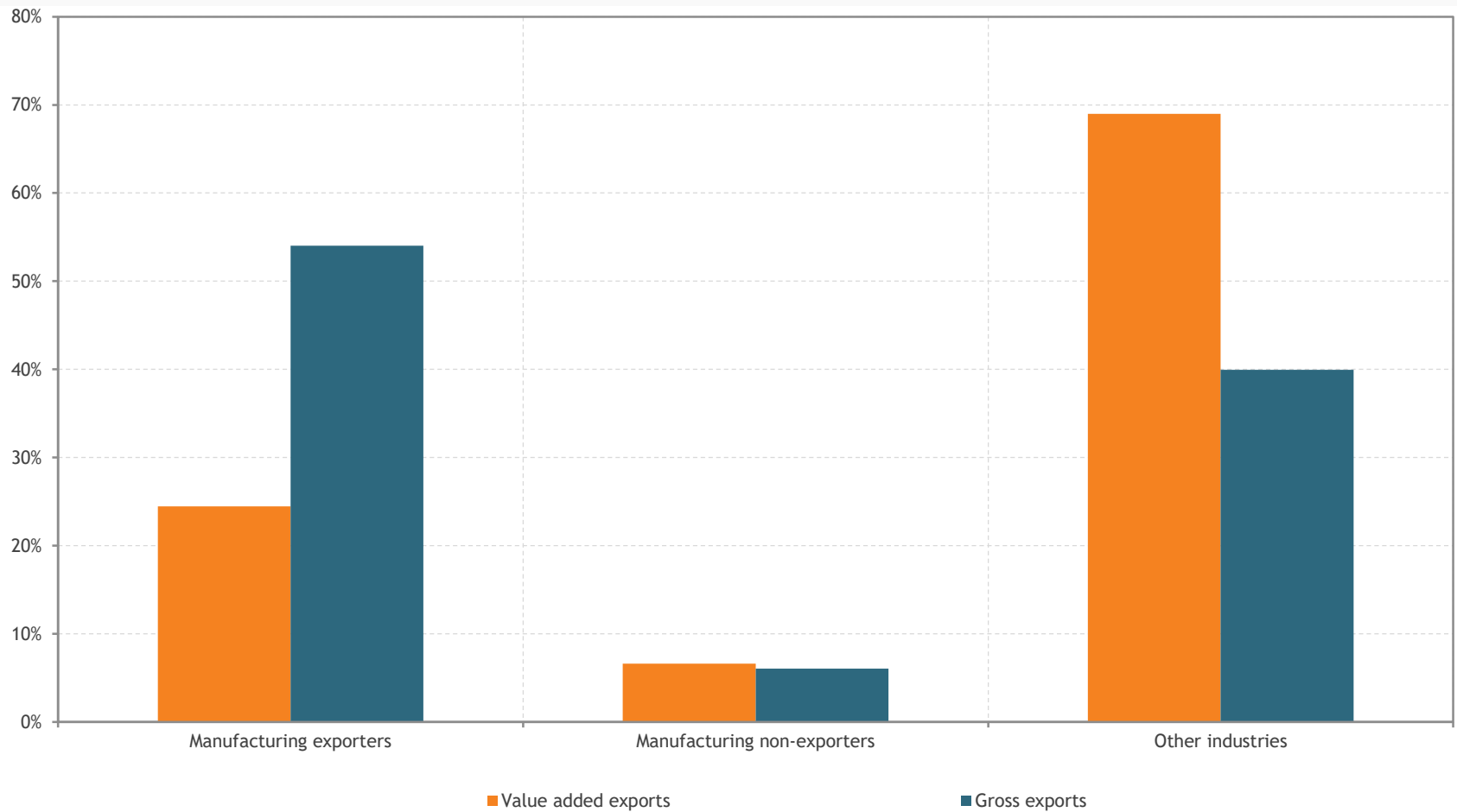
$$VS^* = 145.6 / 260.5 = 56\%$$

Complement of vertical specialisation (Hummels et al., 2001), which is the direct and indirect import content of a country's exports:

