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New Measures of Trade and Global Value Chains

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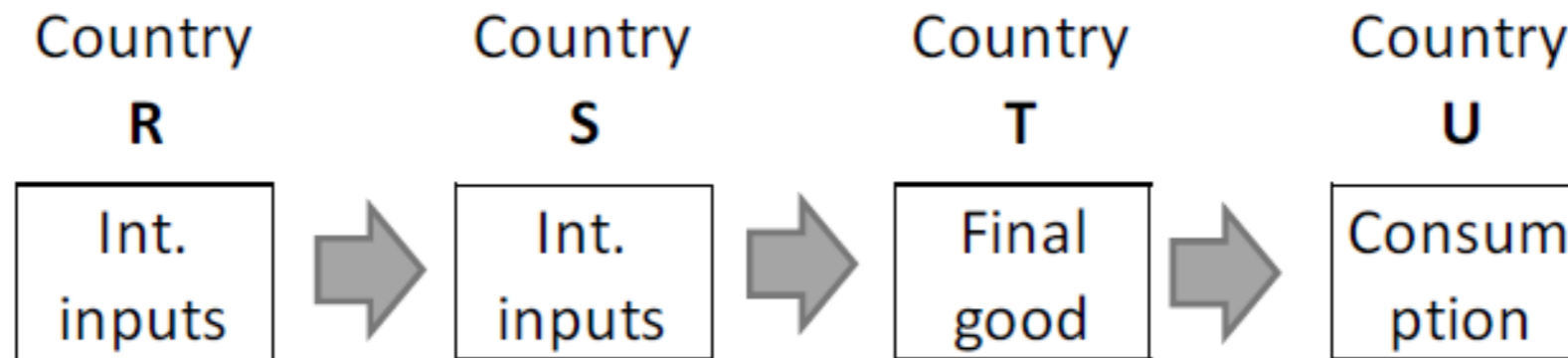
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Measuring Bilateral Exports of Value Added: A Unified Approach and Application

Bart Los and Marcel P. Timmer
(University of Groningen and ESCoE)



Definition *Trade dependence* of country R on country i is defined as: *value added* in country R related to demand in country i .

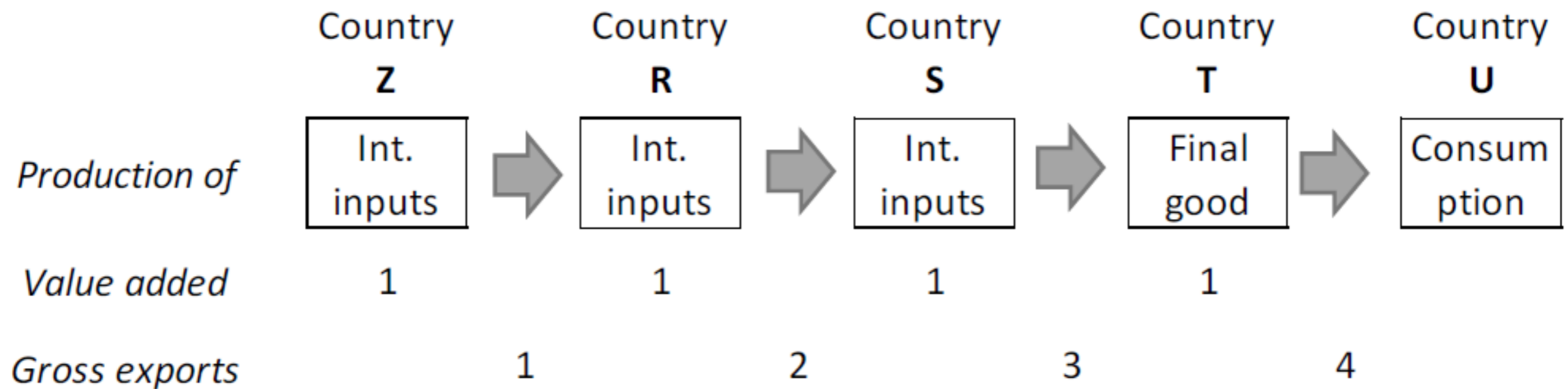


Context: world in which international production sharing is pervasive (Global Value Chains).

