Foreign Trade and Energy Consumption

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“Analyses of economic and social impacts of changes in energy prices in the Polish Economy”

The project is run with the cooperation of Technical University of Łódź. Partners from TU are responsible for preparation of scenarios on possible changes in energy prices and energy consumption.


The project is planned for 20 months.
The data

J. Boratyński prepared complete set of product by product i-o tables for the period 1995-2002 both in current as well as constant prices. This is the starting point for the model and foreign trade equations. The data set will be extended until 2005. Import and export time series will be additionally calculated back to 1985 for the purposes of estimation. We expect, that the new set of i-o tables for 2005 will be published, but it probably will not be available soon.
Product classification of i-o tables

Prod. Of agriculture and forestry
Prod. Of fishing
Coal and lignite
Other mining products
Food products and beverages
Tobacco products
Textiles
Wearing apparel and furs
Leather and leather products
Wood and wood products
Pulp, paper and paper products
Printed matter and recorded media
Coke, refined petroleum products
Chemicals and chemical products
Rubber and plastic products
Other non-metallic mineral products
Basic metals
Metal products
Machinery and equipment
Office machinery and computers
Electrical machinery and apparatus
RTV and communication equipment
Medical, precision, optical instruments etc.
Motor vehicles, trailers and semi-trailers
Other transportation equipment
Furniture and other manufactured goods
Recovered secondary raw materials
Electrical energy, gas, steam and hot water
Water and its distribution
Construction works
Trade and repair services...
Hotel and restaurant services
Transport and communication
Financial intermediation (incl. Insurance)
Real estate and business services
Public administration services
Education services
Health and social services
Other services
Households services
Consistency of scenarios

The most important problem for solving this part of the model is to elaborate consistent scenarios of changes in prices. Domestic prices will be calculated in the framework of the model according to assumptions made about the rise in prices of different types of energy. Most of energy resources are offered on the global market. If domestic producers experience the rise in prices of energy, so do their foreign competitors.

Both domestic, as foreign producers experience the same price impulses, and the reaction of imports and exports for rise in energy prices depends on difference in technology of production between domestic and foreign goods, especially quantity and type of energy used per unit of output. Thus, the crucial point when calculating import and export is to assume the changes in prices of imports adequate to the changes in prices of energy put into the domestic price equations.
Primary and secondary sources of energy

Scenarios will consider changes in prices both of primary and secondary sources of energy.

Secondary sources of energy will be treated in foreign trade block as „normal” goods, and investigated deeply for domestic market.
Primary sources of energy in 2003

EU-25:
- Oil: 37%
- Natural gas: 18%
- Coal and lignite: 15%
- Nuclear: 6%
- Other: 6%

Poland:
- Oil: 61%
- Natural gas: 12%
- Coal and lignite: 22%
- Nuclear: 5%
- Other: 0%
General layout of foreign trade block

1. Prices of primary energy inputs
2. World prices of products
3. Exports
4. Import shares
5. Prices of domestic products
6. Prices of products
7. Export shares
8. Prices of primary energy inputs
World prices of products

World price of product $i$ is a function of primary energy cost of an unit of production

$$PW_i = f(\sum_{k=1}^{K} Pp_k E_k W_k, T_i)$$

Where:

$Pp$ – price of $k$-th primary source of energy

$E$ – technological index showing changes in energy production per unit of $k$-th primary source

$W$ – weight, share of $k$-th primary source in energy production

$T$ – technological index showing changes in energy consumption per unit of production
Prices of primary energy sources will be transferred into prices of domestic products with i-o price equation. Prices of imported intermediate goods affect the prices of domestic products according to the share of imports in total output.
Import shares equations

\[
\ln\left(\frac{S_i}{(1-S_i)}\right) = \alpha_0 + \alpha_1 \frac{P_{w_i}T_iR}{P_{d_i}} + \ldots
\]

where:

- \(S\) - is the share of import in total output,
- \(P_{w}\) – world price
- \(T\) – import taxes etc.
- \(R\) – exchange rate
- \(P_{d}\) – domestic price
Export equations

\[ Ex_i = f\left(\frac{Pw_i R}{Pd_i}, D_i, T\right) \]

where:

- \( Ex \) - export,
- \( Pw \) – world price
- \( R \) – exchange rate
- \( Pd \) – domestic price
- \( D \) – world demand (volume of world trade)
- \( T \) – time trend