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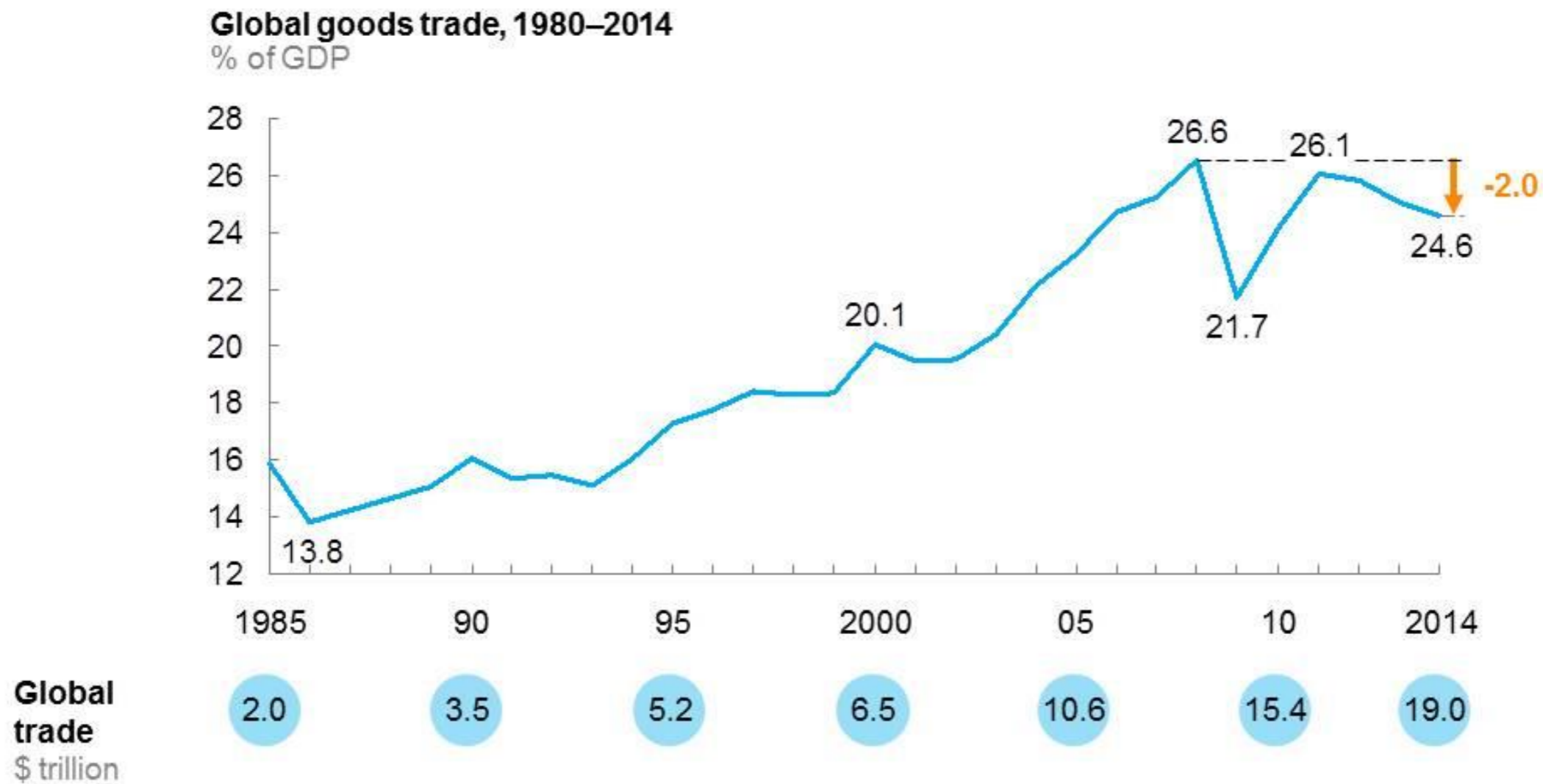
Peak trade? An Anatomy of the Recent Global Trade Slowdown

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End of an era? Global trade is shrinking compared to world GDP





Structure of final demand in terms of:

- product mix (Engel effects, e.g. goods vs services; and type of product, e.g. consumption versus investment goods)
- consuming countries (e.g. EU versus China, including home market effect)
- Method: long-run and short-run effects in a dynamic panel data on final demand elements
- (see also e.g. Bussiere et al. (2011, *AEJ_Macro*), Boz et al. (2015, in *VoxEU* e-book edited by Hoekman); ECB (2015, *Economic Bulletin*); Ollivaud and Schweltnus (2015, OECD WP), Constantinescu et al., 2015, IMF).