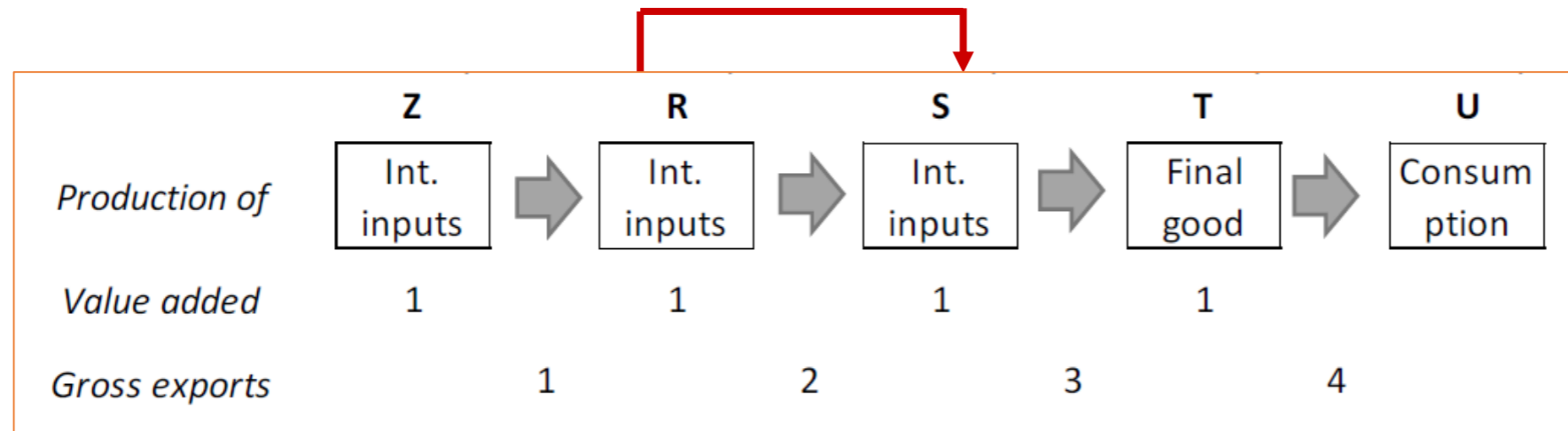
Measurement strategy Short run effect of closing down particular bilateral trade flows (through so-called hypothetical extraction in a Leontief demand driven model)



Figure 1 Example of sequential production chain

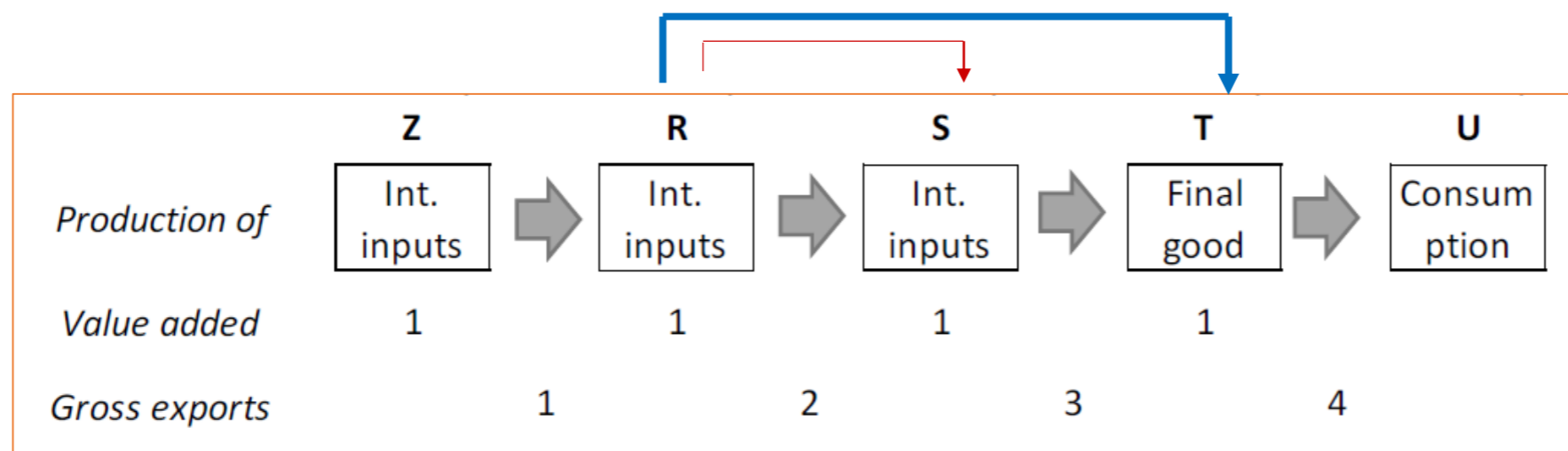


Note: This GVC is a “pure snake” (Baldwin and Venables, 2013, *JIE*), but validity of indicators does not depend on shape of GVCs



VAX-D: Value added exports for direct use.

