



Project for the National Science Center



Determinants of the development of the Polish economy in the twenty-first century. Empirical analysis and projections based on system of macroeconomic models

- **Team:**
- Waldemar Florczak, Jagiellonian University, Cracow
- Michał Przybyliński, University of Lodz, head of the project
- Iwona Świczewska, University of Lodz
- Łucja Tomaszewicz, University of Lodz
- Joanna Trębska, University of Social Sciences, Lodz

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Aim



- The purpose of the study is an analysis of the basic phenomena and processes that emerged in the Polish economy in the 21st century. The identification of these phenomena through their empirical verification will be completed with the projection of the simulation variants showing the possible impact of these phenomena on the future development of the Polish economy.
- Results of the research will allow a better understanding of the essence of phenomena and processes taking place in the Polish economy in the early 21st century.
- Poland is a typical European country, and the issues described below are common to most European countries, so the conclusions may have more general character.



Phenomena and processes

- 1) **Demographic phenomena.** Study of the macroeconomic determinants of demographic development and - simultaneously - of demographic determinants of economic growth will be undertaken.
- 2) **Technological progress and the increase in knowledge capital in the economy.** An important role in the long-term growth is played by a widely understood knowledge capital in the economy. It is identified with the human capital resources, innovativeness of the economy and its ability to gain the knowledge capital from abroad.
- 3) **Changes of supply of financial instruments and demand for them** declared by particular institutional sectors as well as their relationships with the investment processes. The study of the intersectoral relations will focus on the relationship between investment process and financial transactions registered on flow of funds accounts.
- 4) **Deepening of the process of globalization** featuring the Polish involvement in the phenomenon of fragmentation of the production process, changes of intensity and structure of Polish foreign trade.



Demographic processes

- There is no doubt that in the long-run it is the demography that determines developmental prospects of each nation in isolation and the whole world in general. The demographic hallmark of European modern societies is continually growing life expectancy accompanied by a very low fertility, with Poland being a case in point. This is bound to exert strong pressure upon social and political sustainability in the oncoming decades.
- In the long-run demographic conditions are of crucial importance for socio-economic development, whereas outcomes of international research show that so called replacement migration can only slightly ameliorate the adverse effects of the ageing process of the Polish society.



Demographic processes in Poland

Figure 7a. Mortality rates for females aged 0-2

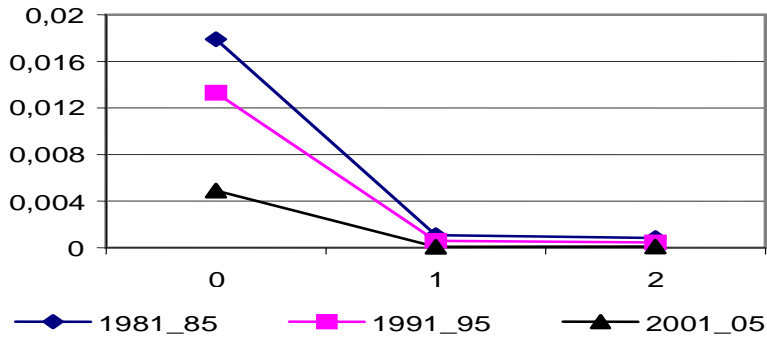


Figure 7b. Mortality rates for females aged 3-15

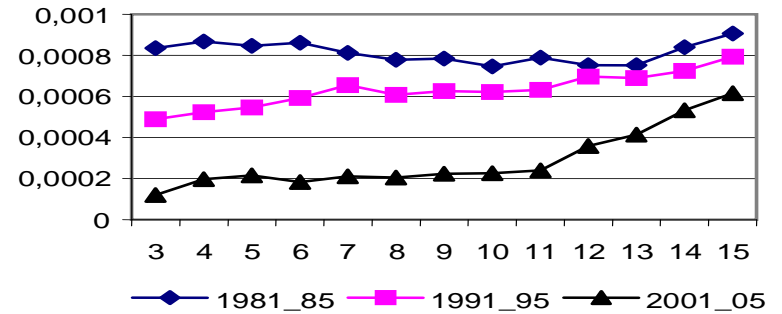


Figure 7c. Mortality rates for females aged 16-39

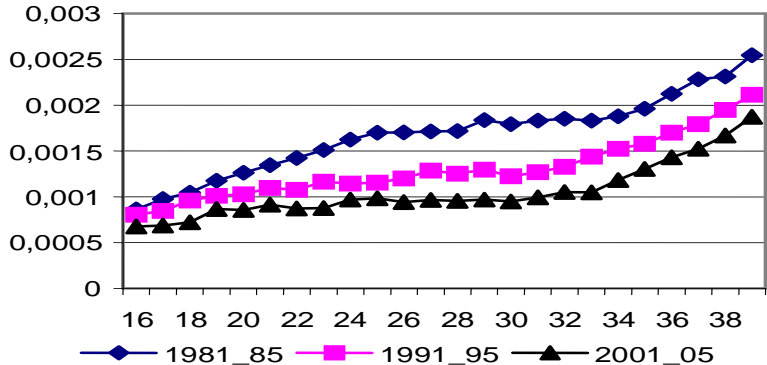
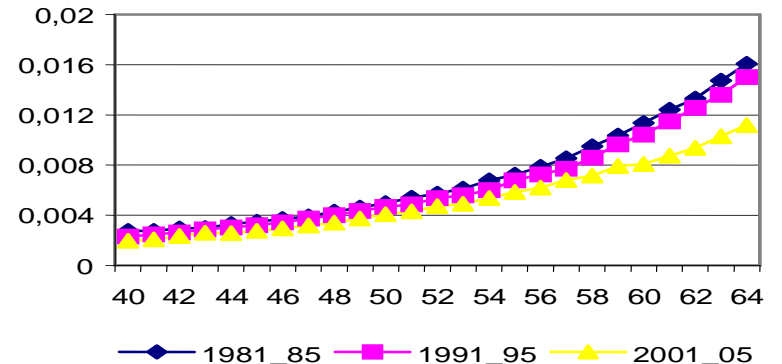
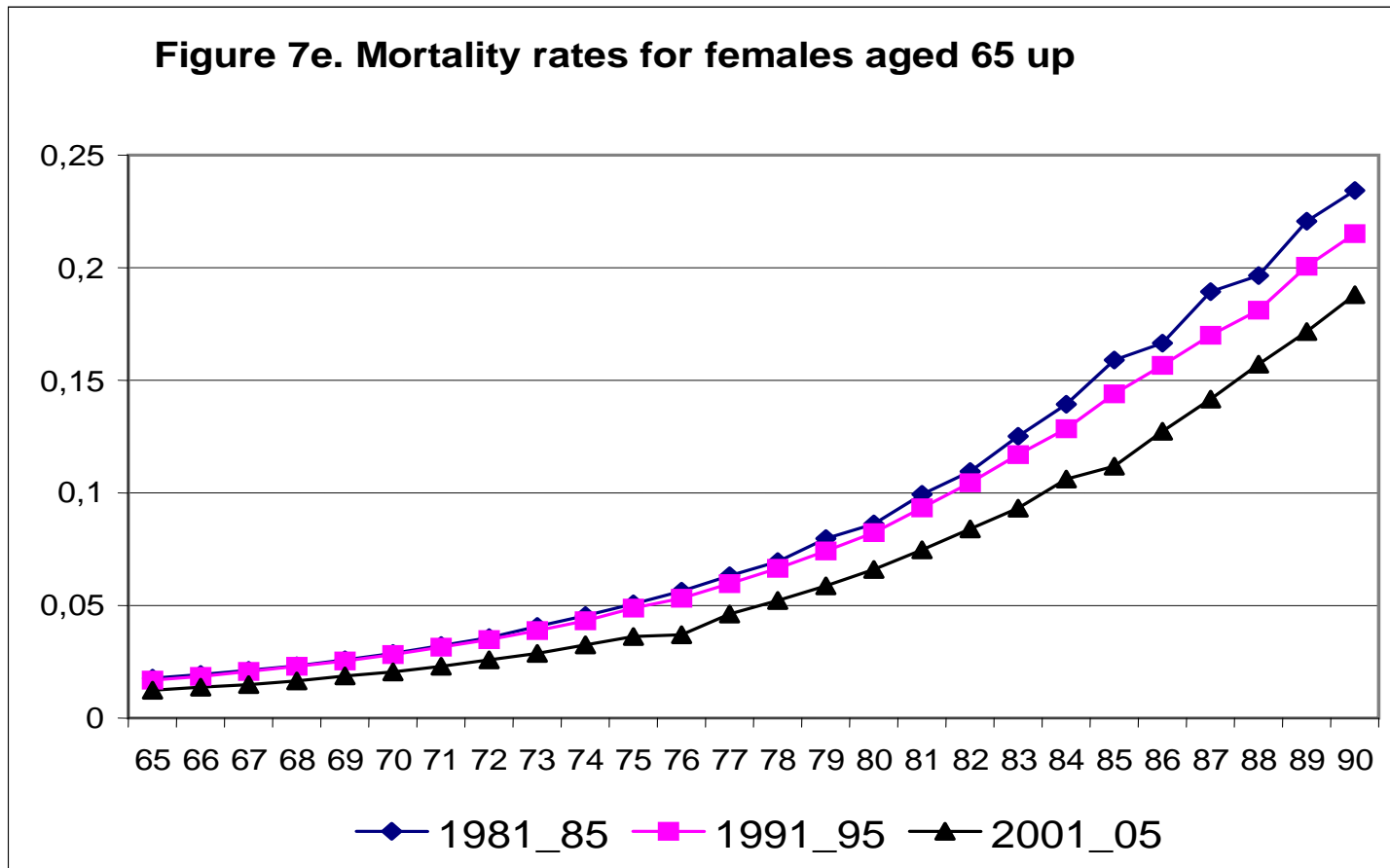