- International fragmentation of production processes is still far from complete (Baldwin & Lopez-Gonzalez, 2015, *WorldEcon*; Los, Timmer & de Vries, 2015, *JRegSci*)
- Less international fragmentation of production processes,
 - as a consequence of more protection (Evenett & Fritz, 2015, in Hoekman ed.),
 - increasing domestic capabilities (e.g. in China (Kee and Tang, 2014), reshoring and labour saving innovations.
 - Trade financing constraints
- Method: product trade data, firm-level data



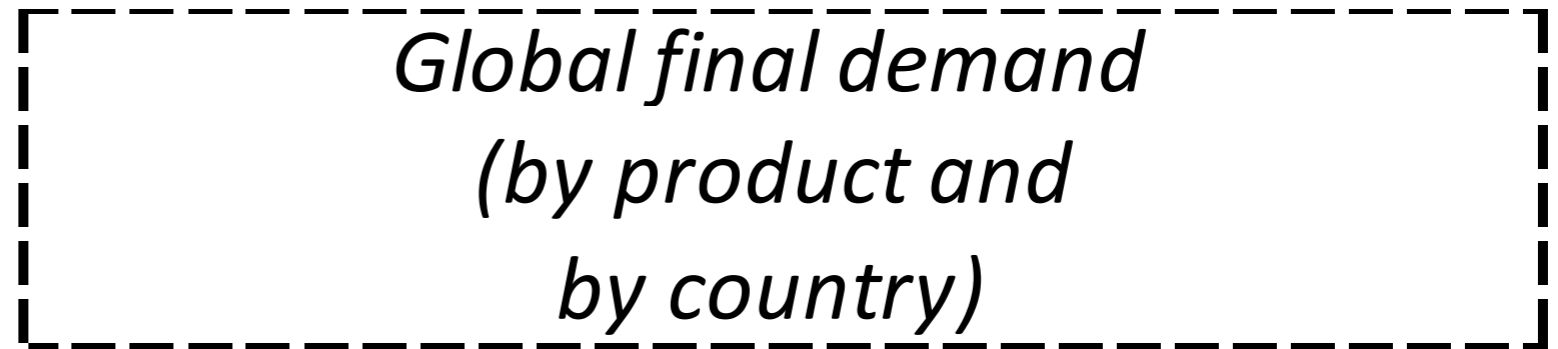
Methodological: new ex-post accounting framework of changes in international trade, including structure of final demand and production in one coherent global modeling framework;

Empirical: Using updated WIOT (2000-2014) to account for changes in global trade elasticity;

