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Session IV: Measurement in a World of Globalized Production

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First and second generation statistics as discussed by Rob Feenstra. Note that these statistics have the country as unit of observation and consider one stage of production.

This discussion introduces **third generation** statistics that consider all stages of production. Also known as global value chain (GVC) statistics.

These take final products as observation. Two examples:

1. Measuring **international production fragmentation**.

Application: its effects on the global trade slowdown.

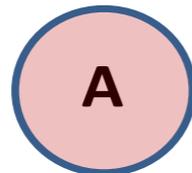
2. Measuring the **factor content of GVC production**.

Application: disentangling the effects of offshoring and (biased) technological change on local labor demand.

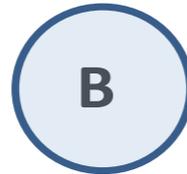


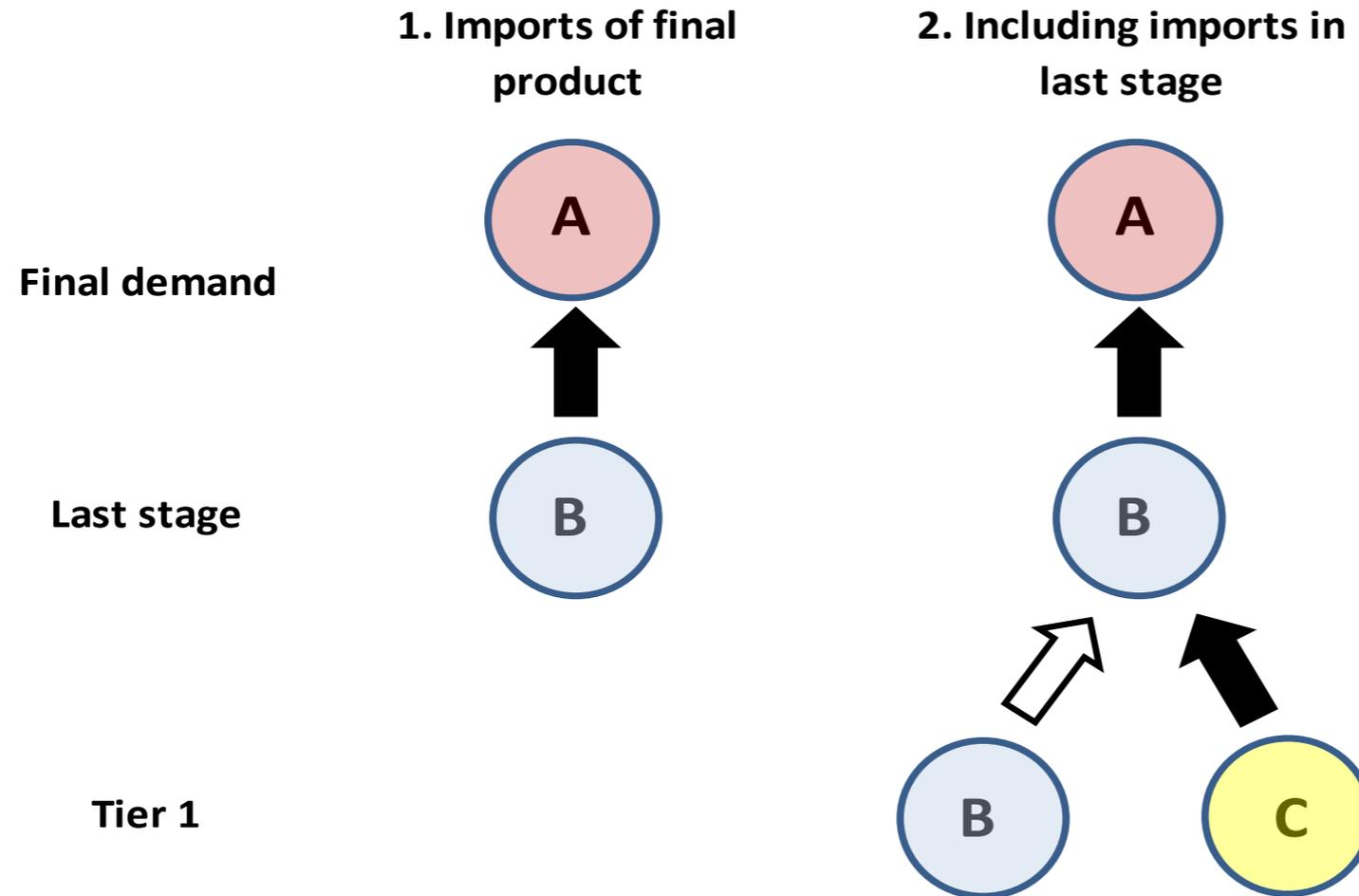
1. Imports of final product

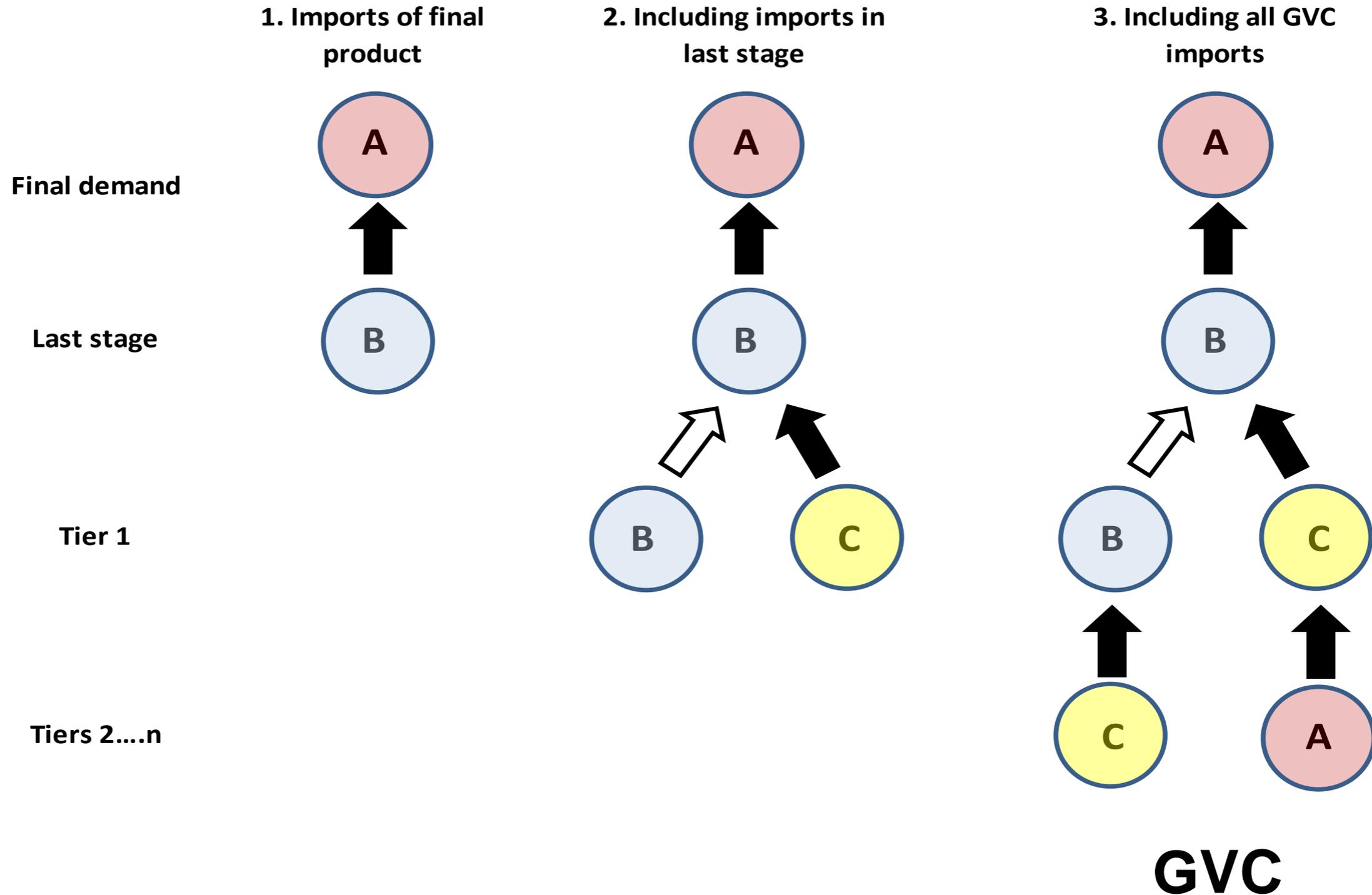
Final demand



Last stage









Challenges in measurement

- GVCs cannot be directly observed
- Firm-level (or transaction level) data will only provide information on one stage of production.