Figure 7d. Mortality rates for females aged 40-64





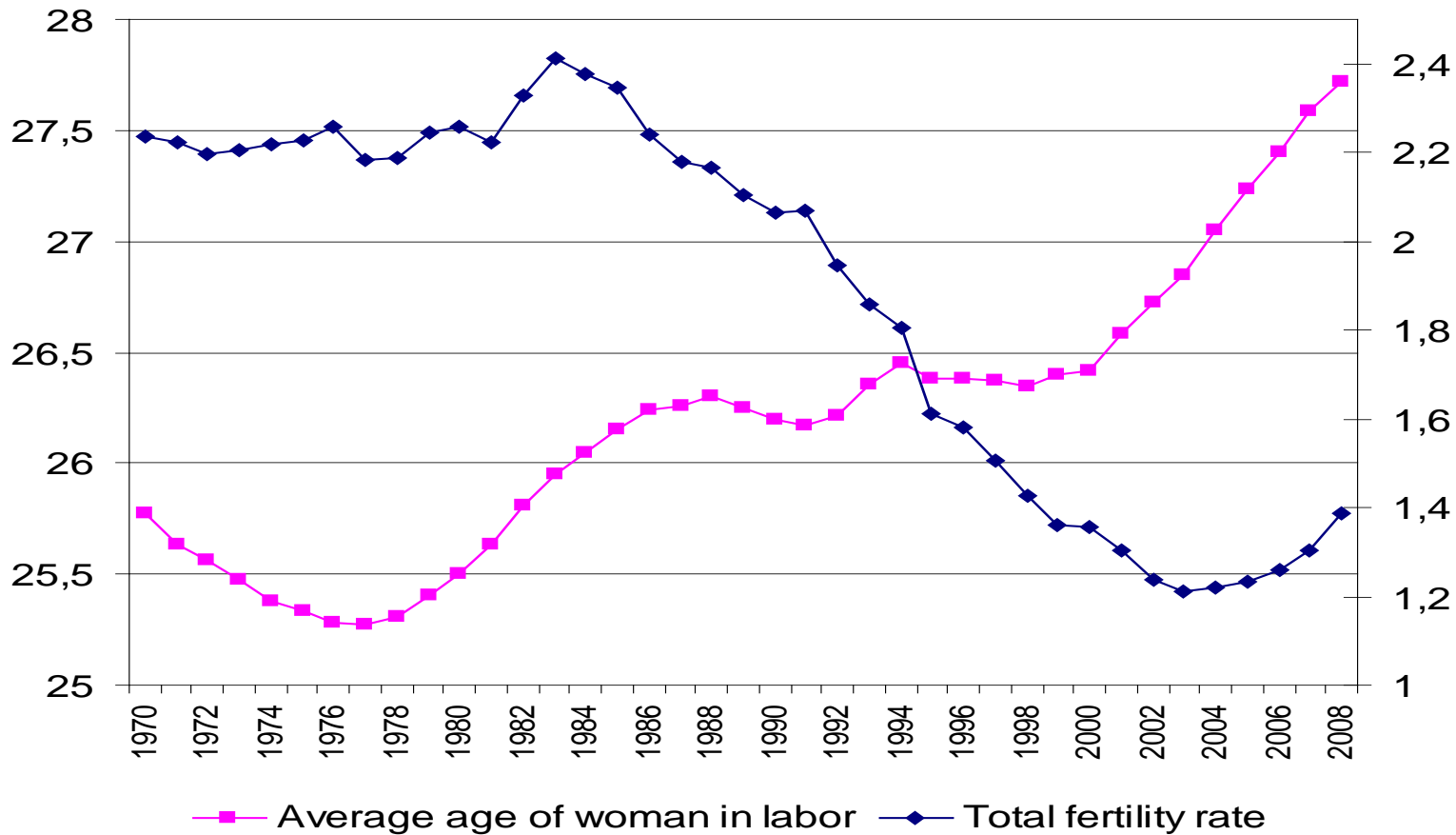
Demographic processes in Poland





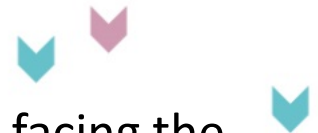
Demographic processes in Poland

Figure 1. Actual values for average age of women in labor (left axis) and total fertility rates (right axis)





Demographic processes



- Very low fertility should be classified as one of the main problems facing the Polish economy. The scale of this problem is best illustrated by a simple example elaborated by McDonald (2000), who – under realistic conditions – estimated that if very low fertility rates (like the ones experienced in Poland) are to persist for decades to come, then after 100 years the population will drop to 14-20% of the its initial level. The fact that life expectancy is almost sure to further increase in the meantime, this might lead – if once neglected – to insurmountable and irreversible bad consequences of unprecedented socio-economic scale.
- In short, bearing in mind the significance of the demographic issues for the future development of Poland it is necessary to account for demographic changes in the Polish society. This task is going to be accomplished by means of constructing a model generating population structure by age and gender, as well as a model of fertility. Both models are going to benefit from demometrics techniques supported by the latest methodological developments in the field of applied econometrics (like frequentist model averaging).

Technological progress

- Results of previous research indicated that domestic resources of knowledge represented by cumulative expenditure on R&D were of increasing importance for the TFP growth. They consist of both public and private outlays. Unlike West European countries or the USA, expenditure on R&D in Poland comes mainly from public sources (about 2/3 of the total amount of outlays on this type of activity). Hence, from the point of view of this project it is important to answer the question: how efficient is the public expenditure compared to enterprise spending? Thus, it seems necessary to decompose the domestic inputs by their financing sources, which is a novelty in research on sources of technological progress in the Polish economy. At the same time, a broaden research on possible foreign origin sources of technological progress is required. To date, the model included two main channels of technology transfer: imports (investment or imports of products of different technological level) as well as foreign direct investment.



