Peak trade?
An Anatomy of the Recent Global Trade Slowdown

Bart Los and Marcel Timmer (University of Groningen) with Robert Stehrer and Gaaitzen de Vries

World KLEMS meeting, Madrid, May 22, 2016
End of an era? Global trade is shrinking compared to world GDP

Global goods trade, 1980–2014
% of GDP

SOURCE: UNCTAD; McKinsey Global Institute analysis
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

• 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;

Model Set up

Structure of global final demand

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

Global final demand (by product and by country)

\[
\begin{align*}
(1,1) & \quad (i,j) & \quad (I,J) \\
\vdots & \quad \vdots & \quad \vdots \\
\text{stages} & \quad \text{stages} & \quad \text{stages} \\
\vdots & \quad \vdots & \quad \vdots \\
\end{align*}
\]
Accounting identity:

\[ m = y \cdot f(A, F) \]

with \( m \) as imports,
\( y \) as global GDP,
\( F \) the structure of global demand (in terms of products and countries).
\( A \) 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 $A$) and effects of change in global demand structure (change in $F$

$$\Delta(m/y) = f(\Delta A, F_0) + f(A_1, \Delta F)$$

or

$$= f(\Delta A, F_1) + f(A_0, \Delta F)$$

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 $(I-A_1)^{-1}(F_1u)$ with $u$ a summation vector and $F_1$ the structure of global demand in terms of products and countries.

Intermediate inputs needed to produce global final demand:

$$A_1(I-A_1)^{-1}(F_1u)$$

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

$$m_1 = u' [I_{int} \odot \{A_1(I-A_1)^{-1}(F_1u)\} + I_{int} \odot F_1] u$$

with $I_{int}$ is a matrix with zeroes in the diagonal blocks and ones in off-diagonal blocks such that domestic trade flows are excluded ($\odot$ stands for element-wise multiplication)
Intermediate input requirements dollar of gross output (both imported and sourced domestically) can be computed, yields matrix \( A \).
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)

- 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)
Results

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

-0.10  -0.05  0.00  0.05  0.10  0.15  0.20  0.25
00-05  05-08  08-10  10-14  00-14

Change in demand structure
Change in supply chain
• 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)
Results (excl. raw materials)

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:

\[ F = (F_{PM} \circ F_{CWD})y \]

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

\[ F_{CWD} : \text{countries’ shares in world GDP} \]
\[ F_{PM} : \text{product mix (within countries)} \]
Decomposition of change in Trade to world GDP ratio (log-change, sub-periods 2000-2014)

Results

-0.10 -0.05 0.00 0.05 0.10 0.15 0.20
00-05 05-08 08-10 10-14

Country Shares in World Demand
Product Mix
Change in supply chain
Concluding remarks

• 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.