How much GDP of *R* is related to exports to *S*?

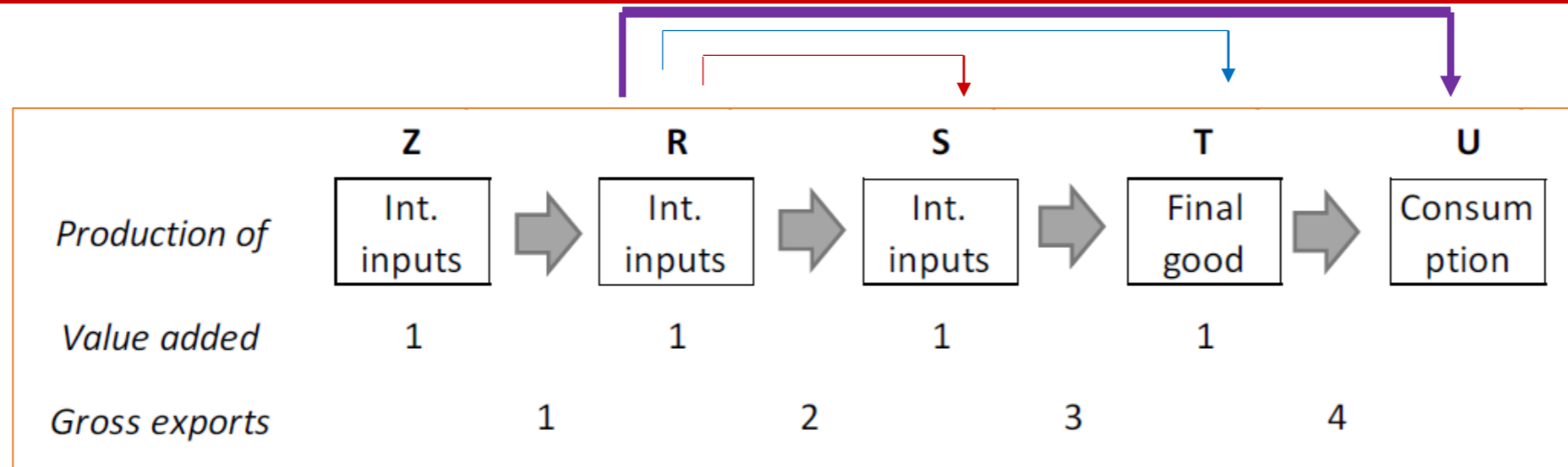


VAX-D: Value added exports for direct use

VAX-P: Value added exports for final stage production

How much GDP of *R* is related to *final output* produced in *T*?
(e.g. Blanchard et al., 2017, *NBER-WP*)

Note: These are non-direct exports



VAX-D: Value added exports for direct use

VAX-P: Value added exports for final stage production

VAX-C: Value added exports for consumption

How much GDP of *R* is related to final demand from *U*?

(e.g. collapse 2008/09 analysed in Bems et al., 2011, 2013)



Unified framework to measure exports of R to i

Hypothetical extraction method (Los et al., *AER*, 2016):

$$\mathbf{GDP}_R = \mathbf{v} (\mathbf{I} - \mathbf{A})^{-1} \mathbf{f}$$

with \mathbf{v} value added to gross output by industry, \mathbf{A} world input requirements matrix and \mathbf{f} world final demand vector

Compute **hypothetical GDP*** of R through extraction of a particular trade flows (of intermediates and/or final goods) involving country i ,

$$\mathbf{GDP}_R^* = \mathbf{v} (\mathbf{I} - \mathbf{A}^*)^{-1} \mathbf{f}^*$$

$$\mathbf{VAX}_{Ri} = \mathbf{GDP}_R - \mathbf{GDP}_R^*$$



Unified framework to measure exports of R to i

$$\text{GDP}_R^* = v (I - A^*)^{-1} f^*$$

- For **VAX-D**: set exports from R to i to zero in input coefficients matrix (\mathbf{A}) and in final demands matrix (\mathbf{f})
- For **VAX-P**: set final output sales of i to zero in \mathbf{f}
- For **VAX-C**: set final demand by i to zero in \mathbf{f}