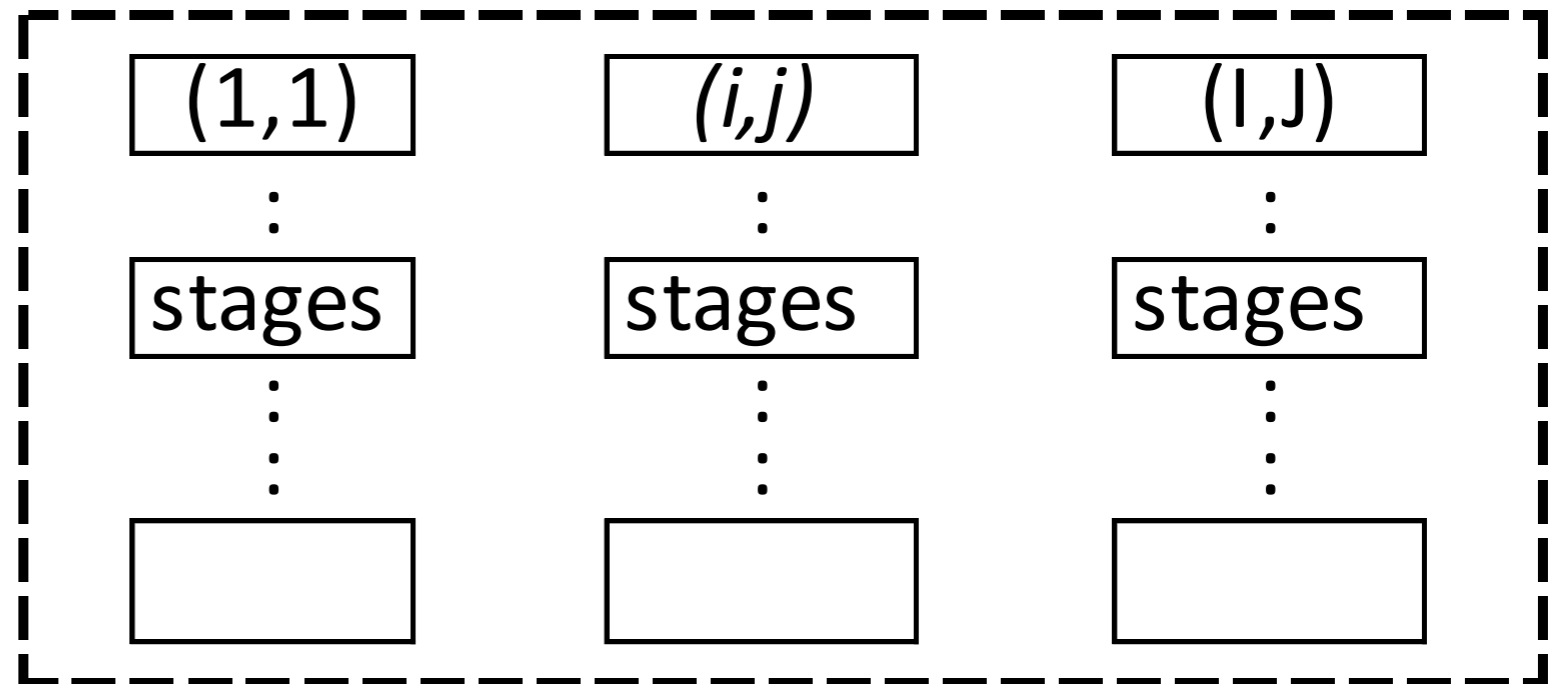
The analysis borrows from Leontief's classic contributions and is closely related to Johnson & Noguera (2012, *JIntEc*), Bussiere et al. (2011, *AEJ_Macro*), Bems et al. (2013, *AnnRevEc*), Nagengast & Stehrer (2016, *RIntEc*), and Los et al. (2015, *JRegSc*)



**Structure of
 global final
 demand**



**Structure of
 global production
 system (product i
 finalised in
 country j)**





Accounting identity:

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

with m as imports,

y as global GDP,

\mathbf{F} the structure of global demand (in terms of products and countries).

\mathbf{A} the structure of global production (in terms of intermediate input structures)

We will decompose change in global trade elasticity (m/y) into change in global production structure and change in global demand structure



Change in m/y can be decomposed into effects of change in global production structure (change in \mathbf{A}) and effects of change in global demand structure (change in \mathbf{F})

$$\Delta(m/y) = f(\Delta\mathbf{A}, \mathbf{F}_0) + f(\mathbf{A}_1, \Delta\mathbf{F})$$

or

$$= f(\Delta\mathbf{A}, \mathbf{F}_1) + f(\mathbf{A}_0, \Delta\mathbf{F})$$

We take geometric average of the two polar alternatives.

These decompositions can be calculated based on information on inter-industry and inter-country flows as given in a world input-output table



Gross output related to world GDP is $(\mathbf{I}-\mathbf{A}_1)^{-1}(\mathbf{F}_1\mathbf{u})$

with \mathbf{u} a summation vector and \mathbf{F}_1 the structure of global demand in terms of products and countries.

Intermediate inputs needed to produce global final demand:

$$\mathbf{A}_1(\mathbf{I}-\mathbf{A}_1)^{-1}(\mathbf{F}_1\mathbf{u})$$

Global trade (m) is sum of trade in intermediates and final:

$$m_1 = \mathbf{u}' [\mathbf{I}^{int} \circ \{\mathbf{A}_1(\mathbf{I}-\mathbf{A}_1)^{-1}(\mathbf{F}_1\mathbf{u})\} + \mathbf{I}^{int} \circ \mathbf{F}_1] \mathbf{u}$$

with \mathbf{I}^{int} is a matrix with zeroes in the diagonal blocks and ones in off-diagonal blocks such that domestic trade flows are excluded

(\circ stands for element-wise multiplication)



		Country A Intermediate use <i>Industry</i>	Country B Intermediate use <i>Industry</i>	Rest of World Intermediate use <i>Industry</i>	Country A Final domestic use	Country B Final domestic use	Rest of World Final domestic use	Total
Country A	<i>Industry</i>	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	<i>Industry</i>	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)	<i>Industry</i>	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				

Intermediate input requirements dollar of gross output (both imported and sourced domestically) can be computed, yields matrix **A**.