Financial flows

- In order to better understand the relations among the institutional sectors distinguished in the system of national accounts in the process of income generation and redistribution (including financial transactions registered on financial accounts. The study of intersectoral relations will be focused on the relationship between investment process and financial transactions registered on flow of funds accounts. In connection with the investment demand analysis, forecast of the demand and supply of financial instruments (particular financial assets and liabilities distinguished in the flow of funds accounts or groups of them) will be carried out.
- **The flow of funds model for the Polish economy was presented at 2012 Inforum Conference in Florence (Tomaszewicz and Trębska). One of conclusions was that households decreased their share in supply of funds in favour of corporations.**



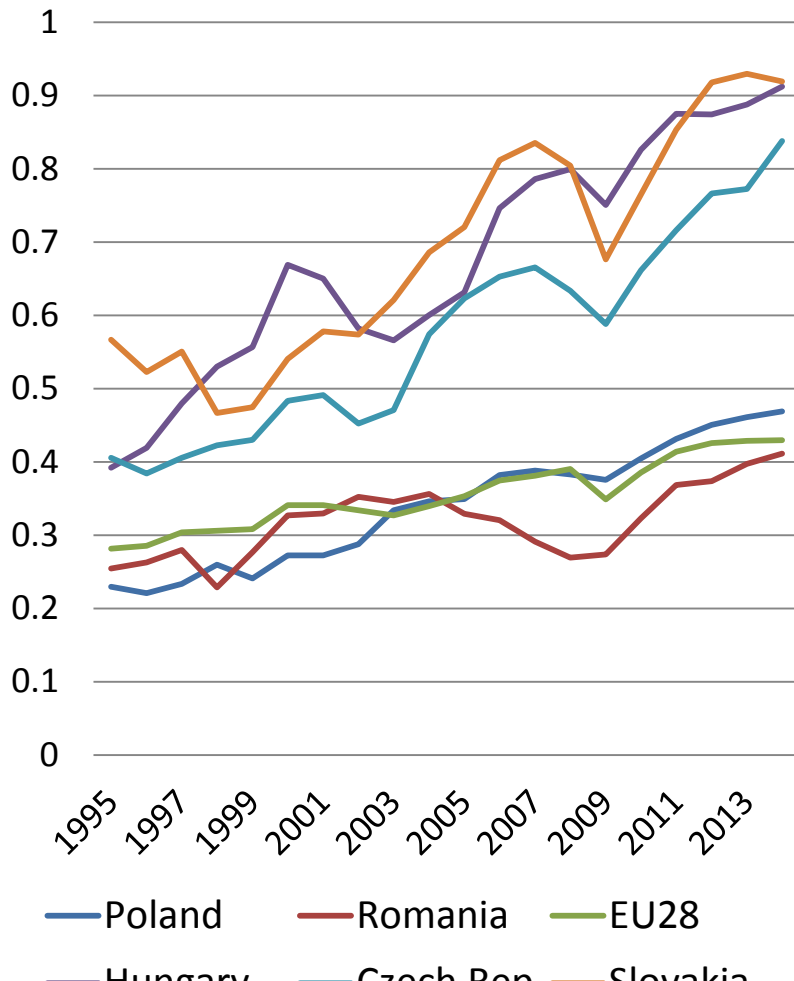
Foreign trade

- The increase in the intensity of trade that took place in Poland after 1990 was primarily the result of the transition and the fact, or rather the process, of Poland's accession to the EU. At the same time, becoming the country with an open market economy, Poland joined the processes of globalization, such as increased involvement in international fragmentation of production. These processes lead to changes in the product structure of foreign trade. In a situation where political transformation has already been completed and the process of integration with the EU has long passed its main phase, the future development of Polish foreign trade depends on factors characteristic for modern, open economies. Identification of these trends is not only an interesting cognitive task, but it plays a crucial role in determining the future of the Polish economy.