- Need for synthetic statistics based on integration of various statistical data sources

Current data initiatives create world (or global) input-output tables, using combinations of:

- National Supply and Use (Input-Output) Tables
- International trade statistics (Bilateral)



World Input-Output Database, Release November 2016.
Publicly available at www.wiod.org.

World input-output tables (plus underlying data) for

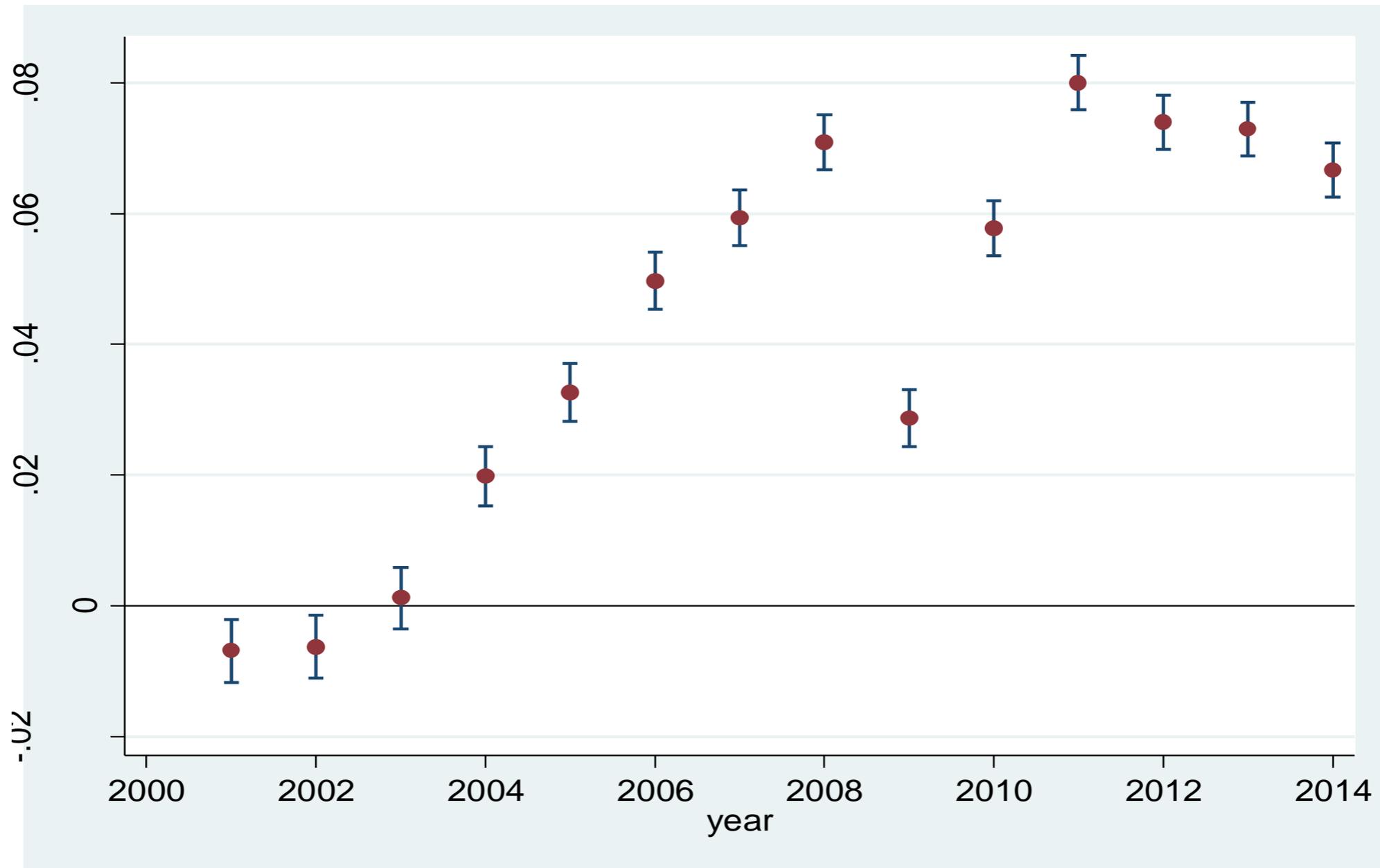
- 43 countries (85% of world GDP), plus Rest-of-World region
- 59 industries in ISIC rev.4
- Annual series for 2000-2014
- Based on SNA08 information for most countries



