Global Production Sharing: Trends and Patterns

Neil Foster, Robert Stehrer, Marcel Timmer, Gaaitzen de Vries

WIOD conference, 24–26 April 2012
Groningen
Production fragmentation

- Local and global value chains (1\textsuperscript{st} & 2\textsuperscript{nd} unbundling)
  - From made in [country] to: Made in the World

- Trade statistics are revealing
  - Growth in trade versus growth in GDP
  - Most trade is in intermediates nowadays

- Theory
  - Trade in Activities (Feenstra and Hanson, 1996; Grossman and Rossi-Hansberg, 2008)

- Why?
  - Information and Communication Technology
  - Declining trade barriers, regional agreements
  - Opening up of China and India
This paper

- Measures global production sharing:
  - Over time, from 1995–2009
  - Viz. GTAP, relevant improvements in the WIODatabase for measuring vertical specialization
  - Extends production sharing measures to distinguish production factors

- Finds:
  - Increasing vertical specialization
    - Trend is robust to a host of controls, such as regional trade agreements and levels of economic development
  - Regional shifts in foreign earnings
  - Positive relation between GDP per capita and skill content contribution in value chains
Related literature

- International production fragmentation requires new measures of international trade (WTO, OECD, DGTrade)

- Analysis based on gross export and gross import data leads to controversial conclusions (e.g. Rodrik, 2006 vs Krugman, 2008)

- Recently, trade economists have started to measure the export of value added (e.g. Trefler and Zhu, 2010; Johnson and Noguera, 2012; Bems et al., 2011)
  - **Definition**: the amount of value added produced in a given source country that is ultimately embodied in final goods absorbed abroad
Define number of countries $C$, industries $S$ and Factors $F$

$A =$ Intermediate input coefficients ($CS \times CS$)

Total inputs required per unit of final demand is given by

$$L = (I - A)^{-1}$$

Where $L$ is the Leontief inverse, which is a matrix indicating the output used both directly and indirectly to produce final goods.
To measure the output contribution of countries in international production sharing (Johnson and Noguera, 2012):

\[ \text{va}_{\text{exp}} = \text{diag}(r) (I - A)^{-1} c_j \]

where \( r \) is the ratio of value added to output for each sector in each country, and \( c_j \) is the vector of final demand for country \( j \).

Extension to production factors from shares in value added
Measurement

- Time series analysis based on national accounts data
- Intermediate use is broken down into domestic and foreign origin using detailed trade statistics
- A standardised database of bilateral services flows
- Socio-economic accounts for large developing countries, such as China and India
Export of value added as a share in GDP
Shifts in foreign earnings

1. EU27
2. EU15
3. EU12
4. East Asia
5. US
6. China
7. BRIIMT
8. Rest

Year: 1995, 2008

Percentage

EU15 EU12 East Asia US China BRIIMT Rest
GDP per capita and the skill content of exported value added
## Robust time trend

<table>
<thead>
<tr>
<th>Fixed effects and time dummy</th>
<th>Low-skilled VAX</th>
<th>Medium-skilled VAX</th>
<th>High-skilled VAX</th>
</tr>
</thead>
<tbody>
<tr>
<td>log income per capita</td>
<td>-0.038</td>
<td>-0.003</td>
<td>-0.032</td>
</tr>
<tr>
<td></td>
<td>(0.97)</td>
<td>(0.12)</td>
<td>(1.35)</td>
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<tr>
<td>time dummy</td>
<td>-0.005</td>
<td>-0.004</td>
<td>-0.002</td>
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<td></td>
<td>(3.43)**</td>
<td>(4.90)**</td>
<td>(1.64)</td>
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<tr>
<td>constant term</td>
<td>0.712</td>
<td>0.139</td>
<td>0.194</td>
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<td>(109.33)**</td>
<td>(37.53)**</td>
<td>(37.48)**</td>
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<tr>
<td>R^2</td>
<td>0.49</td>
<td>0.56</td>
<td>0.29</td>
</tr>
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Concluding remarks

- New measures of trade are needed for the modern international economy
- This paper extends the export of value added in time and across production factors
- Main conclusions:
  1. Increasing vertical specialization
  2. Regional shifts in foreign earnings
  3. Positive relation between GDP per capita and skill content contribution in value chains

Thanks
g.j.de.vries@rug.nl