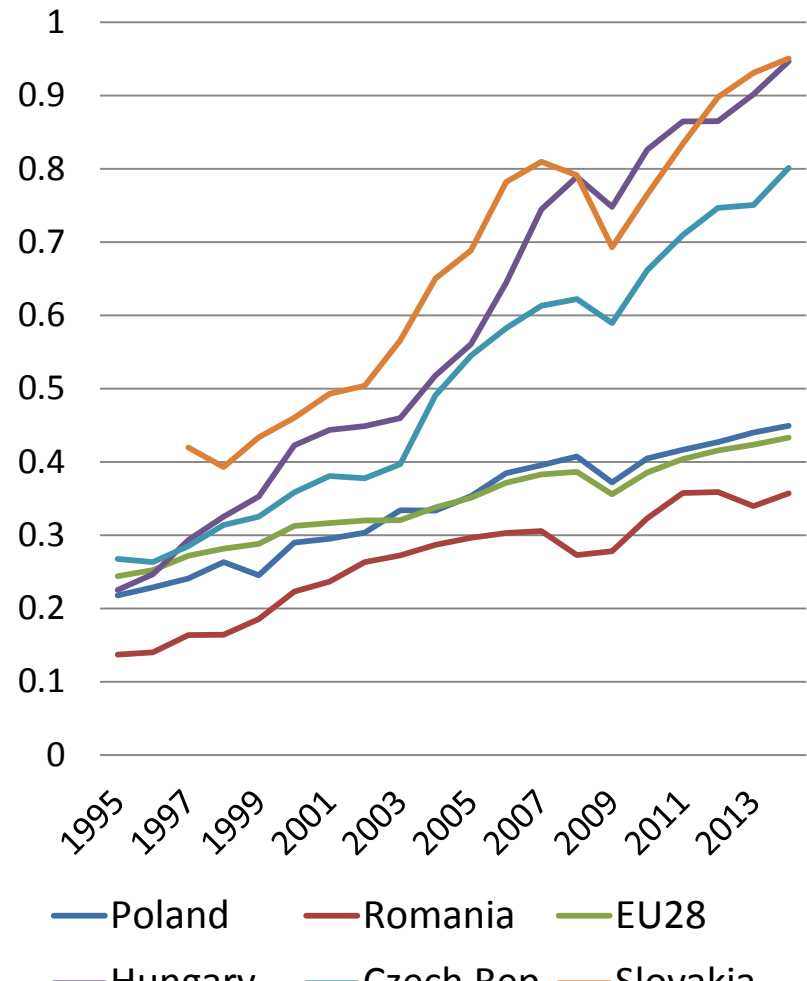


Export/GDP

Current prices

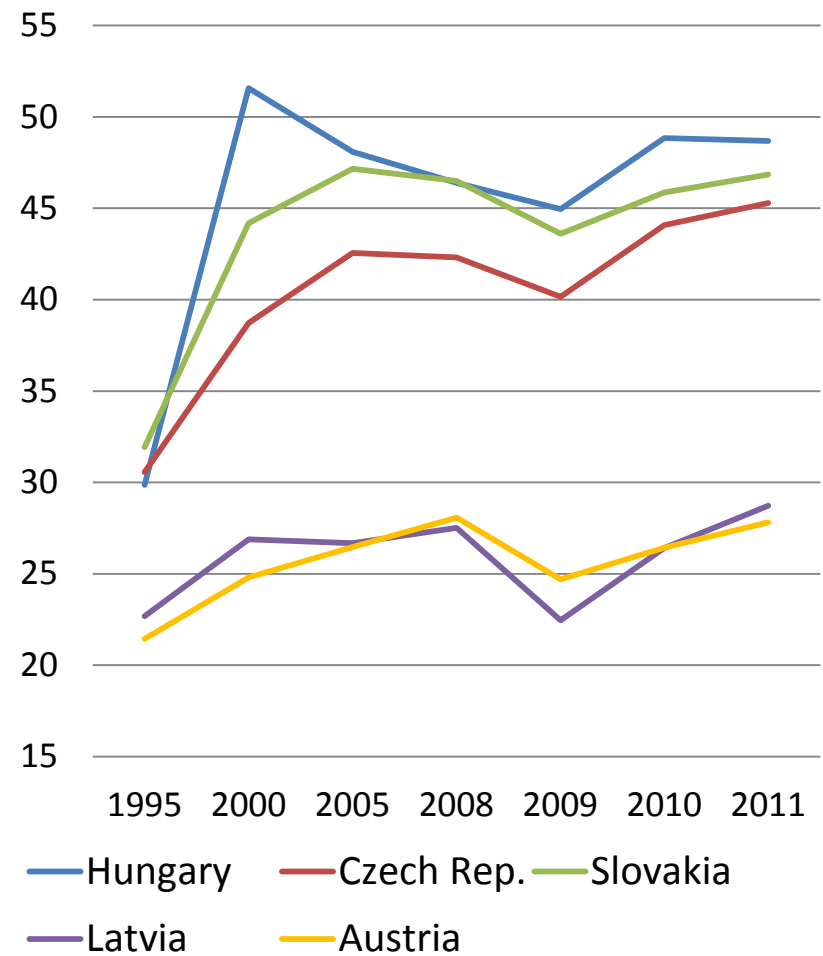
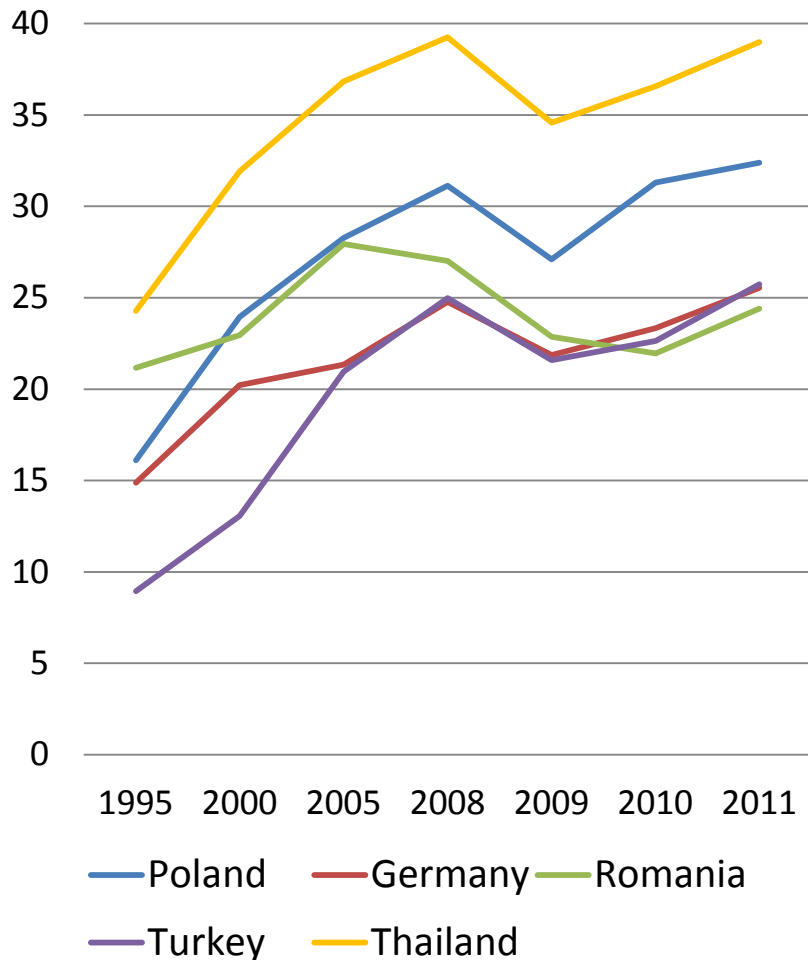


Chain linked volumes





Foreign value added share of gross exports





General shape of the model



Demographic submodel

Technological submodel

Central model:
Input-output table
Labour /Unemployment identities
System of National Accounts (Accountant)