- Starting point: a final product identified by “country-industry of finalization”. This is the country-industry where the last stage of production takes place (before being sold to final user), e.g. the GVC production of cars finalised in Germany.
- To analyse all stages of production additional assumptions are needed, namely that the production technology of an industry is the same for all its final products (“homogeneous technology”).
- In that case a recursive method can be used (known as “Leontief inverse”)



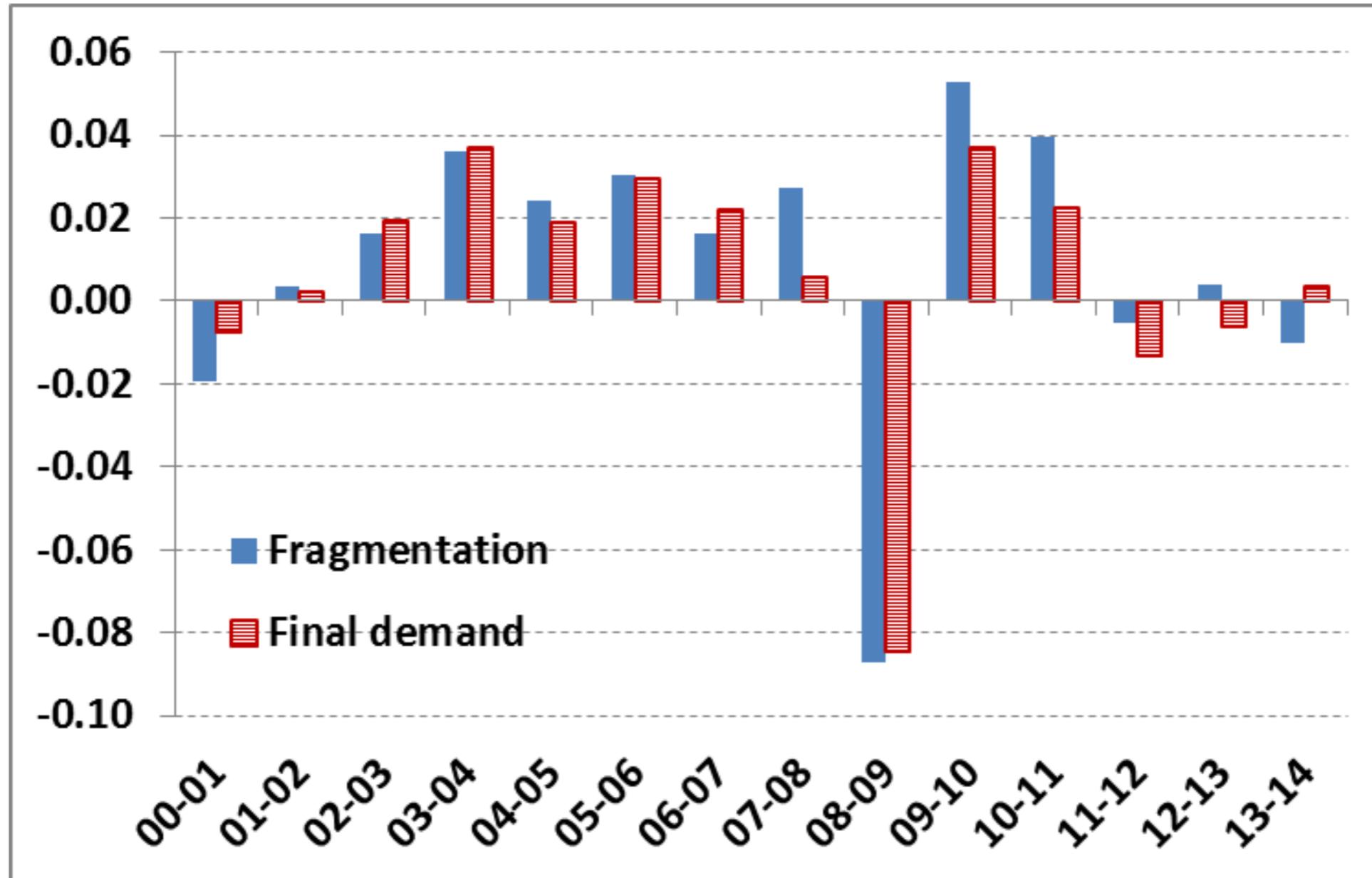
EXAMPLE 1 Measuring international fragmentation of goods production. New finding: Stagnation since 2011



