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Analyzing Global Value Chains using the World Input-Output Database

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End of an era?

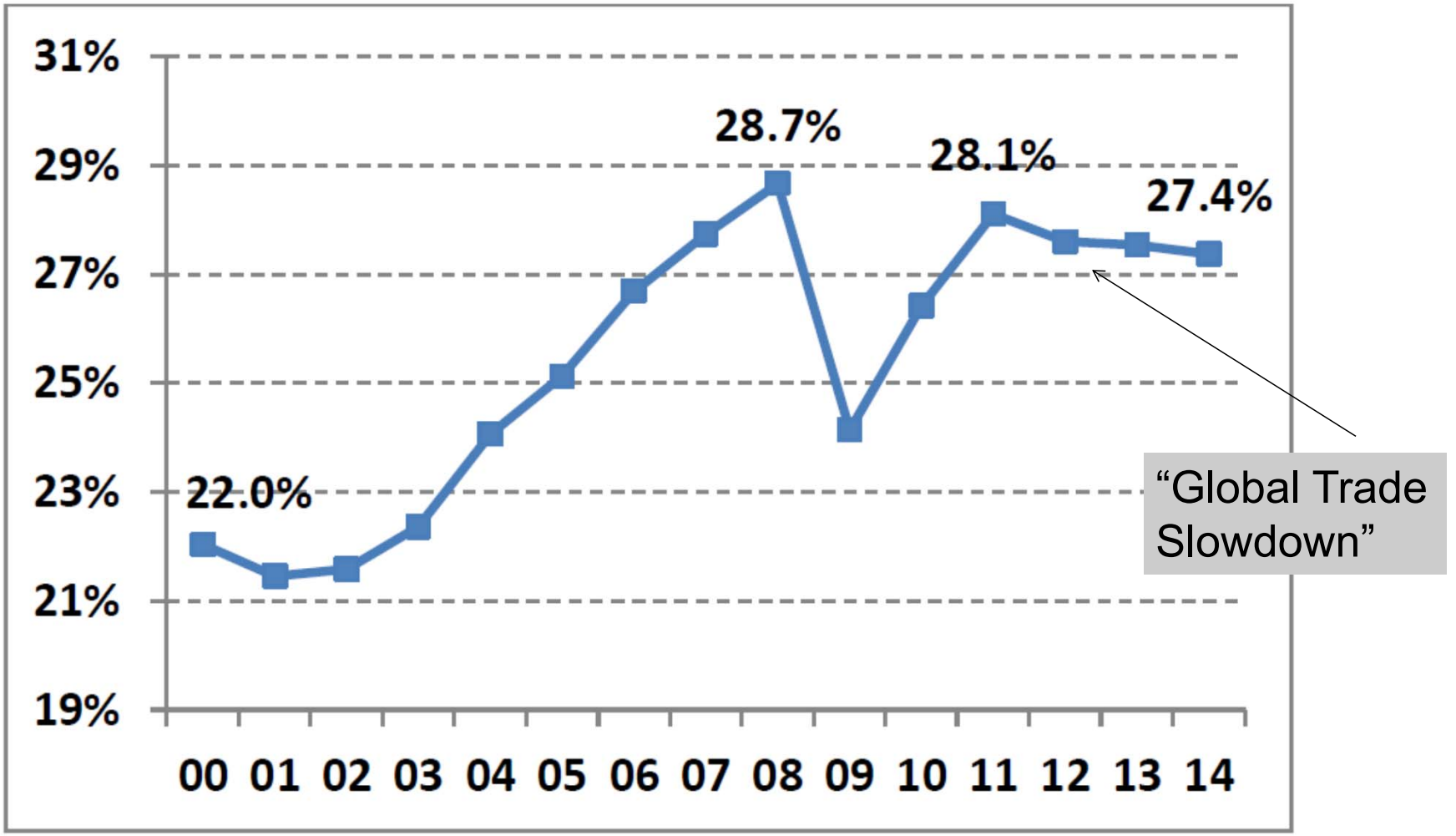

Figure 1 Trade in goods and services (as percentage of global GDP)

Source: own calculations on WIOD (Timmer et al., RoIE 2015), 2016 release;

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Global Trade Slowdown

Question: "The Global Trade Slowdown: A New Normal?"