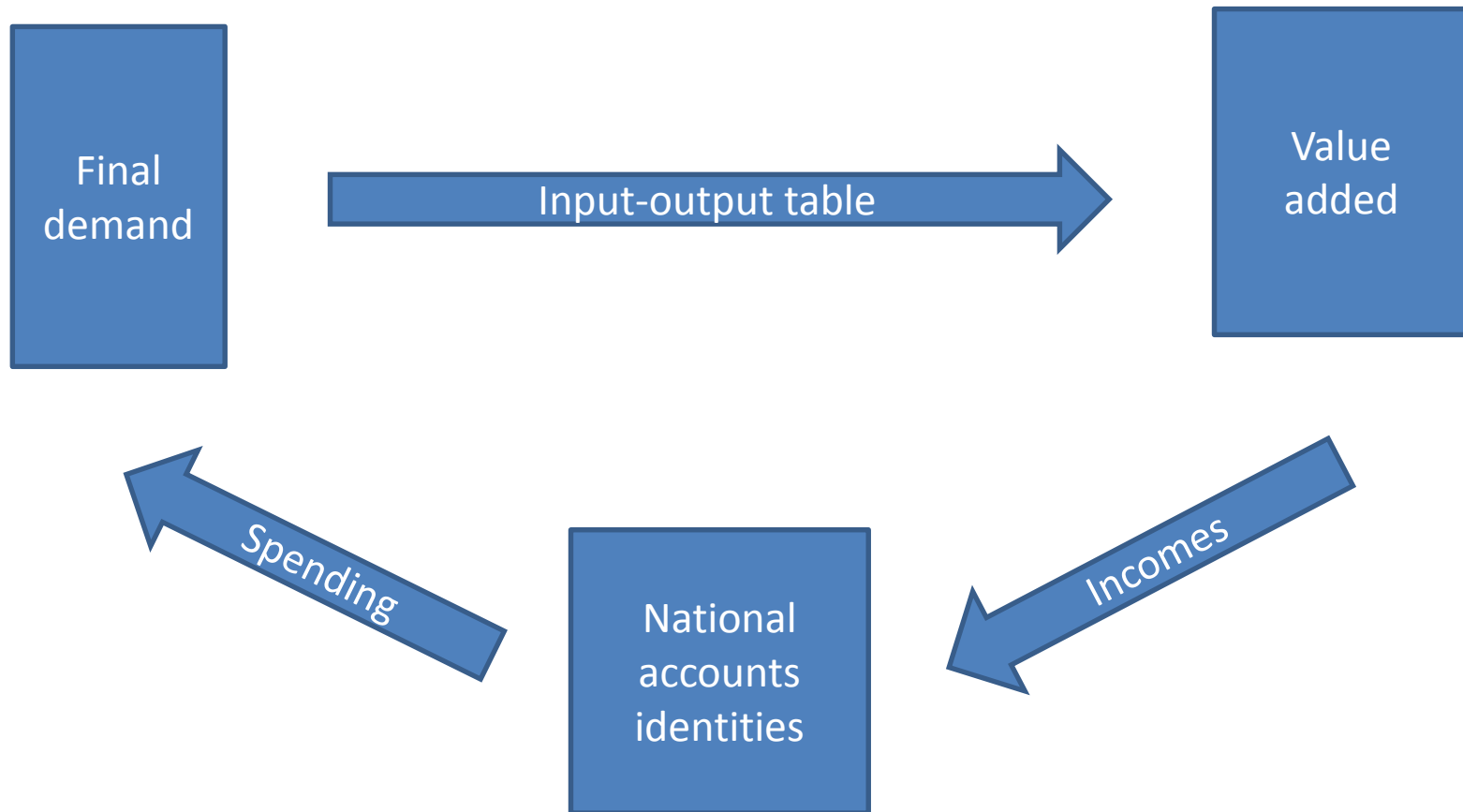
Flow of Funds

Foreign trade

Exogenous price model

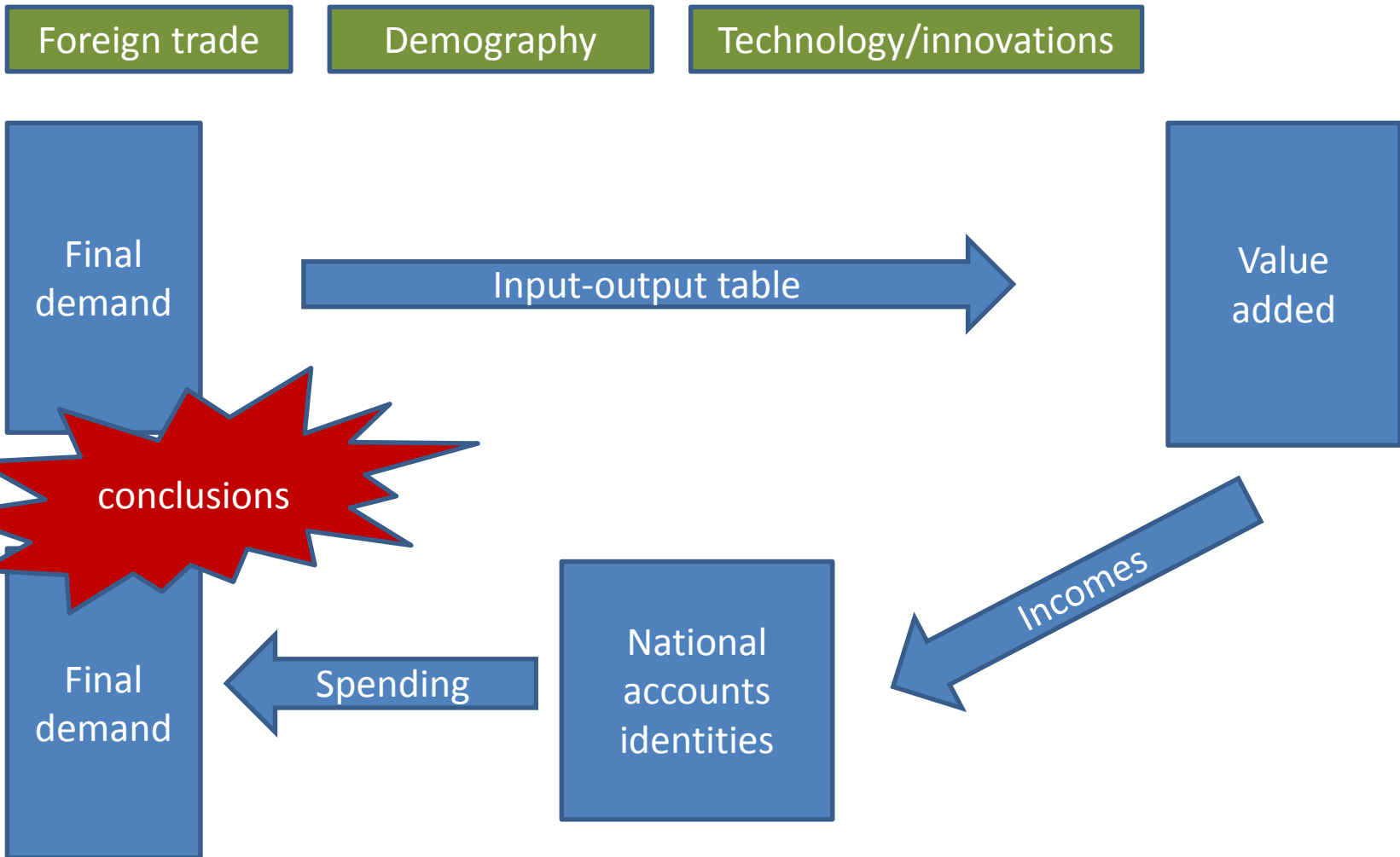


The way of solving – simultaneous equations



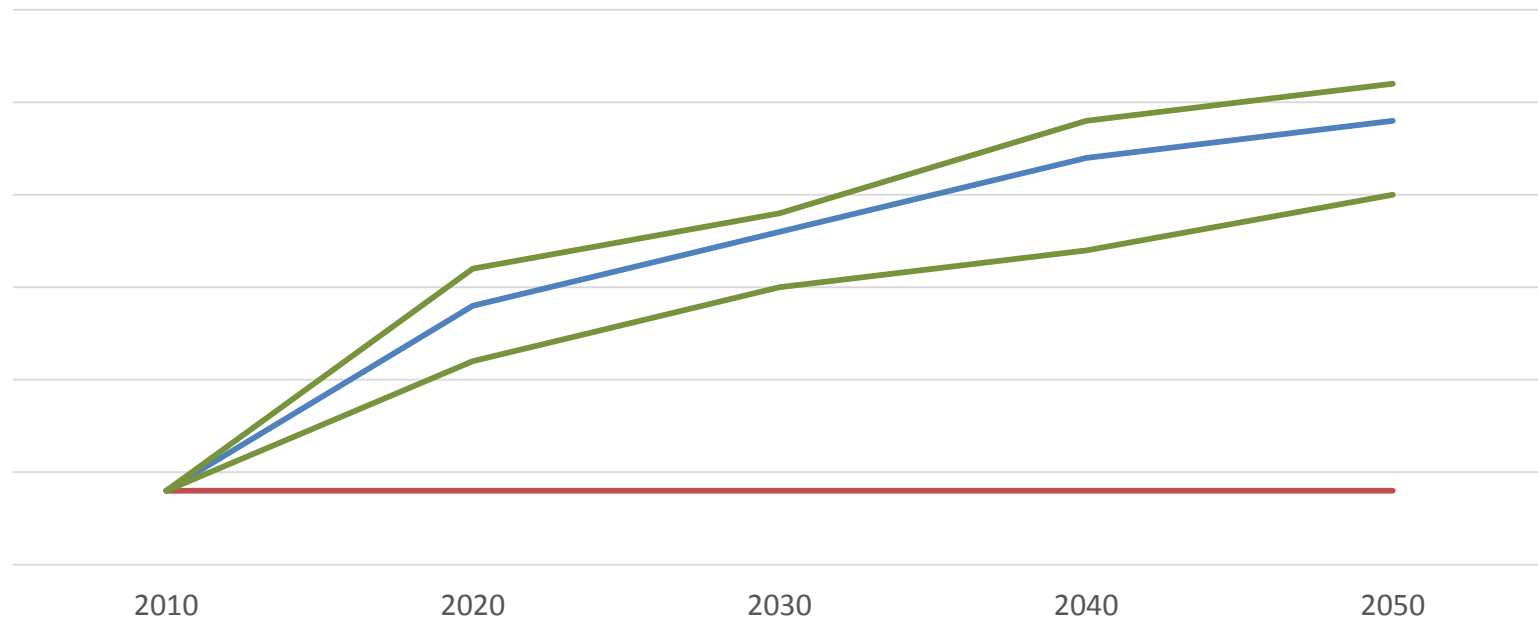


The way of solving – recursive system





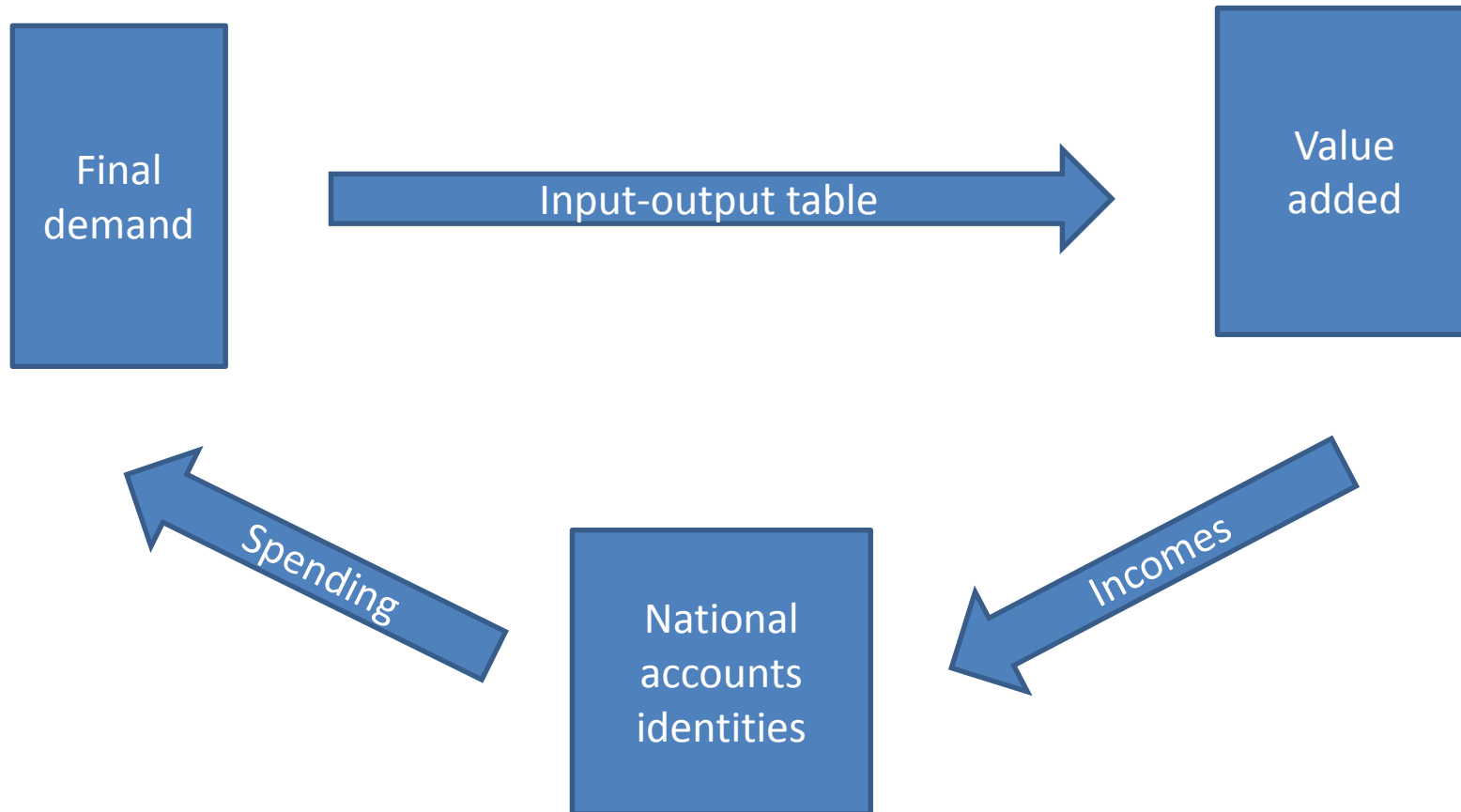
Forgetting the blue line



- we are here
- "realistic" or "baseline" solution - a lot of things will happen
- things we are talking about will happen
- or maybe the green line should look like this