Notes: Based on regression of global import intensities of production of 836 final goods on dummies for country-industry of last stage and years. The figure provides estimated coefficients and 95 percent confidence intervals for the year dummies relative to 2000. Source: Timmer, Los, Stehrer and de Vries (2016).



Stagnation in fragmentation accounts for half of the global trade slowdown

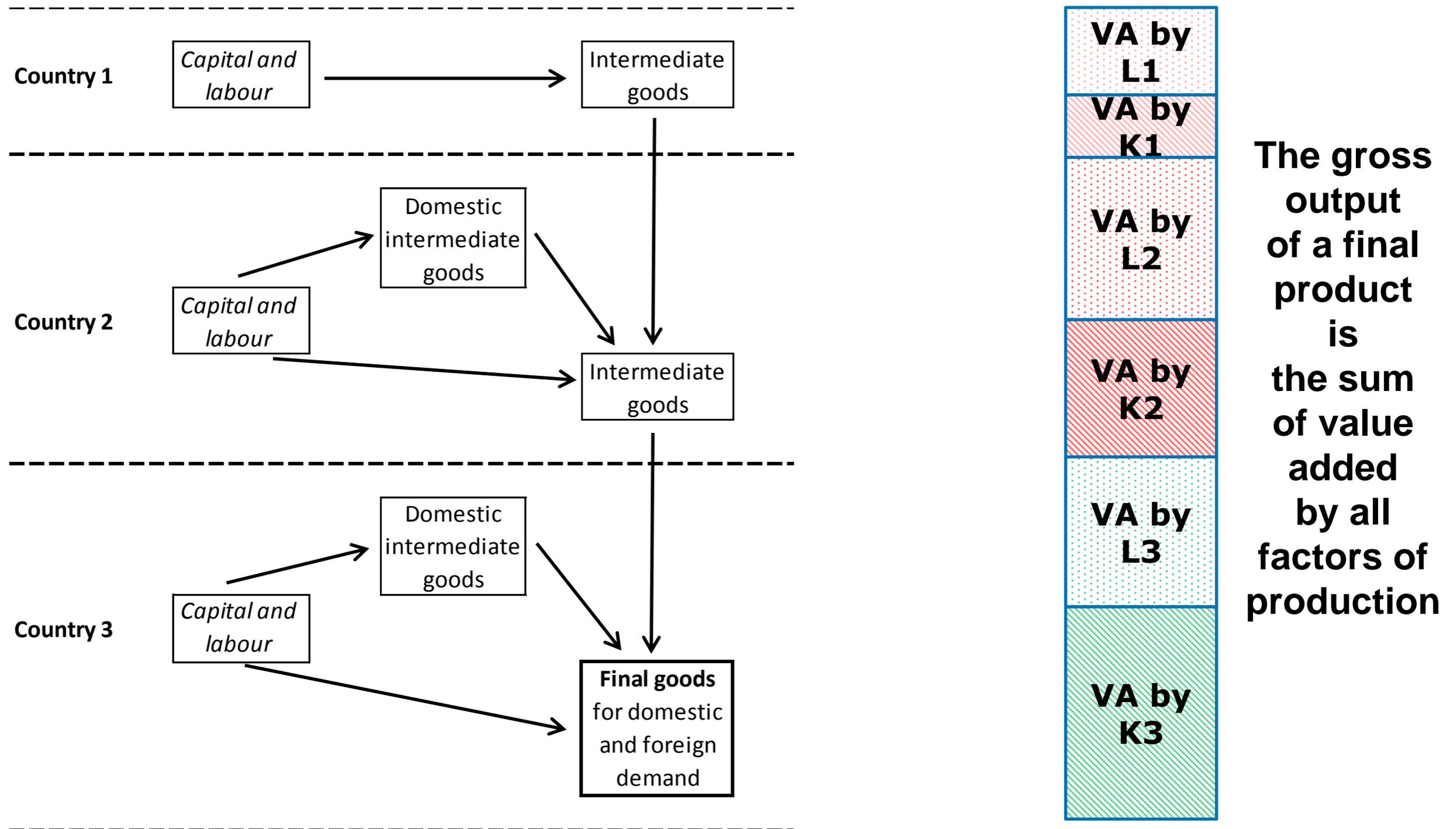


Notes: Annual change (log points) in global import intensity on vertical axis. Decomposed into contribution from change in international fragmentation of final products, and change in structure of demand for final products.