		Country A Intermediate use <i>Industry</i>	Country B Intermediate use <i>Industry</i>	Rest of World Intermediate use <i>Industry</i>	Country A Final domestic use	Country B Final domestic use	Rest of World Final domestic use	Total
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Rest of World (RoW)	<i>Industry</i>	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				

Using proportionality assumptions and matrix **A**, intermediate input demand can be attributed to various parts of final demand. For example: Which parts of the non-green blocks can be attributed to final demand exerted by Country A?

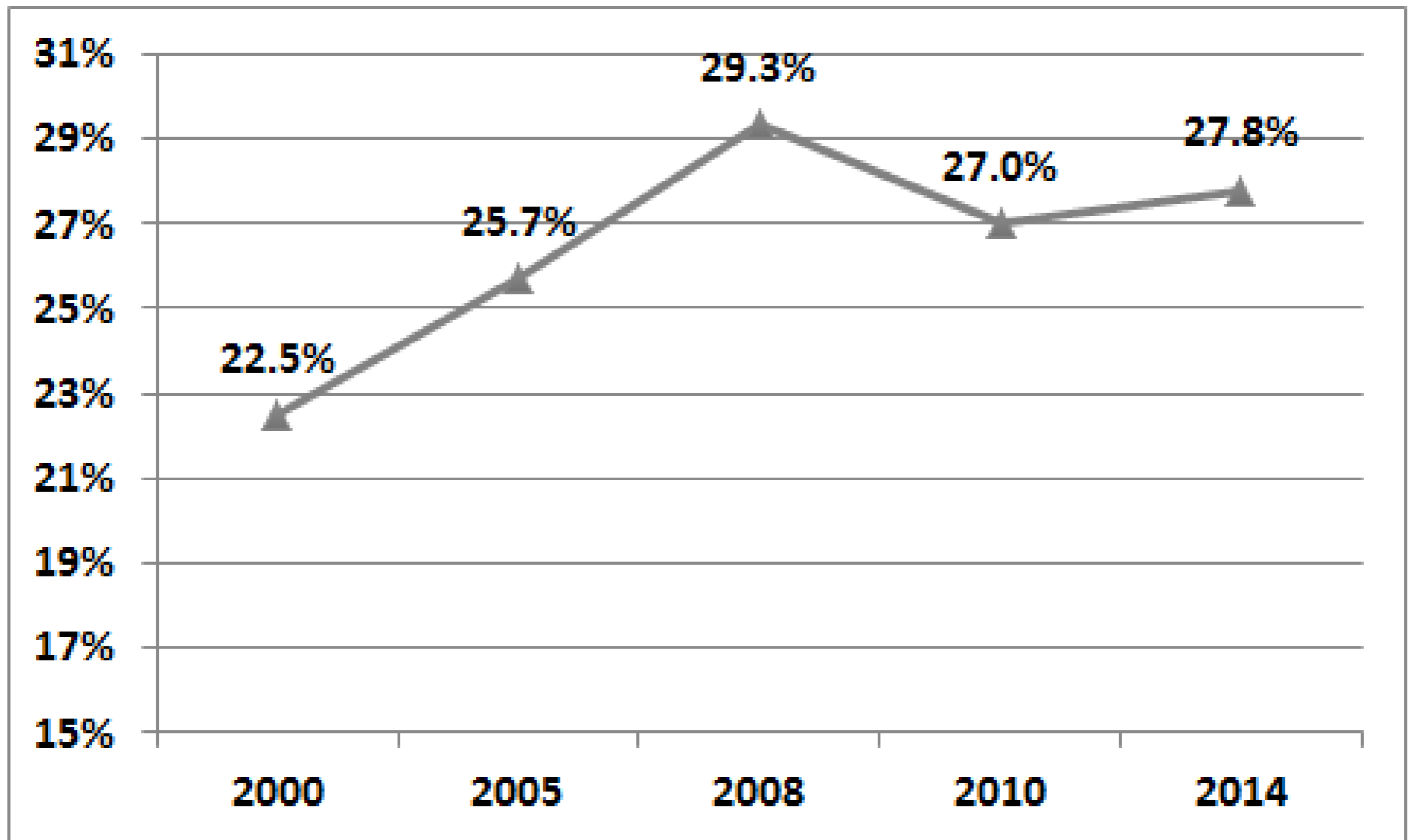


World Input-Output Database (see Timmer et al., 2015, *RIntEc*), updated (preliminary!)