Hoekman (ed., 2015): two types of explanations

- **Changes in structure of global demand** towards categories with lower trade elasticity (*e.g. to consumption of domestic services, or away from investment in machinery*)
- **Changes in structure of global production** such that trade elasticities decline (*e.g. international de-fragmentation of global value chains due to protection, reshoring or industrial upgrading in emerging countries*)
- These two streams of literature are not integrated and lack a common framework of analysis

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Our Analysis (intuition)

AIM: Mapping final demand **F** into trade flows. So find function f such that:

$$m = y.\ f(\mathbf{A}, \mathbf{F})$$

with m = global imports, y = global GDP,

F = structure of global final demand (products and countries).

A = structure of global value chains (intermediate inputs)

Then change in m/y can be decomposed into effects of change in production structure and change in final demand

$$\Delta(m/y) = f(\Delta\mathbf{A}, \mathbf{F}) + f(\mathbf{A}, \Delta\mathbf{F})$$

(Structural Decomposition Analysis, Dietzenbacher and Los, 1998)

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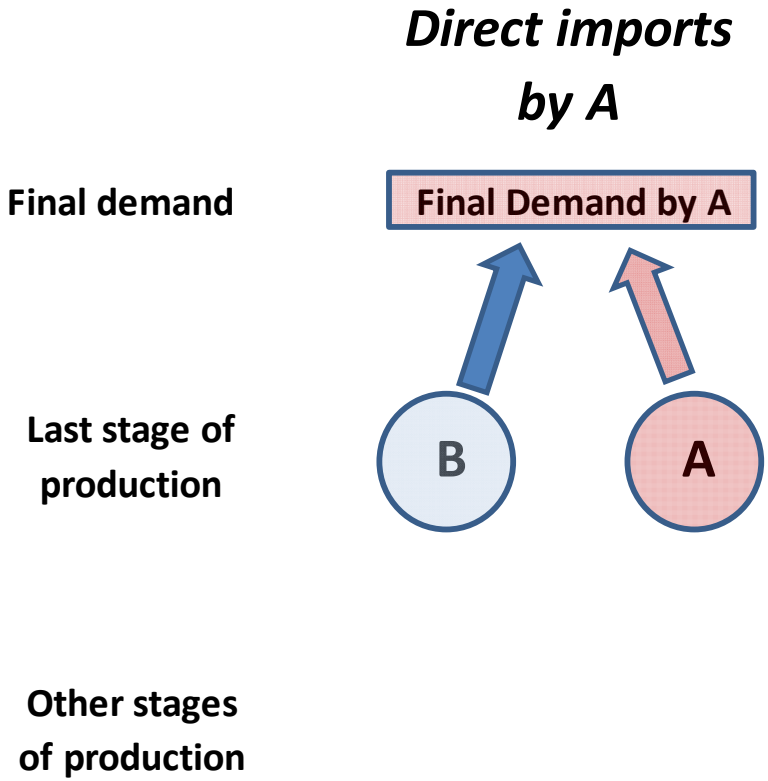
Measuring the global import intensity of final demand