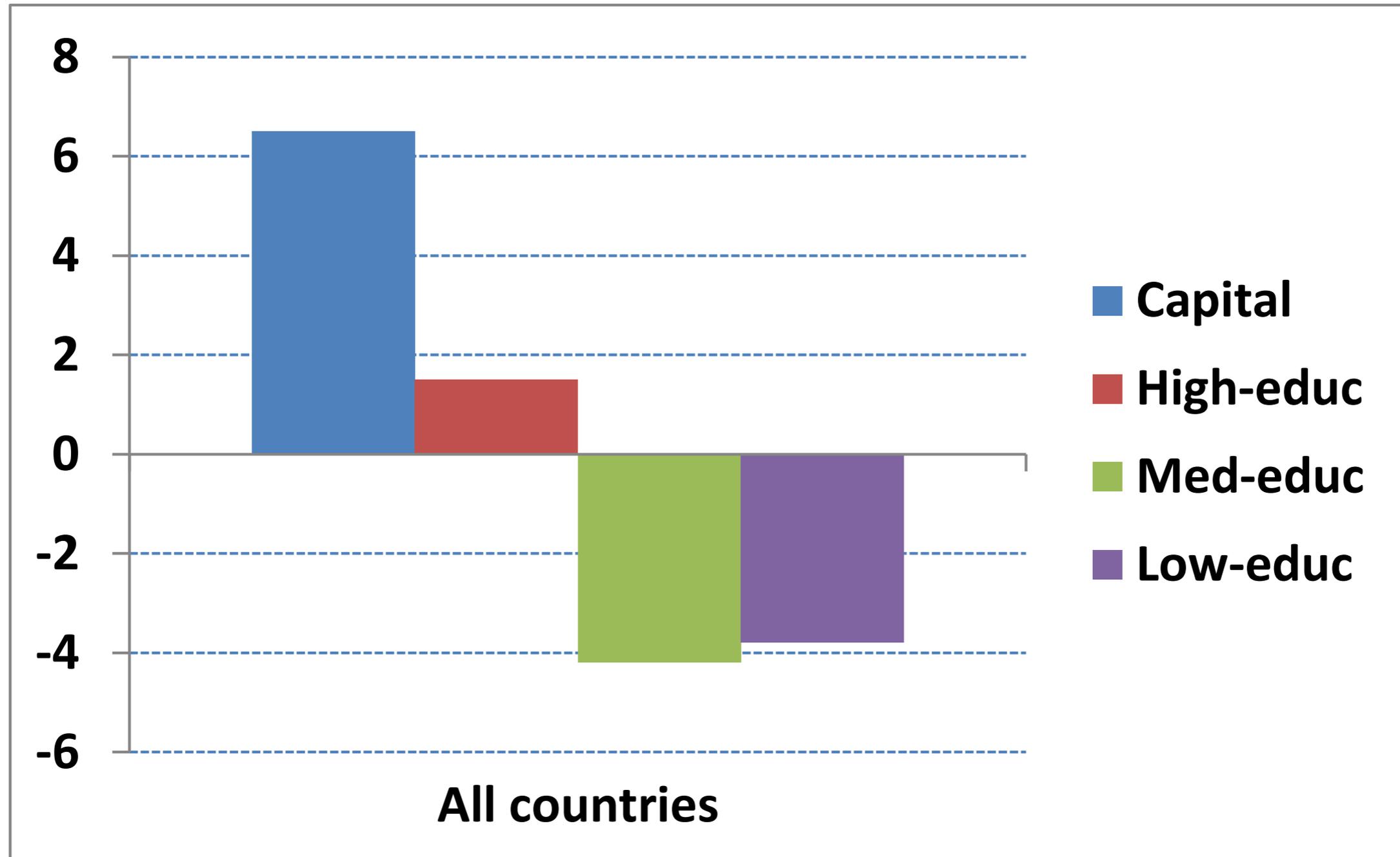
EXAMPLE 2

The factor content of GVCs





The change in factor content of GVCs of goods (1995-2008)