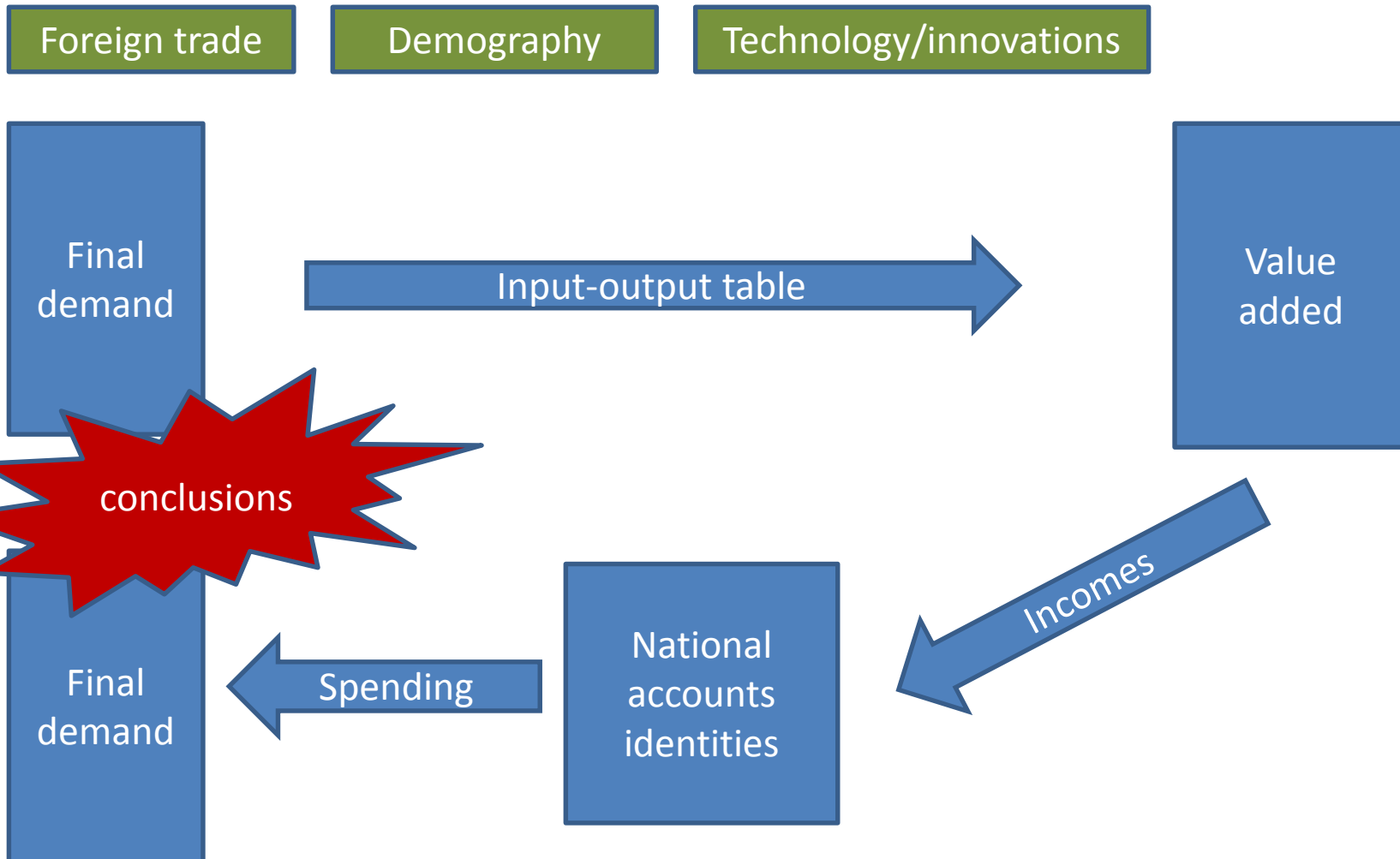


1st step – historical values



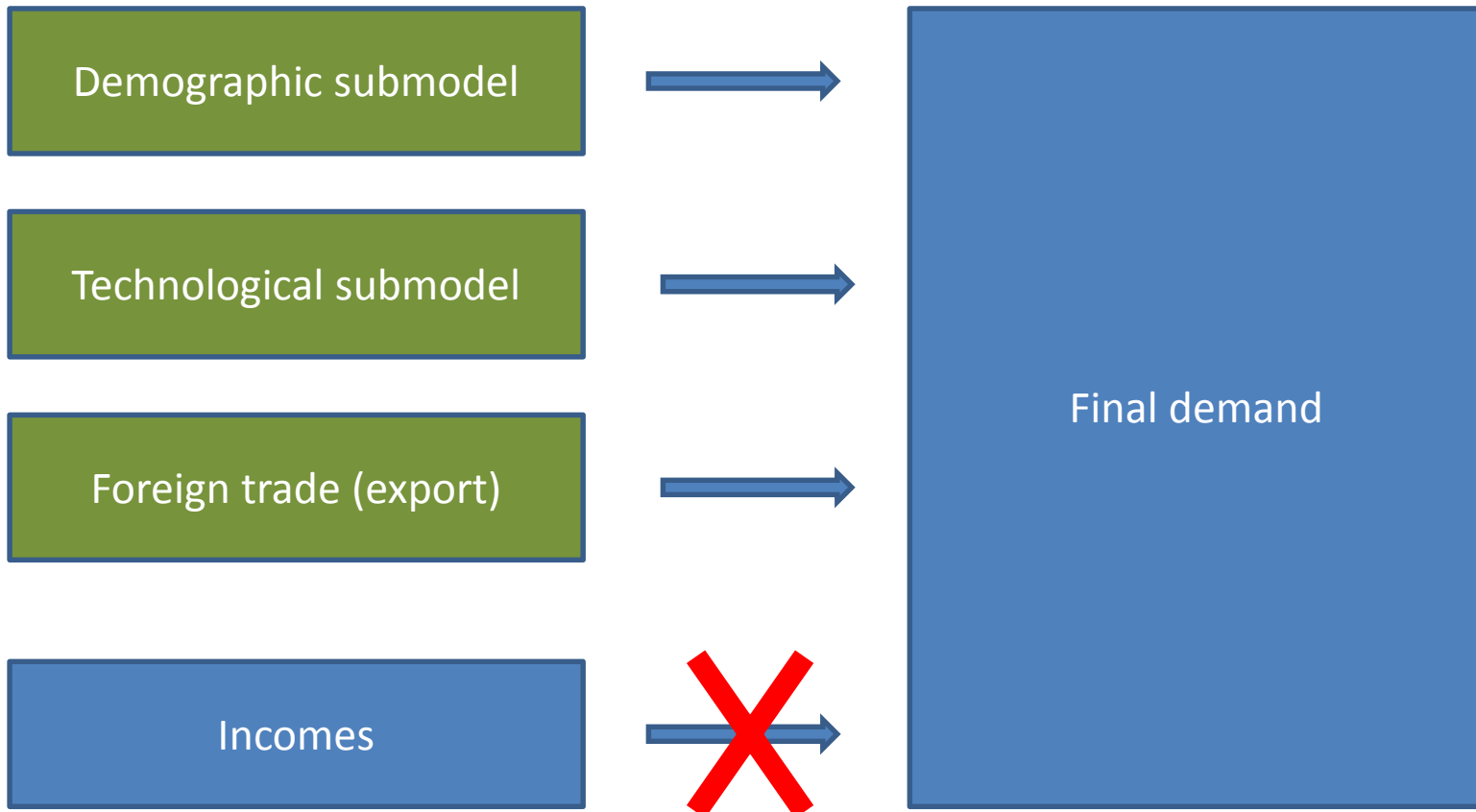


2nd step – introducing long term processes



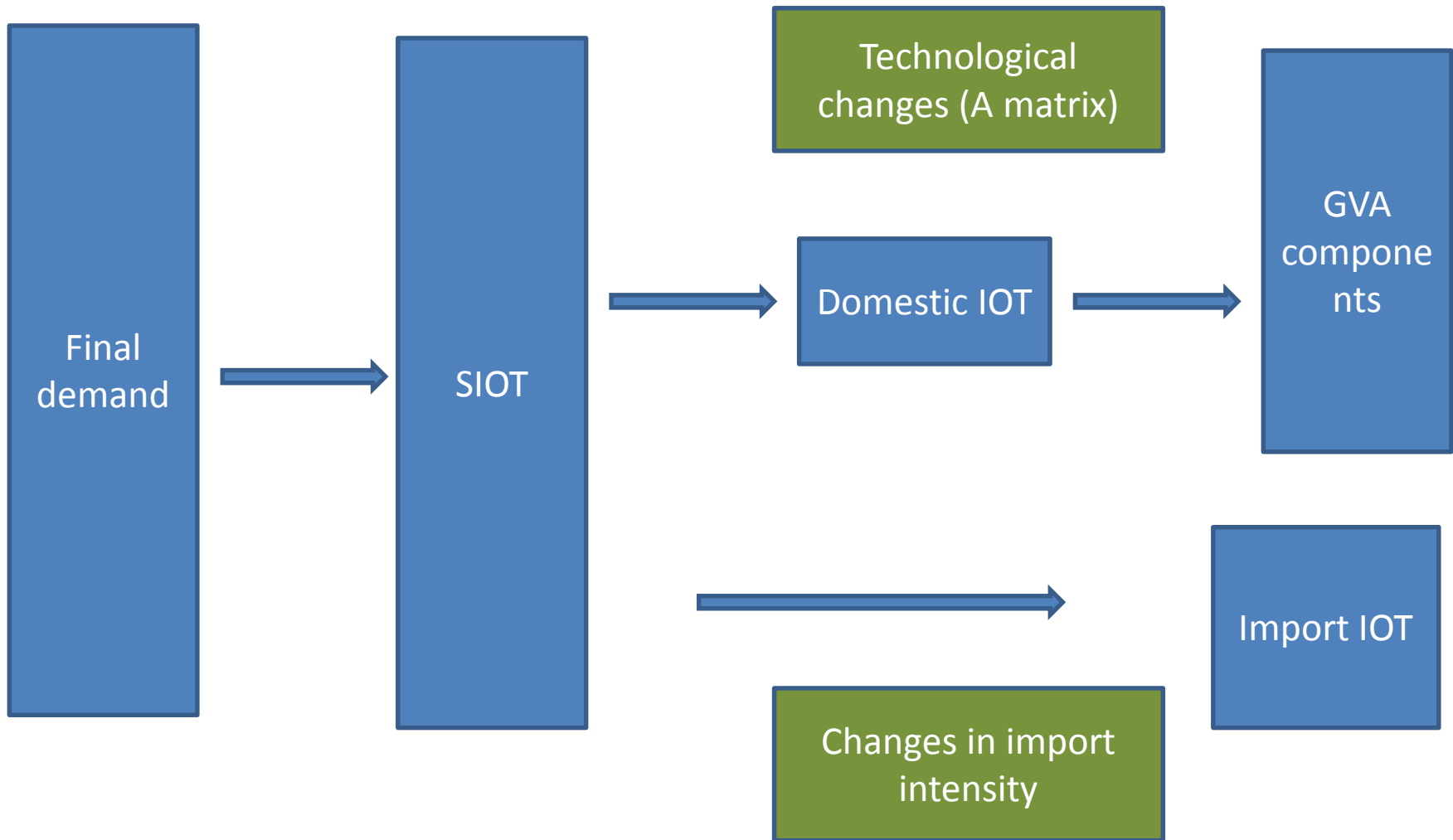


Final demand



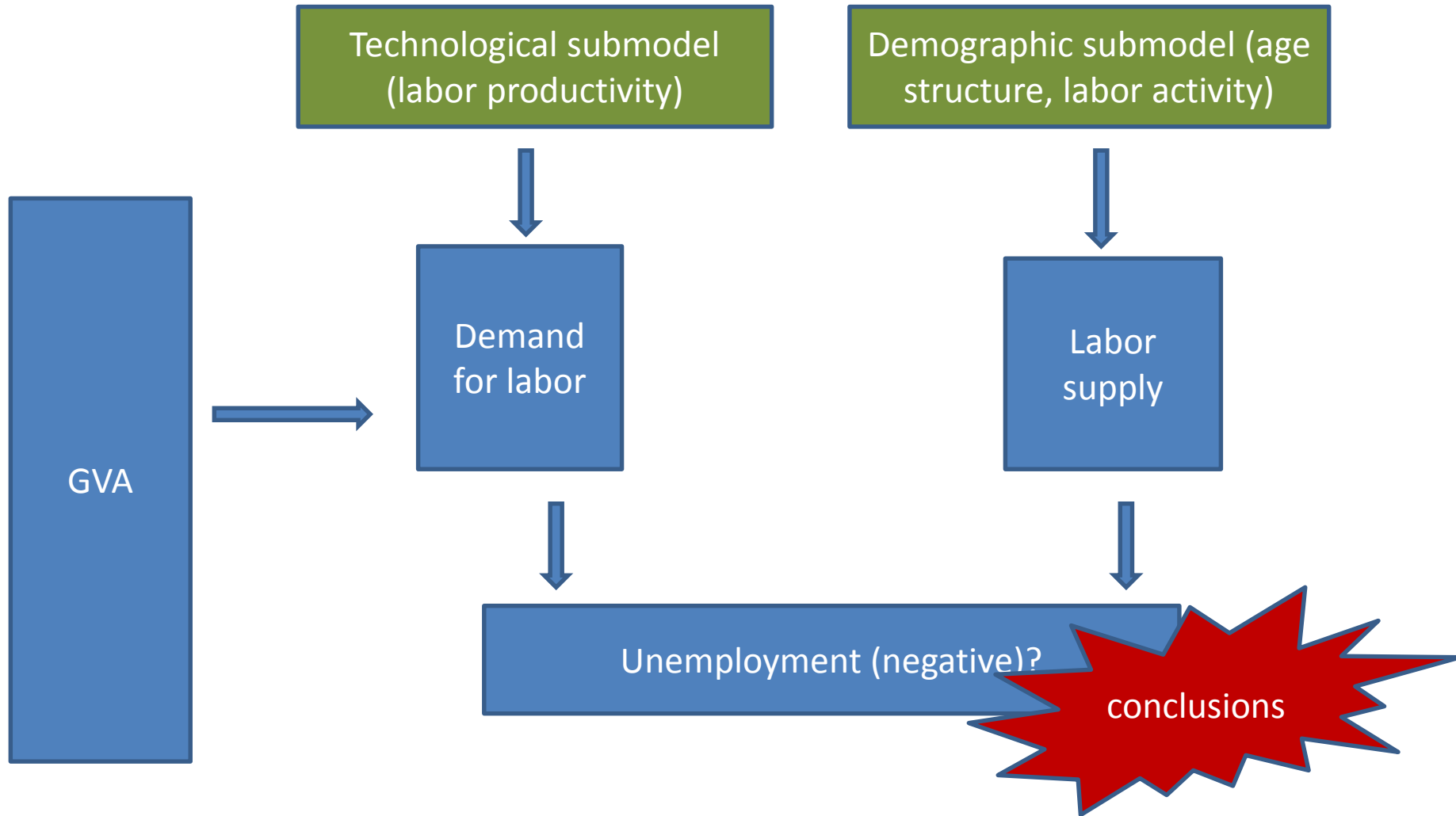


Input output tables