NB This can be easily extended to answer questions like:
how much GDP of R goes to i through j



Partner countries for exports by the UK (in mil US\$, 2014)

	GX	VAX-D	VAX-P	VAX-C
United States	85,559	64,519	47,428	77,249
Germany	54,147	40,702	25,403	36,615
France	46,573	36,845	25,954	34,209
Ireland	34,477	27,275	13,478	14,828
China	27,405	19,194	18,140	29,480
Luxembourg	23,757	20,654	8,153	2,404
Netherlands	23,602	17,874	8,065	12,956

Source: Authors' computations based on WIOD, 2016 release



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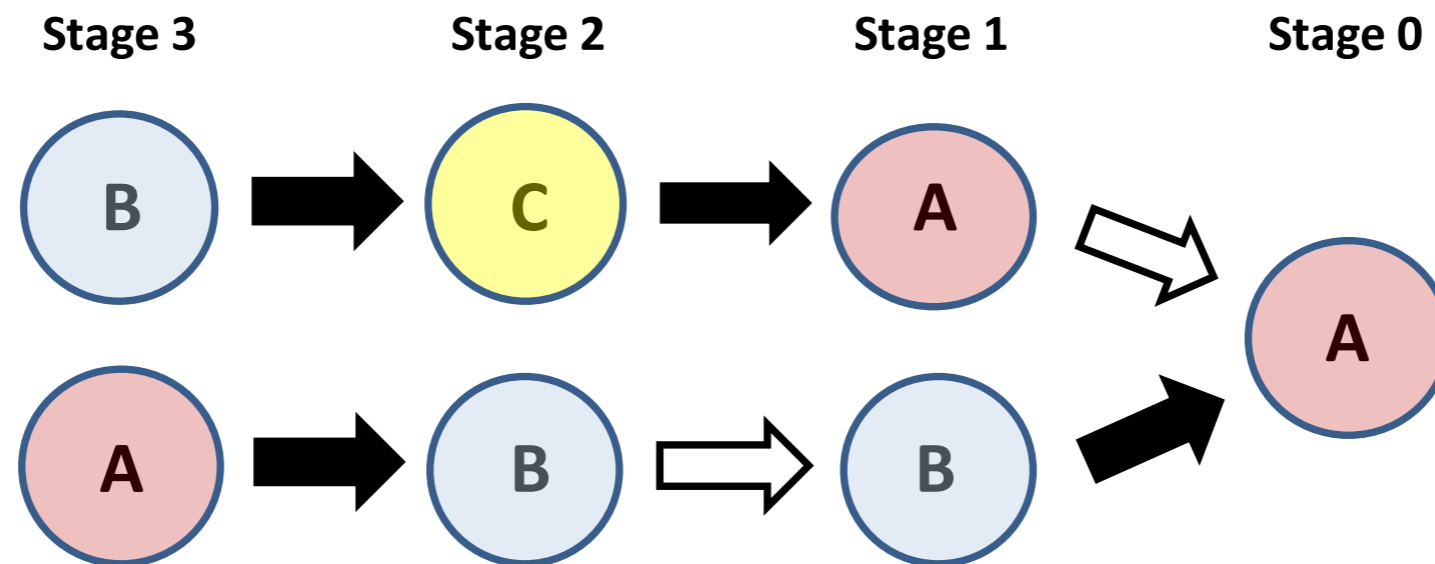
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International Production Fragmentation and the Global Trade Slowdown

Marcel Timmer (Groningen Growth and Development Centre,
University of Groningen) with Bart Los (UoG), Gaaitzen de
Vries (UoG) and Robert Stehrer (wiiw)