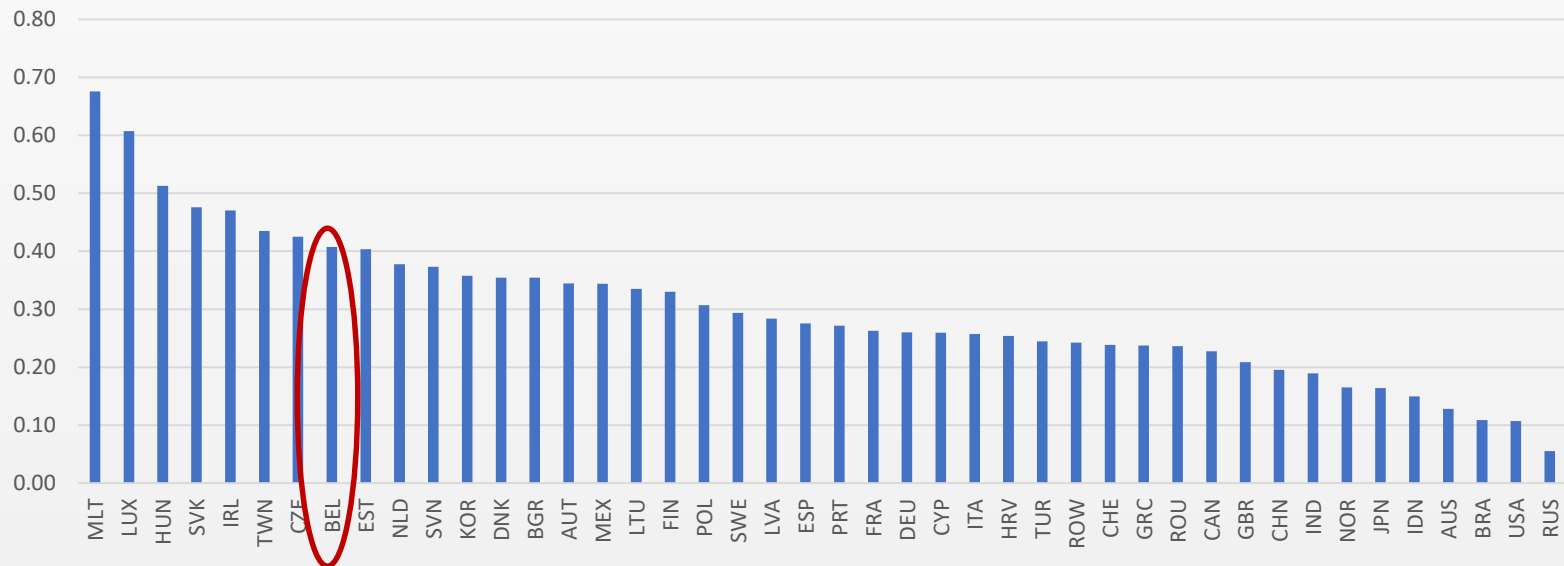
$$VS = 44\%$$

VS is an indicator of the fragmentation of production processes

Value-added in exports and gross exports

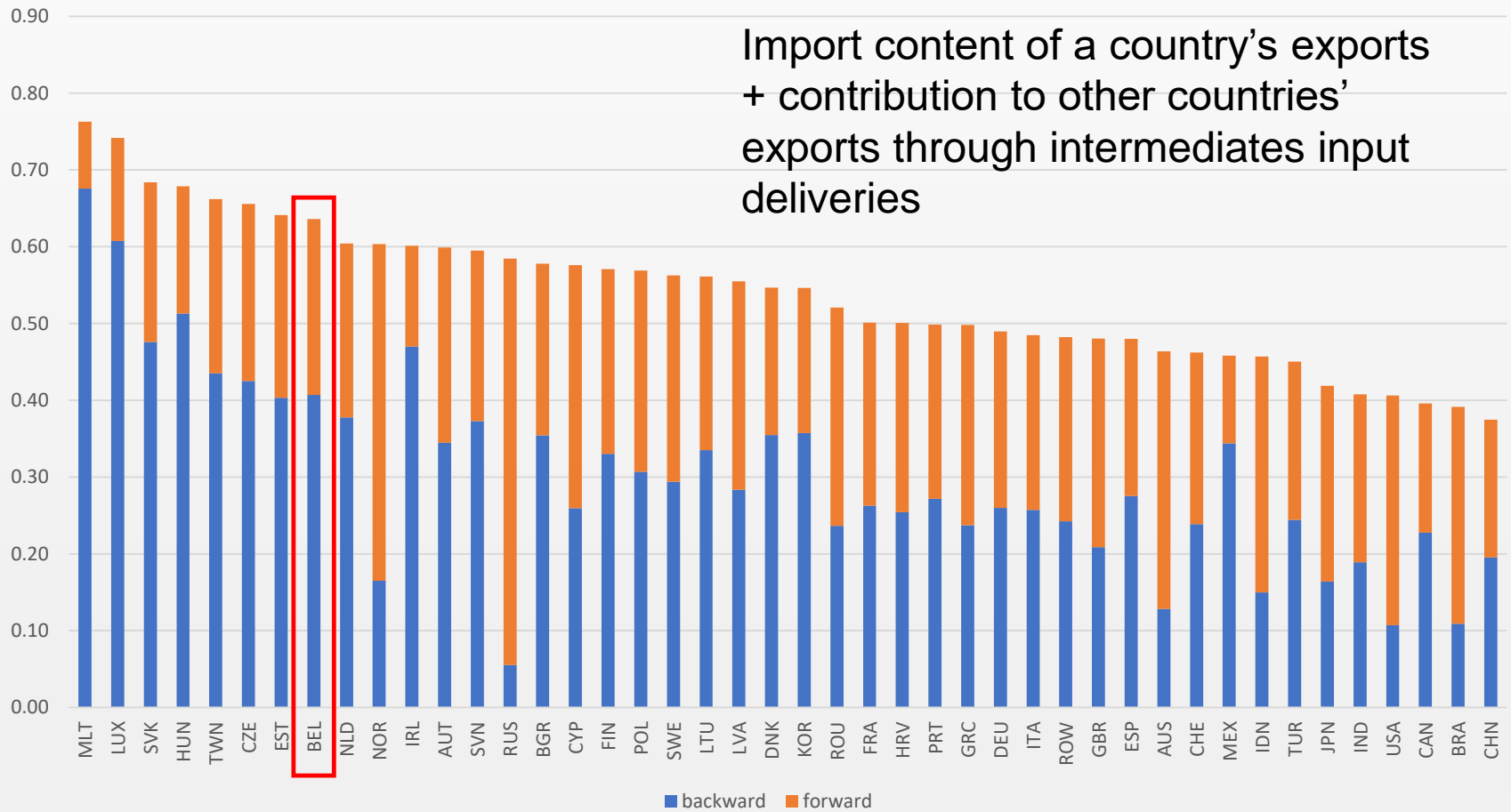


Import content in exports in a global table

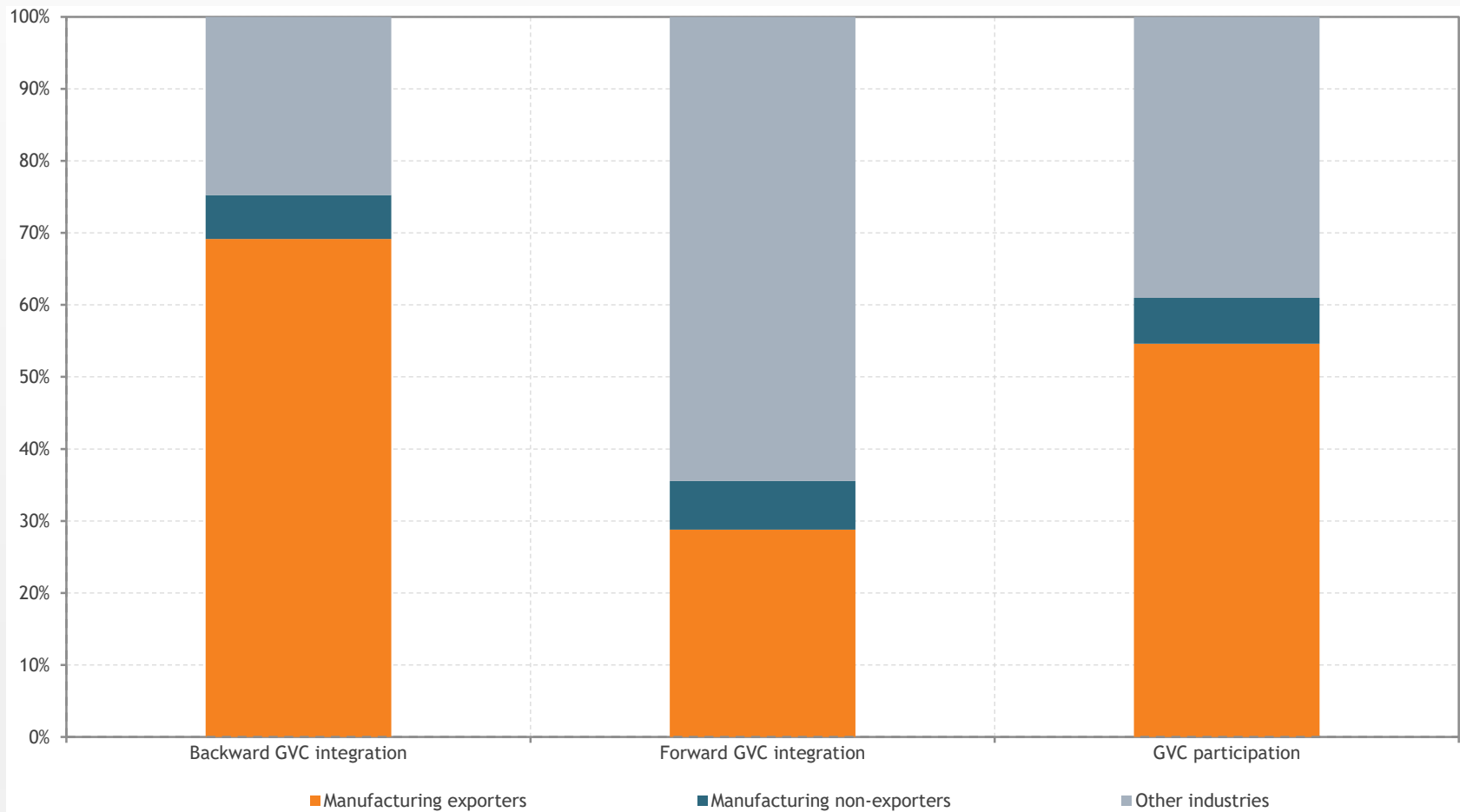


Vertical specialisation: backward integration into GVCs

GVC participation



Contributions to GVC participation



Conclusions & future work



- Belgium: example of limits to what can be done from a statistical point of view (sample size problem for heterogeneous industries, trade-off between avoiding proportionality and including small exporting firms)
- Results: exporters have lower value-added in output shares and import proportionally more intermediates → exporters' production processes more fragmented, in particular internationally.
- Belgium's high GVC participation: backward through manufacturing exporters, forward through other firms

Conclusions & future work



- Further GVC indicators: upstreamness,...
- Employment: split based on social security records (administrative source for linked employer-employee data) → Done (employment multipliers calculated with national tables)
- Service exports and service industries
- Use VAT transaction dataset to refine the split of the rows
- Other sources of heterogeneity
- Work on 2015 tables...