Data needs	*Trade data*

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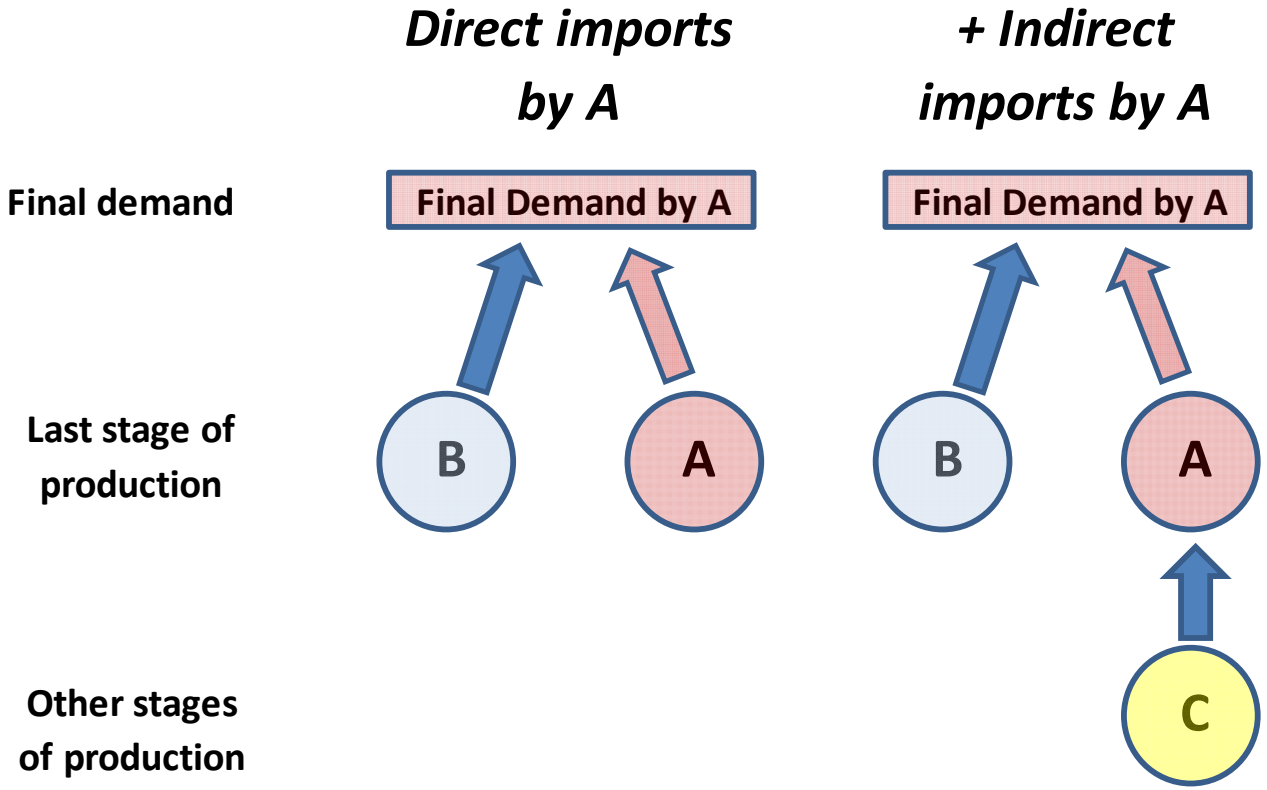
Measuring the trade elasticity of final demand



This was introduced by Bussière et al. (2011, *AEJ Macro*).

