Trade in Jobs: a counterfactual exercise

Robert Stehrer & Roman Stöllinger
The Vienna Institute for International Economic Studies (wiiw), Austria

WIOD Conference: Causes and Consequences of Globalization
April 24th-26th, 2012 – Groningen

The WIOD-project is funded by the European Commission, Research Directorate General as part of the 7th Framework Programme, Theme 8: Socio-Economic Sciences and Humanities, Grant Agreement no: 225 281.
Research question

- What is the *net* employment resulting from countries’ various engagements in international trade at the level of occupations?
  - Objective to take into account both exports and imports
  - Inspired by the offshoring and trade-in-tasks literature
Related Literature

- **Trefler and Zhu (2010)**
  - Provide a definition of the factor content of trade that takes into account (i) productivity differences across countries and (ii) trade in intermediates

- **Goos, Manning and Salomons (2011)**
  - Analyse the effects of technological change and offshoring on the labour demand at the level of occupations. Both are found to be related to the job polarization in Europe

- **Groshen, Hobijn and McConnell (2005); De Backer and Yamano (2008)**
  - Counterfactual calculations for the “job embodiment of international trade” for the US and OECD countries respectively
Methodological Approach (1)

- Input-Output based approach to calculate the ‘job embodiment of international trade’
  - Intuitively, the job embodiment of international trade compares the number of jobs required to produce the export vector with the hypothetical number of jobs that would be required to produce the import vector domestically using domestic labour productivity.

\[
\text{Job embodiment of international trade} = \text{employment requirement per unit of gross output} \times \text{input requirement per unit of output} \times \text{trade vector}
\]
Methodological Approach (2)

- Matrix representation

\[ \tilde{t}_{job \; embodiment}^r = \tilde{e}^r' \cdot L \cdot t^r \]

- 3 country – 1 industry example

\[ \tilde{t}^r = (e^r \quad e^r \quad e^r) \cdot \begin{pmatrix} l^{r,r} & l^{r,2} & l^{r,3} \\ l^{2,r} & l^{2,2} & l^{2,3} \\ l^{3,r} & l^{3,2} & l^{3,3} \end{pmatrix} \cdot \begin{pmatrix} t^{r,*} \\ -t^{2,r} \\ -t^{3,r} \end{pmatrix} \]
Data

- **Input-Output data**: World Input-Output Table (WIOT)
  - 40 countries (incl. EU27) + Rest of the World
  - 35 industries (NACE classification)
  - Time period: 1995-2009

- **Employment data**: from (i) European Labour Force Survey (LFS) and (ii) WIOD Socio-Economic Accounts
  - 27 occupations according to International Standard Classification of Occupations (ISCO) at the 2-digit level
  - Time period: 1995-2008
Features and caveats of the counterfactual exercise

- Attempt to provide a balanced approach the various forms of both export and import flows
- Fixed input and factor requirements; neglecting the quality dimension
- Assumes away non-competing imports and potential ‘technological incapability’ to produce all imported goods
- Technology is the same for domestic production and for exports (problem for enclave economies)
Results – Pattern across Occupations
International trade goes along with a skill upgrading for the EU economy…

Job embodiment of international trade by occupational categories EU27, in thousands

(ISCO-1 digit)
…and a ‘nuanced’ form of job polarization

Job embodiment of international trade by occupational categories
EU27, in thousands

10

© wiiw
Results – Overall employment
US ‘loses’ from trade in terms of jobs…
…Asia is gaining big time

Job embodiment of international trade, 1995-2009, in thousands
Number of job losses (-) and job gains (+)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>EU27</td>
<td>2,483</td>
<td>-</td>
<td>378</td>
<td>-</td>
<td>381</td>
<td>-</td>
<td>616</td>
</tr>
<tr>
<td>EU15</td>
<td>1,681</td>
<td>95</td>
<td>558</td>
<td>187</td>
<td>393</td>
<td>228</td>
<td>420</td>
</tr>
<tr>
<td>EU12</td>
<td>803</td>
<td>-</td>
<td>606</td>
<td>-</td>
<td>180</td>
<td>-</td>
<td>1,009</td>
</tr>
<tr>
<td>NAFTA</td>
<td>-</td>
<td>1,680</td>
<td>-</td>
<td>9,523</td>
<td>-</td>
<td>10,431</td>
<td>-</td>
</tr>
<tr>
<td>USA</td>
<td>-</td>
<td>2,049</td>
<td>-</td>
<td>8,235</td>
<td>-</td>
<td>8,580</td>
<td>-</td>
</tr>
<tr>
<td>ASIA</td>
<td>67,759</td>
<td>81,341</td>
<td></td>
<td>115,278</td>
<td>131,469</td>
<td>127,639</td>
<td></td>
</tr>
<tr>
<td>JPN</td>
<td>121</td>
<td>499</td>
<td>347</td>
<td>322</td>
<td>514</td>
<td>138</td>
<td>-</td>
</tr>
<tr>
<td>CHN</td>
<td>51,723</td>
<td>52,131</td>
<td></td>
<td>94,293</td>
<td>106,943</td>
<td>106,200</td>
<td></td>
</tr>
<tr>
<td>IND</td>
<td>14,217</td>
<td>23,150</td>
<td></td>
<td>15,948</td>
<td>19,669</td>
<td>16,979</td>
<td></td>
</tr>
<tr>
<td>OTHER DEVELOPED</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>531</td>
</tr>
<tr>
<td>OTHER EMERGING</td>
<td>6,335</td>
<td>3,555</td>
<td>2,736</td>
<td>746</td>
<td>4,181</td>
<td>6,845</td>
<td>6,660</td>
</tr>
<tr>
<td>WIOD 40</td>
<td>62,257</td>
<td>78,524</td>
<td>108,484</td>
<td>120,973</td>
<td>111,781</td>
<td>124,089</td>
<td>100,766</td>
</tr>
</tbody>
</table>
EU with small job gains in most years…

…losses for new member states

Job embodiment of international trade for the EU, 1995-2009
Share of job losses (-) and job gains (+) in % of total employment
The trade balance matters for trade induced employment effects

Trade balance position and job effects in the EU27 (in millions), 1995-2009

Regression results suggest that for the typical EU member state a 1 million US-dollar increase in the trade deficit would ‘cost’ 11 jobs.
Conclusions

- The analysis of trade related employment effects should take into accounts exports and imports.
- The pattern of job embodiments of international trade across occupations suggests a trade-induced skill-upgrading for the EU economy.
- Possibly there is a ‘nuanced’ version of job polarisation in the EU economy.
- The position of the trade balance is decisive for the job embodiment of international trade at the aggregate level.
Future Work

- Take into account non-competing imports (industry based-approach)
- Individual results for exports/imports and manufacturing/services (at the level of occupations)
- Bring the country-level employment trend into the analysis (methodology)
- Switch to ‘Trade in Employment’ approach
Thank you for your attention!