23nd Inforum World Conference

23-30 August 2015

Bangkok

Mariusz Plich
University of Łódź

Structural Changes in the European Economies - Analyses Based on IO Tables

(work in progress)

Plan of the presentation

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

Introduction

Motivation

Back to the issue of structural changes:

Previously

- Plich M. 2001. *Structural Changes in Poland. Assessment Based on the New I-O Table*. In M. Grassini (ed.) Contributions on Multisectoral Modelling. Dipartimento Di Studi Sullo Stato Universita' Di Firenze. Centro Editoriale Toscano: 79-96.
- Plich M. 2002. *Structural Changes and the Effect on Emissions in Poland*. Paper presented to th 10th Inforum World Conference 2002. (http://www.inforum.umd.edu/papers/conferences/2002/plich.pdf)

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.

Literature survay: Silva, E.G., Teixeira, A.A.C., 2008, *Surveying structural change: Seminal contributions and a bibliometric account*, Structural Change and Economic Dynamics, vol. 19, iss. 4, s. 273-300.

'Winners' and 'losers' approach (Plich, 2001, 2002)

Introduction

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

Why: drivers

- Demand side
- Supply side
- Changing nature of the linkages and interactions between supply and demand factors

Where: levels

- Economy (industries, institutions)
- Industry
- Institution or firm
- - - - - - - - - - - - - - - - - -
- Spatial (regions)

What to measure

- Input (labor, capital)
- Output (sectors)
- Final demand
- Income
- …

How to measure

- Empirical data
- Models results
- Mixture of the above

‘Winners’ & ‘losers’ approach…

Ex post calculations

$\boldsymbol{X_t} = (\boldsymbol{I} - \boldsymbol{A}_t)^{-1}\boldsymbol{Y}_t$ where t = 0, 1, 2, ...T

$\boldsymbol{X}_t = (\boldsymbol{I} - \boldsymbol{A}_t)^{-1}\boldsymbol{B_t}\boldsymbol{Y}_t^C$

Simulations (constant parameters):

$\hat{\boldsymbol{X}}_t = (\boldsymbol{I} - \boldsymbol{A}_b)^{-1}\boldsymbol{B}_b\boldsymbol{Y}_t^C$ where $b \in \{0, 1, 2, \dots, T\}$

Lets denote growth of any variable Z from the period *s* to *t* by

${}_s^t\Delta Z_i = Z_{it} - Z_{is}$

Consider the growth of output of industry i:

If ${}_s^t\Delta X_i - {}_s^t\Delta\hat{X}_i < 0$ sector *i* "looses" from *s* to *t*

If ${}_s^t\Delta X_i - {}_s^t\Delta\hat{X}_i > 0$ sector *i* "wins" from *s* to *t*

Measure of structural changes between period *0* (base) and *t*

$SC_0^t = {}_0^t\Delta X_i - {}_0^t\Delta\hat{X}_i$ (1) - flow

$CSC_0^n = \sum_{t=0}^{n} SC_0^t$ (2) - stock

$SCP_0^t = \frac{SC_0^t}{X_0}$ $CSCP_0^t = \frac{CSC_0^t}{\sum_{k=0}^{t} X_k}$

‘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 ${}_s^t\Delta X_i^B - {}_s^t\Delta X_i^O < 0$ sector *i* "looses" from *s* to *t*