Data needs	***Trade data***	***National IO- tables***

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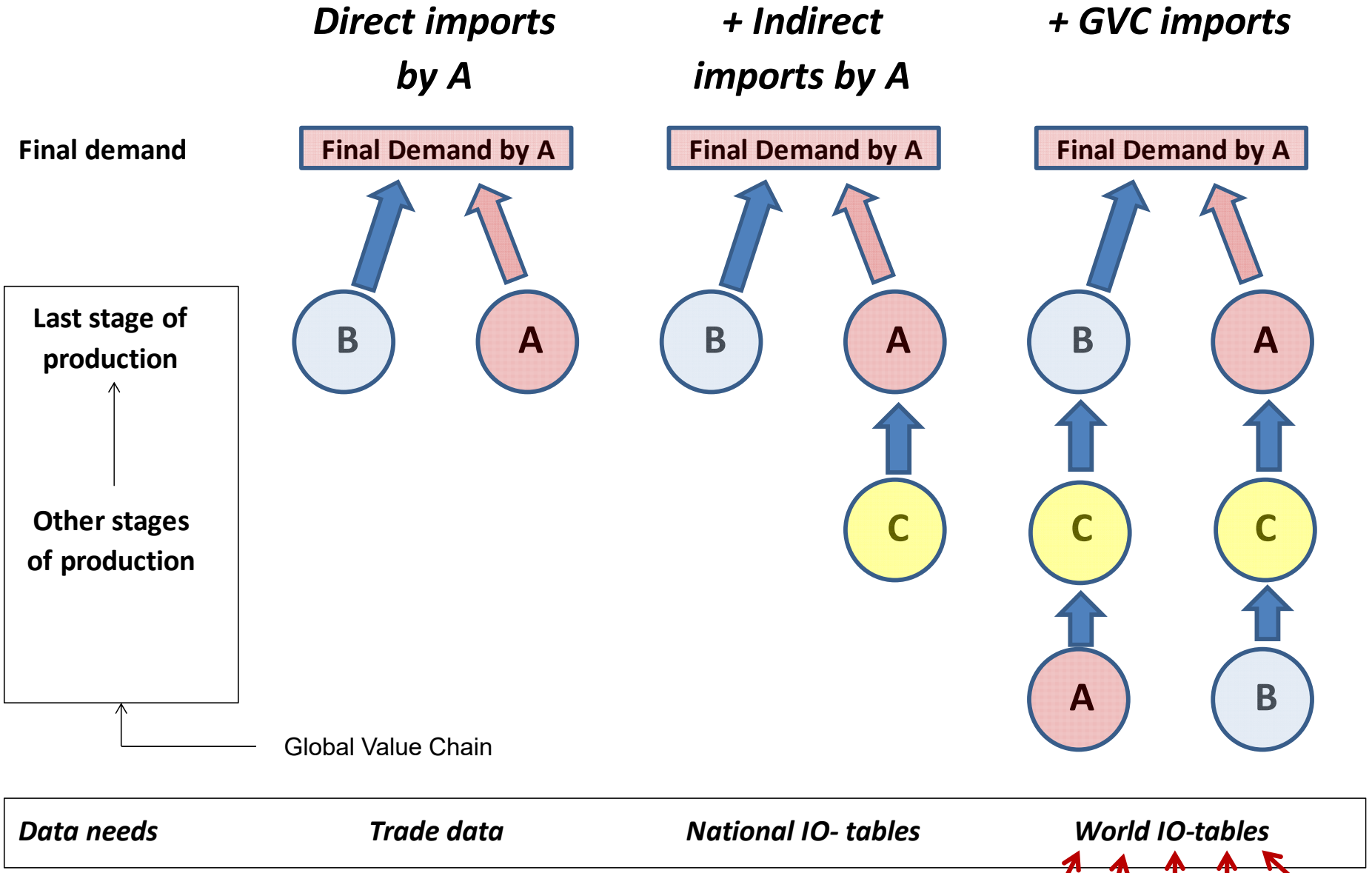
Measuring the full import intensity of final demand (new in this paper)



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Stylized World Input-Output Table

Constructed in WIOD project (funded in FP7)

Based on official, publicly available data only

Inputs:
- National Accounts
- Benchmark Supply and Use Tables/IO Tables
- Bilateral Trade Data
- Market Exchange Rates

		Country A Intermediate use *Industry*	Country B Intermediate use *Industry*	Rest of World Intermediate use *Industry*	Country A Final domestic use	Country B Final domestic use	Rest of World Final domestic use	Total
Country A	*Industry*	Intermediate use of domestic output	Intermediate use by B of imports from A	Intermediate use by RoW of imports from A	Final use of domestic output	Final use by B of exports from A	Final use by RoW of exports from A	Output in A
Country B	*Industry*	Intermediate use by A of imports from B	Intermediate use of domestic output	Intermediate use by RoW of imports from B	Final use by A of exports from B	Final use of domestic output	Final use by RoW of exports from B	Output in B
Rest of World (RoW)	*Industry*	Intermediate use by A of imports from RoW	Intermediate use by B of imports from RoW	Intermediate use of domestic output	Final use by A of exports from RoW	Final use by B of exports from RoW	Final use of domestic output	Output in RoW
		Value added	Value added	Value added				
		Output in A	Output in B	Output in RoW				