- 43 countries (85% of world GDP), plus RoW (*Norway, Switzerland and Croatia added compared to old*)
- 59 industries (*35 in old, isic rev 4*)
- 2000-2014 (*1995-2011 in old version*)
- Based on SNA08 information for most countries (*SNA93 in old version*)
- Tables in current prices, currency conversions based on market exchange rates

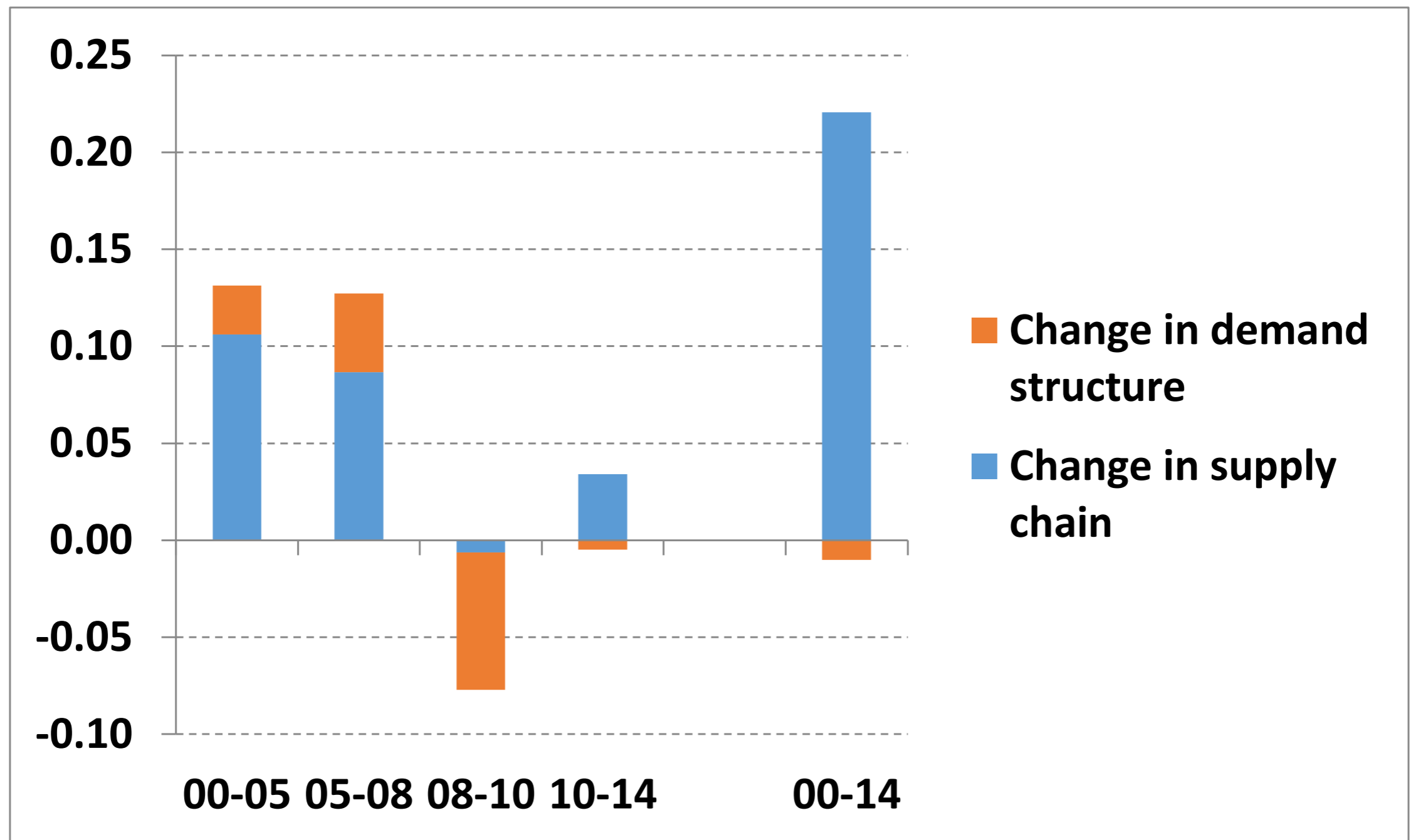


Trade in goods and services (as percentage of global GDP)