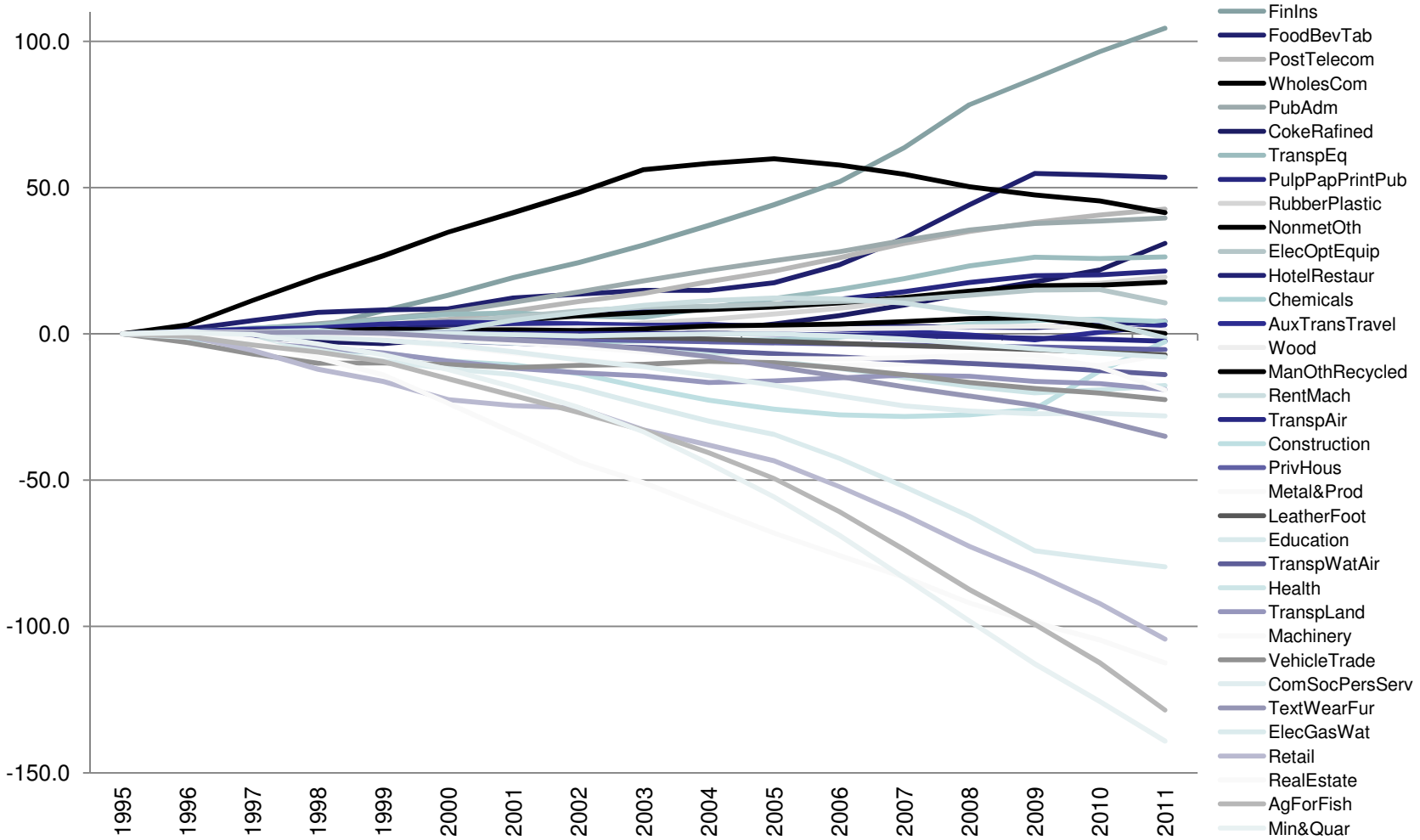
If ${}_s^t\Delta X_i^B - {}_s^t\Delta X_i^O > 0$ sector *i* "wins" from *s* to *t*

$$SC_0^t = {}_0^t\Delta X_i^B - {}_0^t\Delta X_i^O \qquad (1)$$

$$CSC_0^n = \sum_{t=0}^{n} SC_0^t \qquad (2)$$

‘Winners’ & ‘losers’ approach…

Exaple: Poland - (1995-2011)



Discussion about the data

Problems of application

How to measure **X**, **Y**, **A**

- curent prices?
- constant prices?