- All data benchmarked on (revised) National Accounts
- Intermediate output of construction process made available for users (see, e.g. work by Statistics Netherlands)
- WIOTs in current prices and in prices of the previous year
- First release in Spring 2012, revisions in Fall 2013, second release in Fall 2016

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WIOD (2016 release)

World Input-Output Database (Timmer et al., 2015, *RIntEc*), updated from release of November 2013

- 43 countries (85% of world GDP), plus RoW *(Norway, Switzerland and Croatia added compared to old release)*
- 56 industries *(35)*
- 2000-2014 *(1995-2011)*
- Based on SNA08 information for most countries *(SNA93)*

NOTES:

- *Tables in current US$, currency conversions*
- *We cover all international trade between these regions, but not within (no intra-RoW trade).*
- *Data available at www.wiod.org*

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Alternative measures of Global Import Intensity (GII) of Production

Product group	Last stage of production	All tiers of production
Non-durable consumption goods (C-NDur)	0.136	0.288
Durable consumption goods (C-Dur)	0.181	0.401
Services consumption products (C-Serv)	0.042	0.107
Investment goods (I-Mach)	0.113	0.259
Construction (I-Con)	0.089	0.242
Other final demand	0.056	0.132

Notes: Imports measured as global imports related to final products as ratio of FD (by final demand category, 2007)
NB1: Exports is not a final demand category as we analyze global final demand.
NB2: Services (business, financial) are also indirectly traded through GVC imports.

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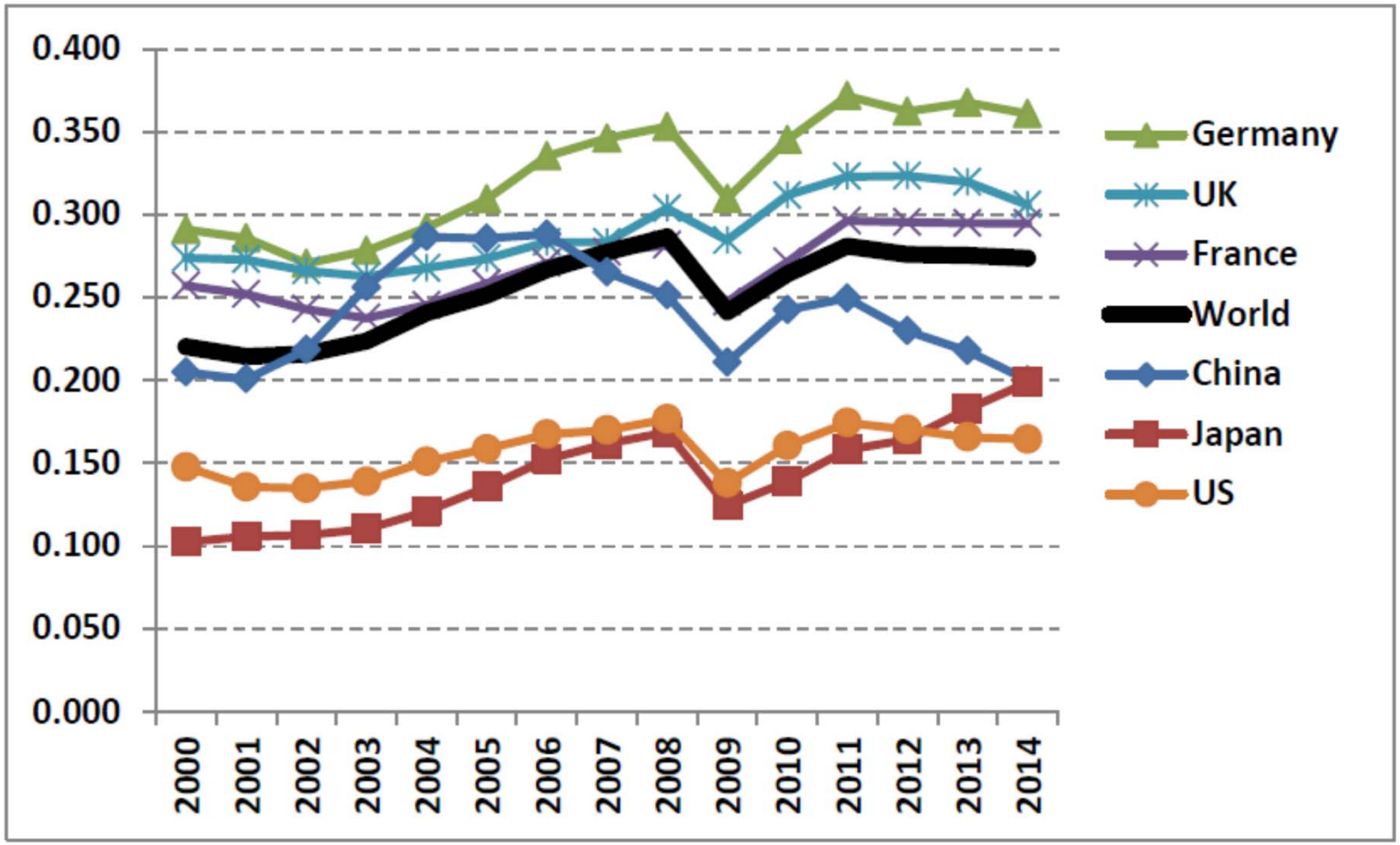
Differences in GIIs of final demand by country

