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Structural Changes in the European Economies - Analyses Based on IO Tables
(work in progress)
Plan of the presentation

- Introduction
- ‘Winners’ and ‘losers’ approach to structural changes
- Discussion about the data
- Results (examples)
- Conclusions (future work)
Introduction

Motivation

Back to the issue of structural changes:

Previously


Now

- Longer time series.
- Consistent data for many countries in open access – WIOD.
Introduction
Definition and literature

Structural change is the process by which an economy is progressively transformed over time.


‘Winners’ and ‘losers’ approach (Plich, 2001, 2002)
### Introduction

Structural changes – why and where they appear, what and how to measure?

<table>
<thead>
<tr>
<th>Why: drivers</th>
<th>What to measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Demand side</td>
<td>- Input (labor, capital)</td>
</tr>
<tr>
<td>- Supply side</td>
<td>- Output (sectors)</td>
</tr>
<tr>
<td>- Changing nature of the linkages and interactions between supply and demand factors</td>
<td>- Final demand</td>
</tr>
<tr>
<td></td>
<td>- Income</td>
</tr>
<tr>
<td></td>
<td>- …</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Where: levels</th>
<th>How to measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Economy (industries, institutions)</td>
<td>- Empirical data</td>
</tr>
<tr>
<td>- Industry</td>
<td>- Models results</td>
</tr>
<tr>
<td>- Institution or firm</td>
<td>- Mixture of the above</td>
</tr>
<tr>
<td>- Spatial (regions)</td>
<td></td>
</tr>
</tbody>
</table>
Ex post calculations

\( X_t = (I - A_t)^{-1}Y_t \) \quad \text{where } t = 0, 1, 2, ...T

\( X_t = (I - A_t)^{-1}B_tY^C_t \)

Simulations (constant parameters):
\( \tilde{X}_t = (I - A_b)^{-1}B_bY^C_t \) \quad \text{where } b \in \{0, 1, 2, ..., T\}

Let's denote growth of any variable \( Z \) from the period \( s \) to \( t \) by
\( t_s\Delta Z_i = Z_{it} - Z_{is} \)

Consider the growth of output of industry \( i \):
- If \( t_s\Delta X_i - t_s\Delta\tilde{X}_i < 0 \) sector \( i \) "looses" from \( s \) to \( t \)
- If \( t_s\Delta X_i - t_s\Delta\tilde{X}_i > 0 \) sector \( i \) "wins" from \( s \) to \( t \)

Measure of structural changes between period \( 0 \) (base) and \( t \)
\( SC^t_0 = t_0\Delta X_i - t_0\Delta\tilde{X}_i \) (1) - flow
\( CSC^n_0 = \sum_{t=0}^{n} SC^t_0 \) (2) - stock

\( SCP^t_0 = \frac{SC^t_0}{X_0} \quad CSCP^t_0 = \frac{CSC^n_0}{C_0} \)
‘Winners’ & ‘losers’ approach

*Ex ante* calculations

The idea of $SC$ and $CSC$ can be generalized (extended) to comparison of two simulations when using multi-equation model: with base assumptions and other assumptions which.

**B** - simulated (base)

**O** - simulated (other - not base)

If $\frac{t_s \Delta X_i^B}{t_s \Delta X_i^O} < 0$ sector $i$ "looses" from $s$ to $t$

If $\frac{t_s \Delta X_i^B}{t_s \Delta X_i^O} > 0$ sector $i$ "wins" from $s$ to $t$

\[ SC_0^t = \frac{t_0 \Delta X_i^B}{t_0 \Delta X_i^O} \]  \hspace{1cm} (1)

\[ CSC_0^n = \sum_{t=0}^{n} SC_0^t \]  \hspace{1cm} (2)
‘Winners’ & ‘losers’ approach…

Example: Poland - (1995-2011)
<table>
<thead>
<tr>
<th><strong>Discussion about the data</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Problems of application</strong></td>
</tr>
</tbody>
</table>

- How to measure $X$, $Y$, $A$?
  - current prices?
  - constant prices?

- Data availability

- Reliability of data
## Discussion about the data

### WIOD main data tables

<table>
<thead>
<tr>
<th>Data type</th>
<th>Description</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>World Input-Output Tables</strong></td>
<td>World Input-Output Tables including 40 countries and a model for the rest of the world.</td>
<td>- Industry by industry (1995-2009/2011)</td>
</tr>
<tr>
<td><strong>Socio-Economic Accounts</strong></td>
<td>Data on employment (number of workers and educational attainment), capital stocks, gross output and value added at current and constant prices at the industry level.</td>
<td>- World input-output tables in <strong>previous yaer prices</strong> (1996-2009)</td>
</tr>
<tr>
<td><strong>Environmental Accounts</strong></td>
<td>Data on energy use, CO2 emissions and emissions to air at the industry level.</td>
<td>- Socio-economic accounts - values in national currency (1995-2009/2011)</td>
</tr>
</tbody>
</table>
Results (examples)

Agriculture, Hunting, Forestry and Fishing

Table:

<table>
<thead>
<tr>
<th>Year</th>
<th>POL</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0.14487</td>
</tr>
</tbody>
</table>

Graphs showing empirical and A1995 to A2009 for different years.
Conclusions (future work)

Questions to answer:

- Does the assumption of a constancy of io coefficients lead to large errors?
- Does the year of io matrix matter for indication of winners and losers?
- Is there a common pattern of winners and losers across different countries?
- Has the pattern in Poland changed for the last 10 years?