Change in Trade to world-GDP ratio (log-change), 2000-2014 and sub-periods

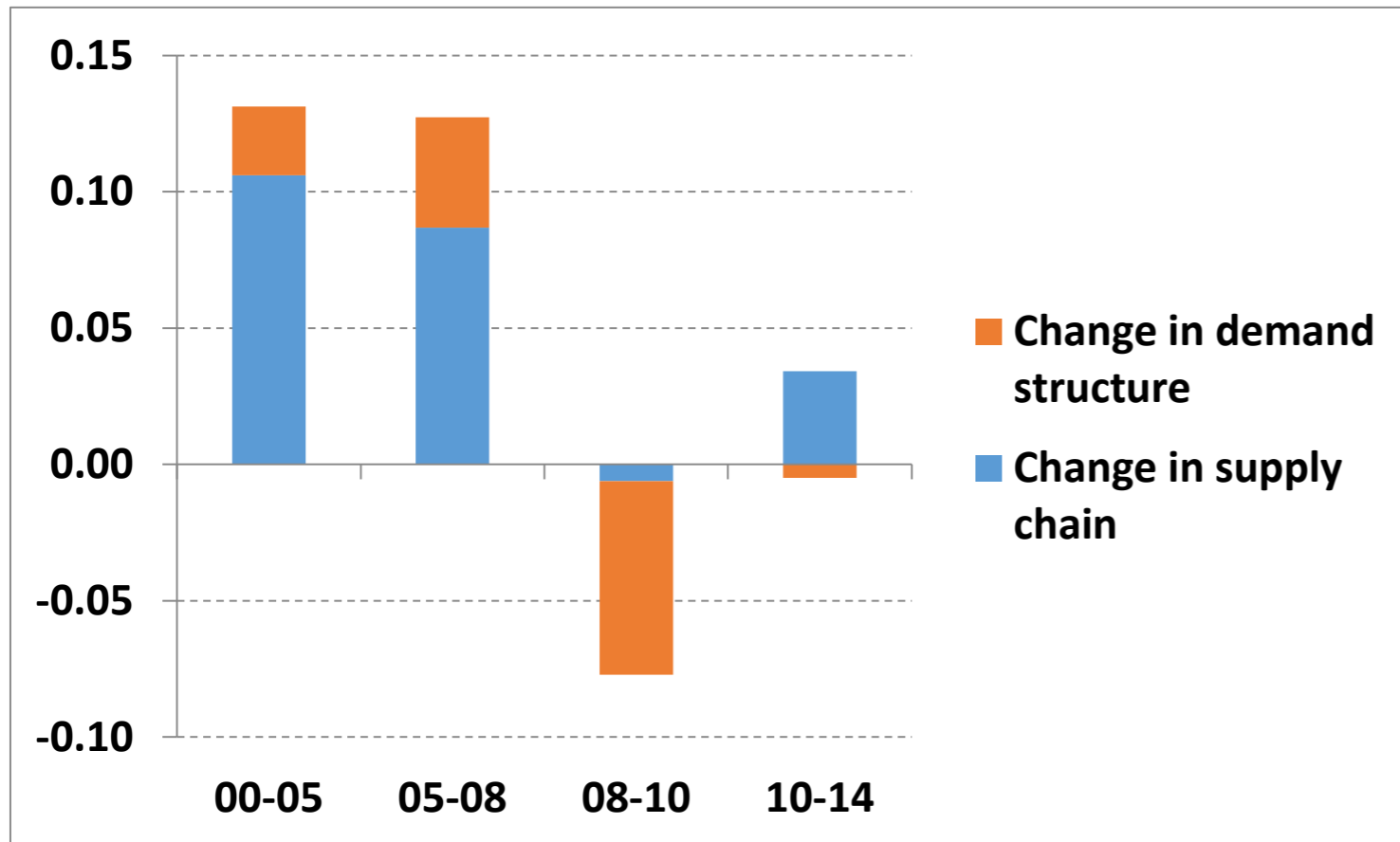




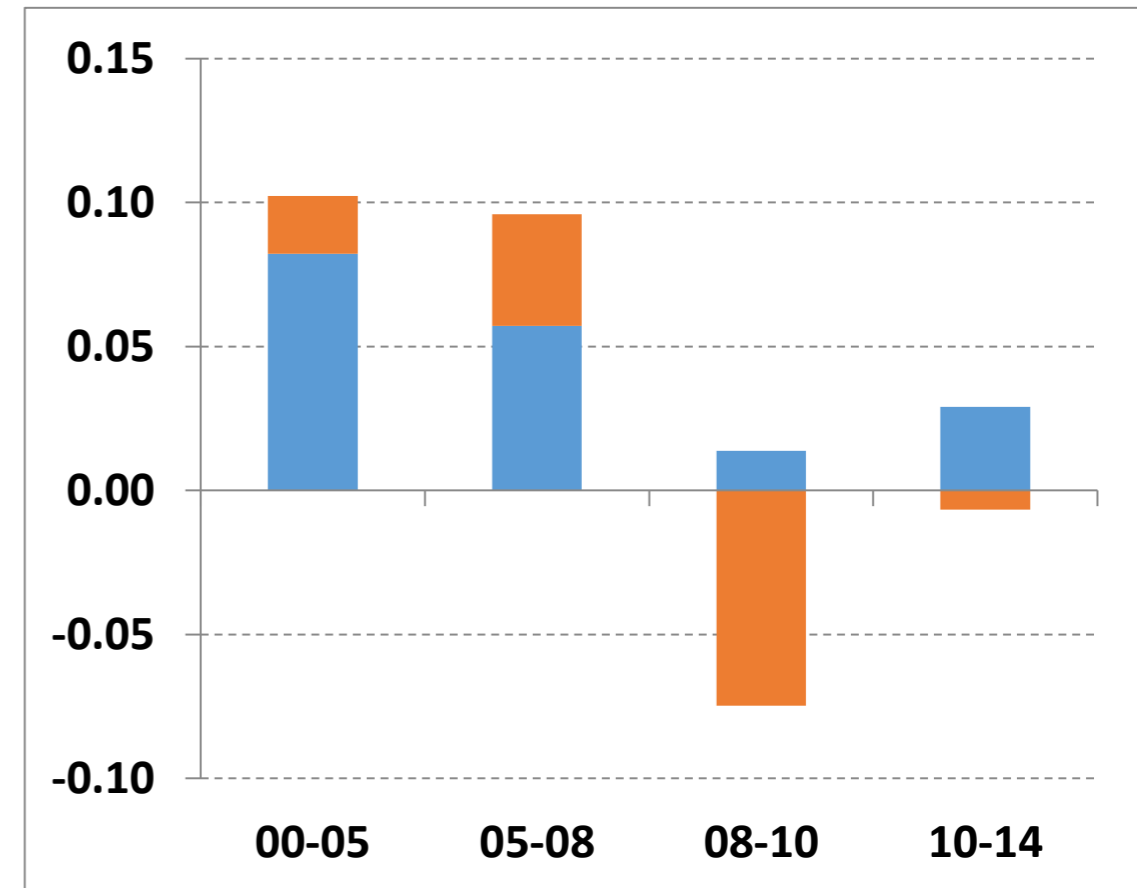
- So far analysis in nominal trade and GDP values (US\$). Part of the changes in trade elasticity might be due to changes in prices of traded products relative to world GDP prices.
- Ideally done on basis of constant price tables (to be constructed).
- As a prelim shortcut we do same analysis, but now excluding trade of products from the industries *Mining* and *Refined petroleum* (about 13% of global trade in 2014)