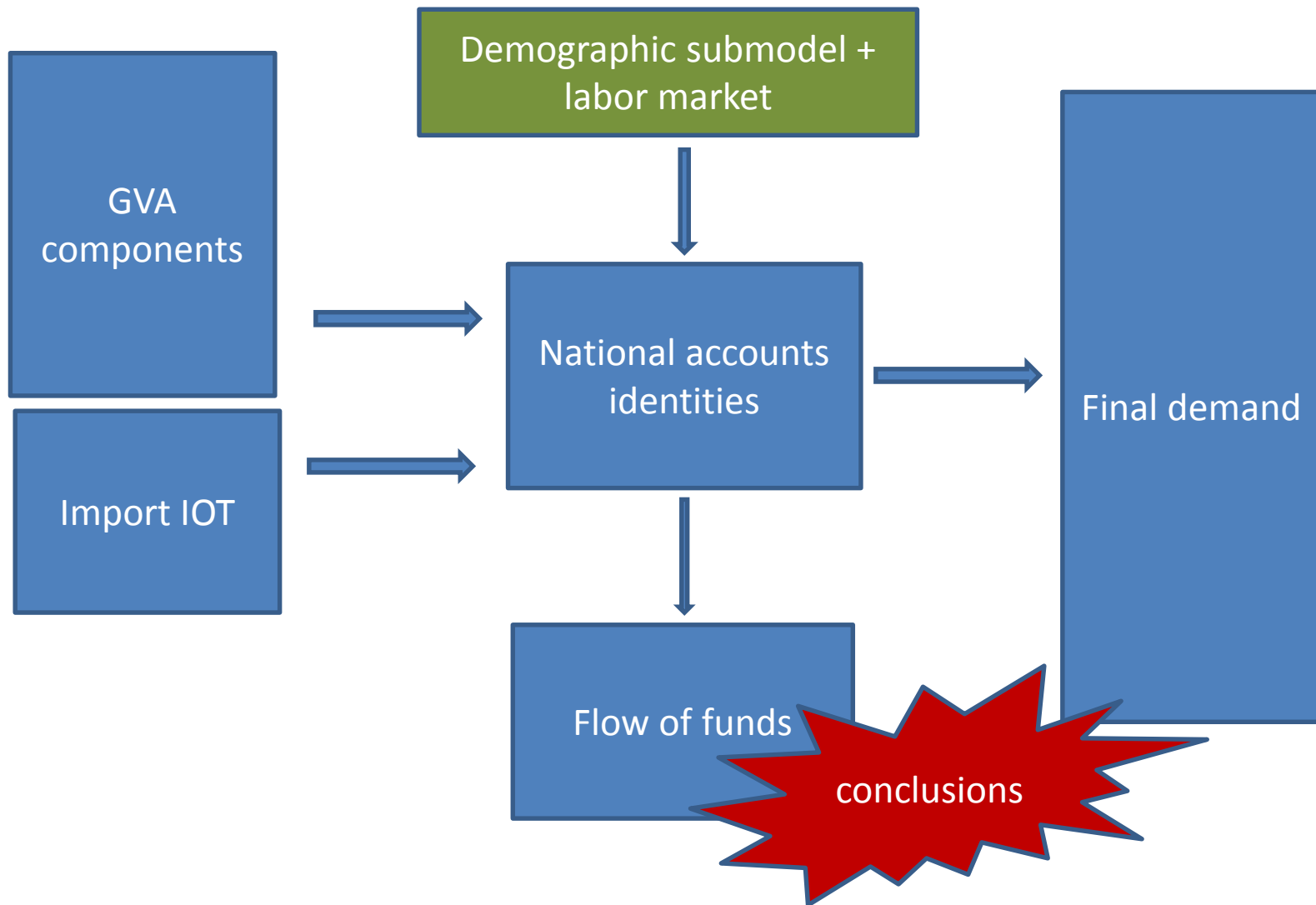


Labor market



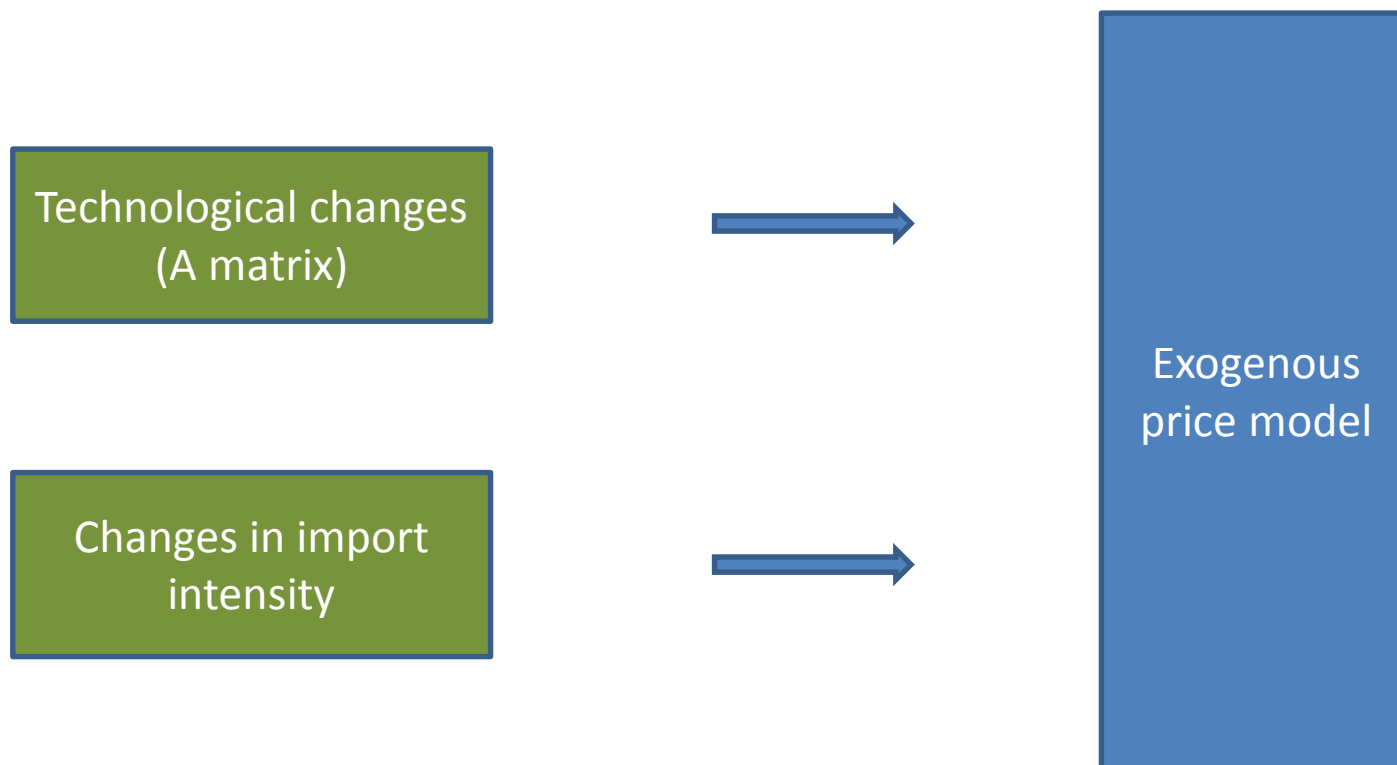


National accounts identities





Have you forgotten about the exogenous price model?





3rd stage – making ends meet

Finding the value of chosen parameters to make the ends meet - calibration.

Most of them are located in sequence of national accounts, for example the structure of value added by institutional sectors, propensity to save, replacement rate at retirement (rate of average retirement pay to average wage).

Optimization techniques at some parts of the model.



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