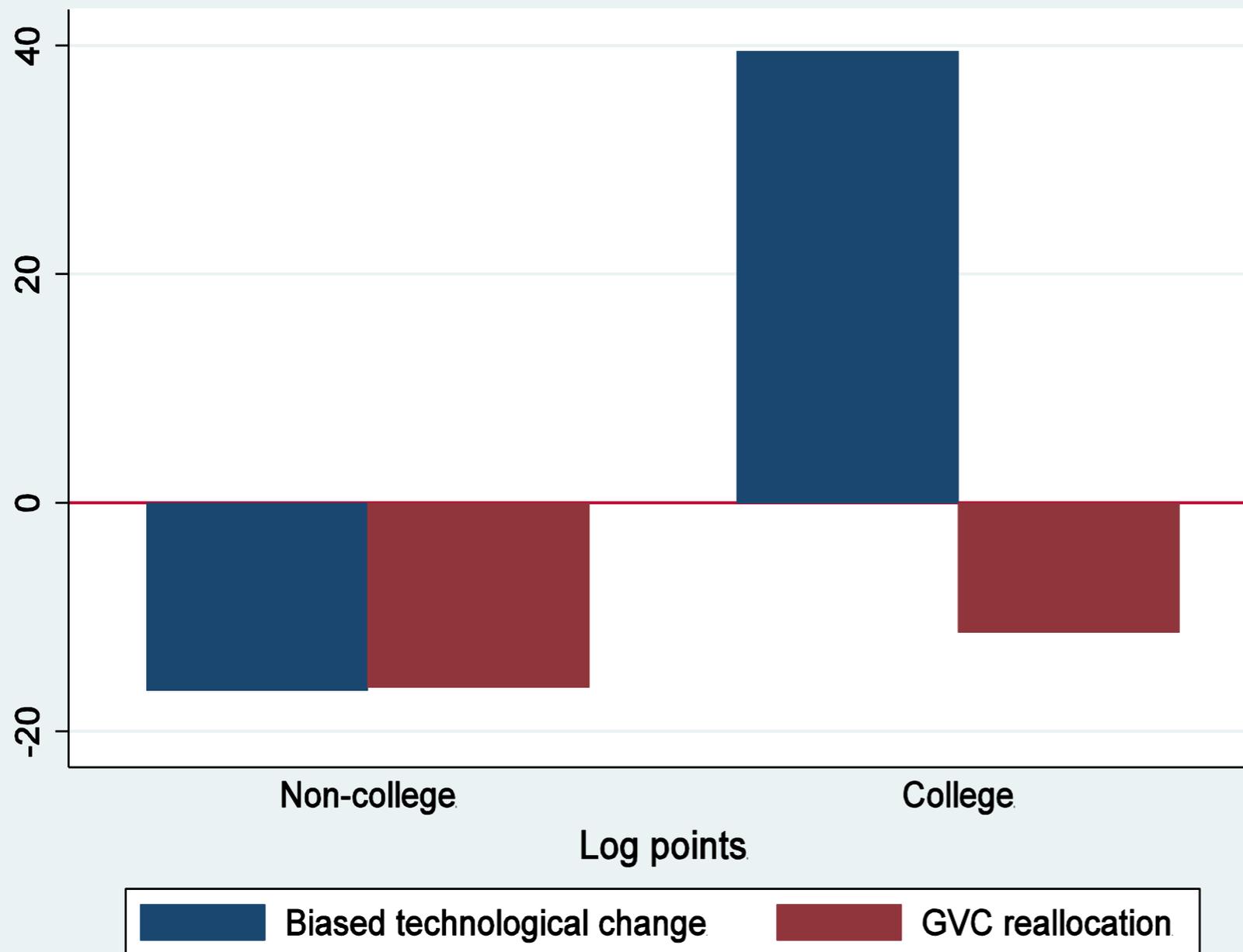
Note: Percentage change in factor income shares in 560 global value chains of manufactures, by region. Source: Timmer et al. (2014, Table 3) based on WIOD release 2013.



- Are factor shares changes in GVC production driven by biases in technical change?
- Reijnders, Timmer and Ye (2016) show how biased technical change can be identified by studying global value chains that include all stages of production, both at home and abroad.
- Study 291 GVCs of manufacturing goods finalised in advanced countries for the period 1995-2007
- They find that technical change has been:
 - strongly biased against less-skilled workers, and
 - in favour of high-skilled labour and capital.



Simulation of change in GVC employment in advanced countries



Notes: Change in hours worked for workers due to task reallocation, change in task prices and biased technological change in 291 GVCs of manufacturing products. Based on imputing the actual change in the period 1995-2007 for one element, while keeping the other elements constant at the 1995 levels. Using estimated task substitution elasticities and biases in technological change in GVCs from baseline regression. Unweighted average across 21 advanced countries. Source: Reijnders, Timmer and Ye (2016).



- Third generation (GVC) statistics are promising, but highly data-intensive.
- Require embedding in international statistical system.
 - UN/OECD/Eurostat (SEIGA) initiative Handbook “Accounting for Global Value Chains: A System of Extended National Accounts and Integrated Business Statistics”
- Require international organisation as “producer”
- Future useful extensions may include linking up with more detailed labor statistics (e.g. characteristics of jobs)



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- Los, Bart, Robert Stehrer, Marcel P. Timmer and Gaaitzen J. De Vries (2016), "Peak trade? An Anatomy of the Global Trade Slowdown", GGDC Research memorandum Nr. 162, Groningen Growth and Development Centre.
- Reijnders, L S M, M P Timmer, and X Ye (2016), "Offshoring, Biased Technical Change and Labour Demand: New Evidence from Global Value Chains", GGDC Research memorandum no. 164.