Data availability

Reliability of data

Discussion about the data

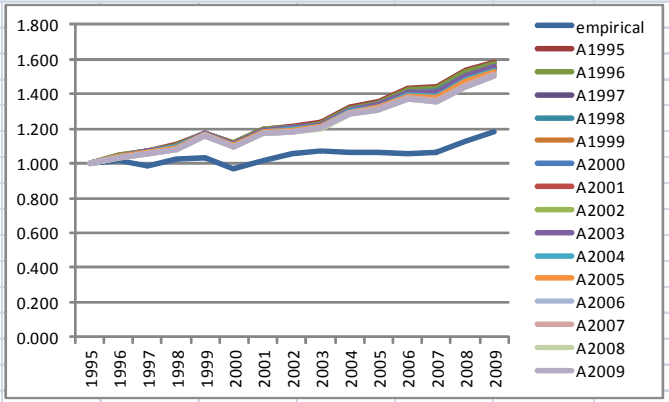
WIOD main data tables

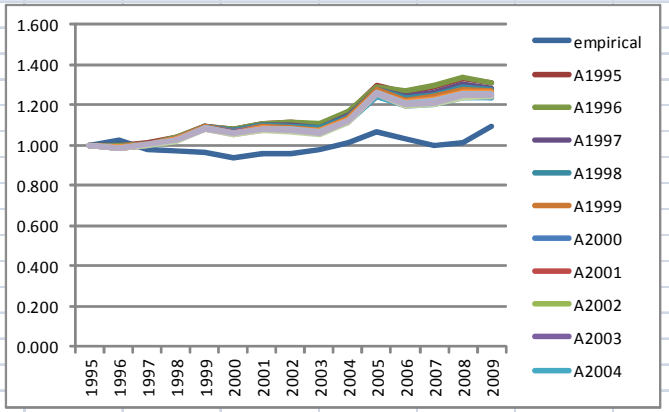
Data type	Description
World Input-Output Tables	World Input-Output Tables including 40 countries and a model for the rest of the world.
National Input-Output Tables	National Input-Output tables based on the world input-output tables.
Socio Economic Accounts	Data on employment (number of workers and educational attainment), capital stocks, gross output and value added at current and constant prices at the industry level.
Environmental Accounts	Data on energy use, CO2 emissions and emissions to air at the industry level.

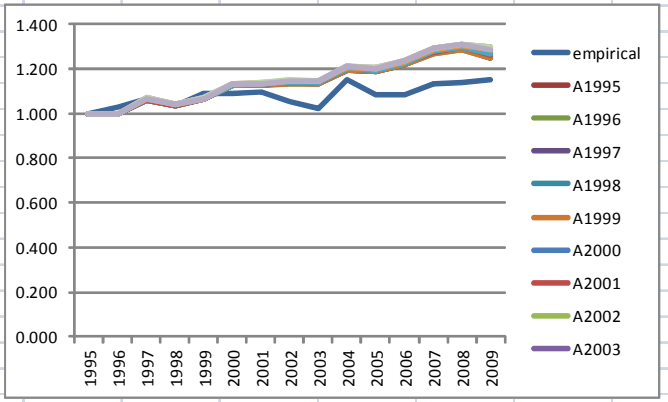
- Industry by industry (1995-2009/2011)
- national io tables in **curent prices** (1995-2011; US dollars)
- World input-output tables in **previous yaer prices** (1996-2009)
- Socio-economic accounts - values in national currency (1995-2009/2011)

Results (examples)

1	Agriculture, Hunting, Forestry and Fishing				POL	0.14487		9.682021									







1	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50
deu		1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
	empirical	50 047	51 352	53 430	51 692	54 527	54 448	54 813	52 825	51 335	57 480	54 355	54 382	56 638	56 912	57 529
	A2009	44 664	44 620	47 685	46 542	47 705	50 638	50 726	51 252	51 149	54 113	53 720	55 149	57 566	58 439	57 529
			0.999	1.069	0.976	1.025	1.061	1.002	1.010	0.998	1.058	0.993	1.027	1.044	1.015	0.984
		1.000	0.999	1.068	1.042	1.068	1.134	1.136	1.147	1.145	1.212	1.203	1.235	1.289	1.308	1.288
	empirical	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
	A2009	1.121	1.151	1.120	1.111	1.143	1.075	1.081	1.031	1.004	1.062	1.012	0.986	0.984	0.974	1.000

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?