

Model *Long-term National Model of the Polish Economy***Model acronym** W8-D**Contact persons***Names* **Wladyslaw Welfe, Waldemar Florczak**

Phones (42) 635-51-72 (42) 635-51-86

E-Mails emfg@uni.lodz.pl emfwaf@uni.lodz.pl**Date** The model was constructed in 2002 and updated for the sake of the Transust Project

Degree of exogeneity

Which are the main driving exogenous variables of the model?

In general, those refer to external factors such as world trade turnover or world prices as well as to demographic ones: number of total population or numbers of people in certain age groups. The other exogenous variables are as follows: ratio of social cost burden, rate of capital depreciation, effective customs tariff rate, ratio of state budget investment outlays, GDP in main trading partners to Poland, carbon taxes. However, for the sake of some more elaborated policy scenarios other variables, typically treated as policy instruments e.g. interest rates or exchange rates, can be easily tracked to be in line with scenario assumptions.

Welfare and consumption

Which measures of welfare are used? Are measures of welfare in particular related to consumption?

The model does not use any welfare measures.

Stocks and Flows

Which are the main stock variables in the model? How do they interact with corresponding flows? Does the model include mechanisms for substituting flows by stocks?

The main stock variables in the model are productive capital and the cumulated R&D outlays. Both of them belong to the simultaneous block of the model and play crucial role in determining the economy's potential output. The productive capital is a lag distributed function of investment outlays, whereas the stock of R&D is split into three components: human capital stock, R&D cumulated outlays incurred abroad and entered Poland via imports, and finally domestic R&D cumulated outlays. Allowing for a fixed depreciation ratio, the stocks are functions of present streams in respective activities (human capital: inflows of graduates from a given education level into either labour force or a higher education level; foreign R&D stock: outlays in R&D incurred abroad in period t and weighted by the share of imports of

Poland's main developed trading partners, in line with the Coe-Helpman procedure; domestic R&D stock: outlays on R&D incurred indoors in period t .

Technical change

What types of technical change are applied to which variables of the model?

The model gives a vast coverage of technical change which is explicitly associated with the TFP generating process. TFP is – beside raw productive inputs: capital and labour – the main driving force determining the country's economic potential. Actually, TFP is split into three components: human capital, imported R&D, and domestic R&D, the individual impact of which upon the overall growth of Poland's potential can be easily computed.

Labor market

Which assumptions determine the characteristics of the labor market of the model?

The W8-D model generates both labour supply and labour demand, with unemployment being residual. Labour demand comes from an identity of total GDP over labour productivity. The former is computed from an identity linking it to the total domestic demand whose components (private consumption, public expenditures, investment outlays, inventories, exports and imports) are explained by behavioral equations, whereas the latter is derived from a behavioral equation allowing for explicit treatment of TFP. As for the labour supply, it is determined by demographic factors (working age population) in the first place but also by some other variables accounting for the labour participation ratio.

Tax recycling

Which assumptions are made as to the use of carbon taxes in the model? How, in particular, are these tax revenues recycled?

The assumptions are in line with those outlined in the Project scenarios. Namely, one group of the simulations presumes no recycling of the revenues due to the taxes imposed on carbon dioxide emissions. Consequently, the revenues do not feed into the budget expenditures making the budget balance increase (in the course of time budget deficit becomes budget surplus). The other group of the scenarios assumes that the additional revenues entail proportional increase in the budget expenditures which are distributed in line with the model's structure, i.e. no changes in the distribution of the expenditures towards any extra acceleration of technological growth have been analyzed. Consequently, the costs of introducing carbon taxes – as measured by Poland's GDP – are lower in this variant than in the previous one. Nevertheless, some decline – as compared to the BAU scenario – can be observed in this group of scenarios, too.

Energy prices

Which assumptions are made about energy prices? To what extent are energy prices exogenous?

There are no explicit energy prices in the W8-D model. However, to allow for the influence of increased prices upon the whole economy, due to the introduction of carbon taxes, the equation generating unit costs in the W8-D model has been appropriately modified, which makes the prices interact with the real sphere of the economy.

Renewables, carbon sequestration

To what extent are renewables and carbon sequestration explicitly or implicitly considered?

No explicit treatment of renewables and sequestration.

Cost and benefit concepts

How do you define abatement costs? What costs of climate policy can the model deliver? How are they defined? How are benefits of climate policy taken into account and can they be quantified?

The W8-D model of the Polish economy focuses on macroeconomic issues rather than ecological ones. Thus abatement costs/benefits should be viewed as losses/gains in the overall performance of the economy measured e.g. by GDP, inflation rate, unemployment rate or others in comparison with the BAU scenario.