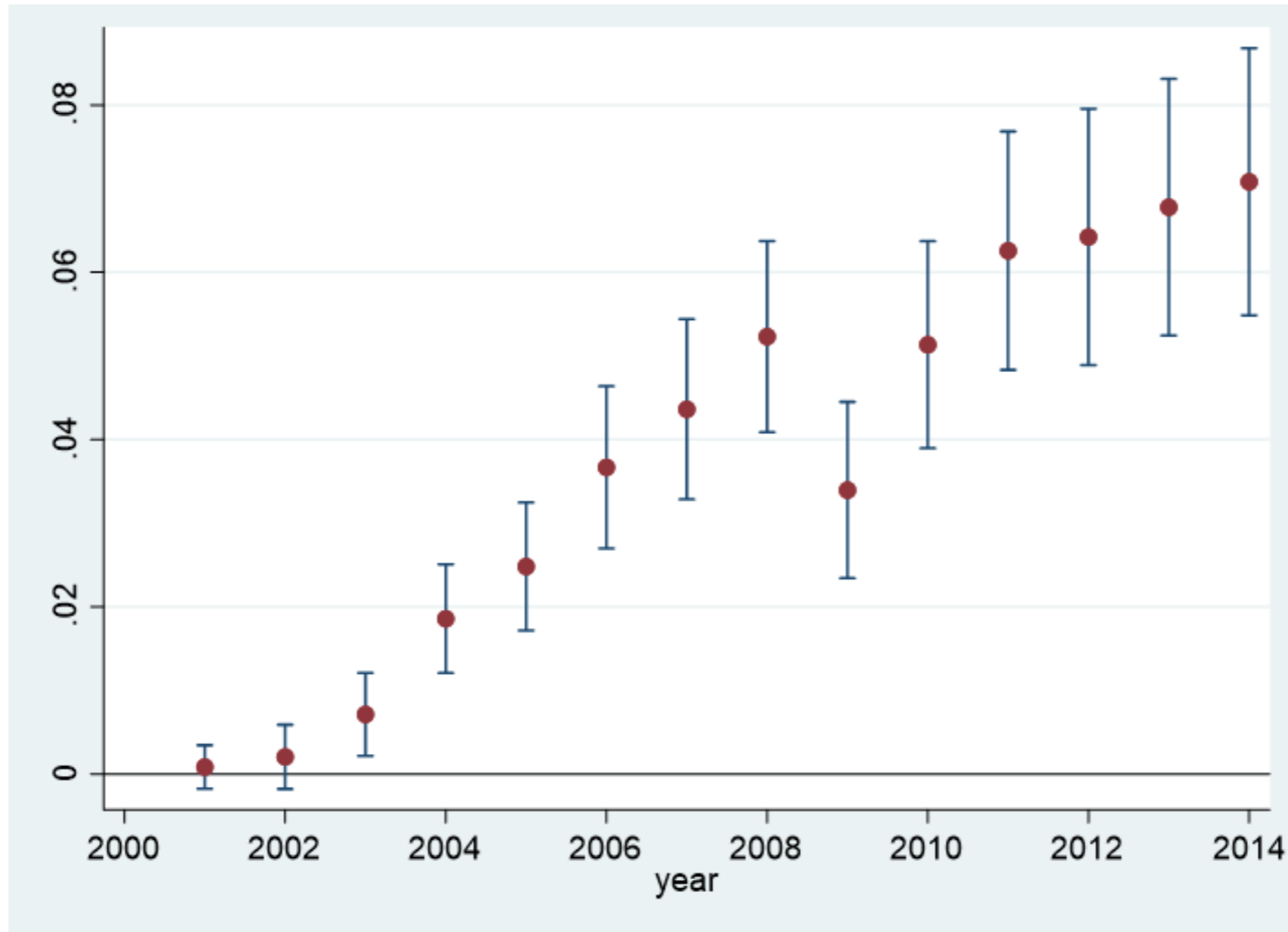
**The global import intensity (GII) of production:
all imports related to production of a final good**



Note: Black (white) arrows indicate import (domestic) flows.



Changes in global import intensity (GII) of production



Note: Results for coefficients on year dummies (relative to 2000) in a regression of global import intensities (GII) of production in 271 GVCs with country-industry pair fixed effects. Dots indicate the point estimates and bars the 95 per cent confidence intervals based on two-way clustering by country and industry of finalisation. GIIs are measured in constant 2000 prices with chained Laspeyres volume indices as in equation (5).



Table 3 Decomposition of import elasticity of global GDP

	2000- 2008	2008- 2014	Change
(1) Unitary elasticity	1	1	
(2) Effect of international production fragmentation (IPF)	0.469	0.202	-0.267
(3) Effect of global final demand composition	0.715	-0.001	-0.717
(4) <i>Change in product mix (DC1)</i>	<i>0.403</i>	<i>-0.014</i>	<i>-0.417</i>
(5) <i>Change in country mix (DC2)</i>	<i>0.312</i>	<i>0.013</i>	<i>-0.300</i>
(6) Import elasticity of global GDP	2.184	1.200	-0.984

Based on method outlined in Timmer, M.P., B. Los, R. Stehrer and G.J. de Vries (2016), “An Anatomy of the Global Trade Slowdown based on the WIOD 2016 Release”, GGDC research memorandum number 162, University of Groningen.



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