Change in Trade to world GDP ratio (log-change), sub-periods



***Including
trade in raw materials***



***Excluding
trade in raw materials***



Additionally, global final demand structure can be decomposed:

$$\mathbf{F} = (\mathbf{F}^{PM} \circ \mathbf{F}^{CWD})\mathbf{y}$$

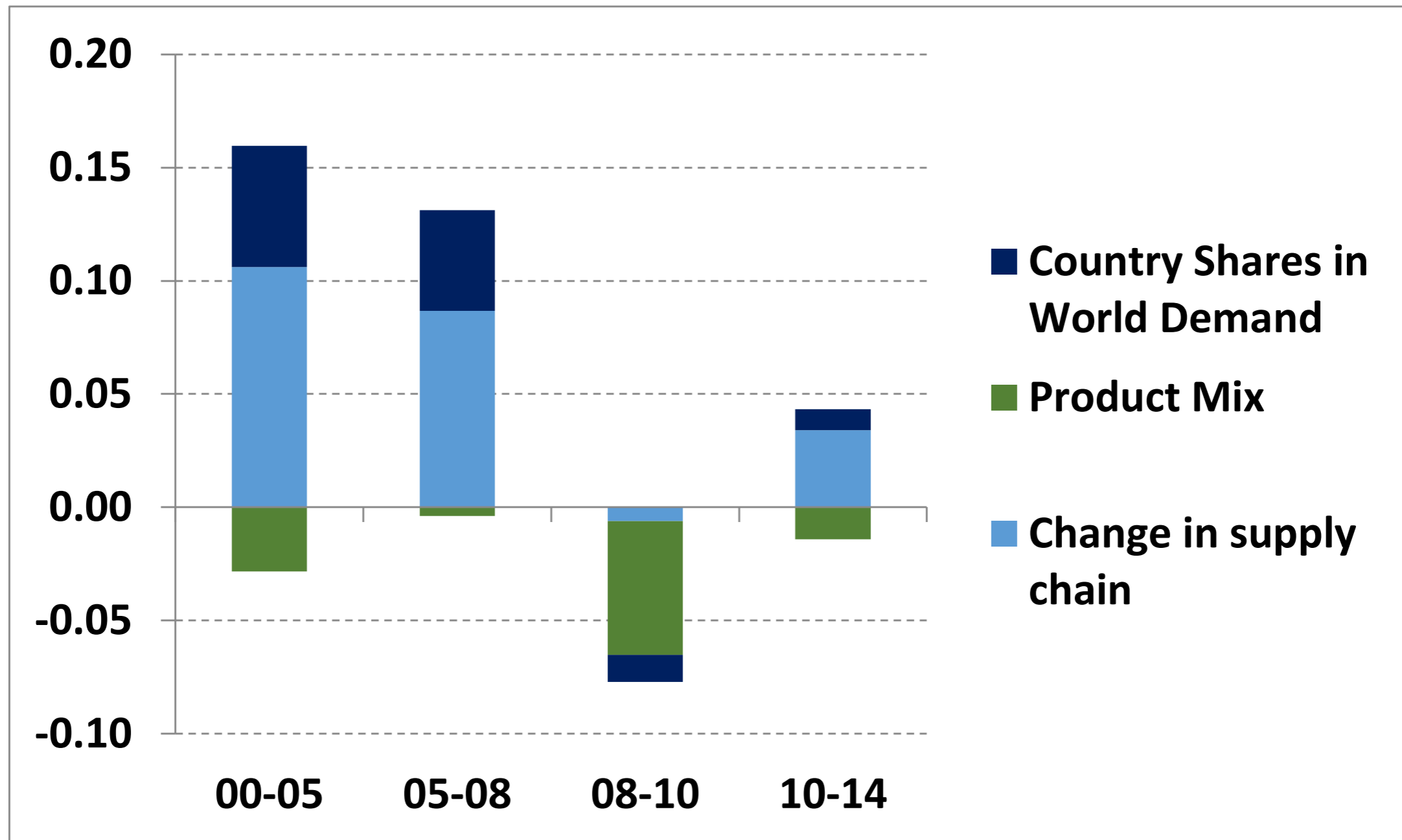
Such that changes in structure of global demand can be decomposed in changes in:

\mathbf{F}^{CWD} : countries' shares in world GDP

\mathbf{F}^{PM} : product mix (within countries)



Decomposition of change in Trade to world GDP ratio (log-change, sub-periods 2000-2014)





- New ex-post accounting framework of changes in global trade elasticity (imports over global GDP)
- Global trade elasticity is recovering after GTC
- International fragmentation of production is on-going
- Effect of changes in structure of global demand is relatively minor. But consists of various counteracting elements:
 - Shift towards consumption of services contributes to decrease
 - Shift towards demand from emerging markets contributes to increase
- *Note: all conclusions are preliminary and need verification with annual data, and with constant price series.*