Figure 11. Global import intensity of final demand by country



Note: in $ of global trade per $ of final demand

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Period averages

	00-08	08-11	11-14		(11-14) minus (00-08)
Annual growth of global imports (1)	11.4	3.8	1.4		-9.9
Annual growth of world GDP (2)	8.1	4.5	2.3		-5.8
Growth in global import intensity (3)	3.3	-0.7	-0.9		-4.2
due to fragmentation (4)	1.7	0.2	-0.4		-2.1
due to change in final demand (5)	1.6	-0.8	-0.5		-2.1

*Note: Change in trade elasticity decomposed into contribution from change in GVC structure ƒ(Δ**A**, **F**) and change in FD structure ƒ(**A**, Δ**F**). Annual log-points change times 100, period averages.*

FINDING 1 Global trade recovered after great trade collapse, but elasticity stagnant since 2011.

FINDING 2 Decline in global import intensity is equally due to changes in GVC structure as to changes in FD structure

Main findings

Main findings:

- Decline in growth of global import intensities about equally strongly driven by changes in the GVC structure of production processes and changes in the structure of final demand.

Peak Trade?

- Still opportunities for much more international production fragmentation (Baldwin), but will these be used and remain (Brexit, Trump, disasters, robotization)?
- As long as China grows faster than the world average, this will have a downward effect on the global trade to GDP ratio.

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Data Issues and The Future

Future work:

- Use of WIOTs at constant prices, to isolate "real" effects from effects of changes in relative prices.

- Relaxing of assumption that all firms in a country-industry produce according to the same technology (heterogeneity due to differences between exporters/non-exporters, small firms/large firms, etc.; see work by OECD)

- Analyzing trade in activities rather than gross trade ('functional specialization'). Current efforts aimed at linking employment by occupation and industry data to World Input-Output Tables

- Spatial disaggregation of EU countries to study regional heterogeneity (e.g. analysis of effects of Brexit on Northern England)

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More on GVC approach and WIOD

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- Chen, W., B.Los, P. McCann, R. Ortega-Argiles, M. Thissen and F. van Oort (2017), **"The Great Continental Divide? Economic Exposure to Brexit in Regions and Countries on Both Sides of the Channel"**, *Papers in Regional Science*, forthcoming.