

Globalization and the Polish Economy: Stylized Facts and CGE Model Simulations

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Abstract

The aim of the paper is to quantitatively assess the impact of globalization on the economy of Poland in the medium term. Four channels of impact of globalization are distinguished: (i) trade openness, (ii) productivity improvement, (iii) labour migrations, (iv) liberalization of the services sector. First, we discuss stylized facts on adjustment of the Polish economy to globalization. Then we will present and discuss model-based simulations. As a modelling tool we use a computable general equilibrium model with multiple industries, labour markets, households and imperfect competition features.

Our results show positive and quite significant effects of globalization on the performance of the Polish economy. The strongest positive impact comes from productivity acceleration. Liberalization of services has also a considerable positive impact on GDP and especially on employment. The sizeable expected migrations result in negative effects of globalization by decreasing growth potential and causing upward pressure on wages. At the sectoral level, globalization is in particular beneficial to some exporting sectors and skilled segments of the labour market.

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1. Introduction

Over the last decades, global processes have gained significance as the factor important for the growth of Poland's economy. It was in fact the coincidence of two major developments. First, what is now called 'globalization' in the economic literature, should be more precisely named 'acceleration of globalization' since, as pointed out and analysed, eg. in Denis et al. (2006) it is the last 1 – 2 decades that have witnessed speeding up of the already ongoing 'secular globalization' process. Second, Poland broke off communist system and started market reforms, leading among others to rapid opening of the economy in 1989 and subsequent years, ie. the time when globalization processes were gaining momentum. Then with further strengthening of market economy mechanism, progressing integration with the European Union and finally accession to the EU in 2004, the economy of Poland has become subject to global economy impact as other medium-income countries of the region. Global factors' influence on Poland's economy manifests itself by all the channels usually mentioned in the literature such as: trade and capital flows, liberalization leading to increasing foreign competition, absorption of innovations from technologically advanced countries, intensive outward but also inward labour migrations, growing weight of global factors in shaping domestic inflation. While the impact of particular global processes on the Polish economy have been analyzed and quantified (eg. benefits of Poland's accession to EU – Centrum Europejskie Natolin 2003; Hagemeyer and Michalek 2007); cost and benefits of accession to Euro area – NBP 2004; Orłowski 2003; impact of globalization on inflation – Allard 2006), there has been scarce, if any, research aimed at quantitative assessment of how globalization, understood as variety of interconnected processes, affects Poland's economy¹. The aim and novelty of this paper lies in a quantitative assessment of the impact of key globalization processes on Poland's economy in the long run, using comprehensive methodological framework of a general equilibrium model.

The paper is organized as follows. In section 2 we review some related literature and discuss some stylized facts on how globalization affects economy of Poland. In section 3 the authors define the simulations experiments and discuss their results. Section 4 finalizes the paper with conclusions.

2. Review of literature and stylized facts on globalization for Poland

2.1. Review of literature

¹ The comprehensive discussion on globalization, with special emphasis on global imbalances and implications for monetary policy, may be found in Rybinski 2006 (in Polish only).

Given the fact that globalization is one of the most popular words in contemporary economic publications, the review of even most important contributions would be beyond the scope of this paper. We will refer shortly to works being themselves the reviews or to those that are relevant directly to our research. For instance, we found the paper of Denis et. al. 2006 as important reference for our work, since this publication gives not only overview of views on globalization and its impact on economies of the European Union (EU15) countries in the past but also offers a quantitative assessment of potential future effects of global processes on growth of the EU15 in the long-run. These authors adopt a standard notion of globalization, manifesting itself in increasing importance of trade and capital flows, international R&D flows and migrations for domestic economies (see section 3.2). Then, using relevant indicators they assess the impact of globalization on the EU15 economy in the past (since 1820). They further present a model-based² quantitative estimate of potential future macro benefits and costs of globalization for the EU in the long run (1990 – 2050). As the main conclusions on the past importance of globalization for EU15 the authors highlight:

- the increase in EU15 living standards by about 20% over the period of 1950-2002 thanks to EU's growing integration into the world's economy (trade openness effect),
- importance of international TFP spillovers (eg., productivity growth in Europe over the period 1950-2000 would be about 30% lower without openness, even without link between capital accumulation and TFP)
- the post-1990 acceleration in the globalization has been marked with the following new features: (i) further expansion in both trade and capital market integration, (ii) an ICT induced acceleration in the global relocation of production processes (iii) a worldwide income and technological convergence process, being driven mainly by the shift from planned to market economies and by the relative abundance of human capital in those countries.

The results of the long-run simulations lead the authors to the following main conclusions:

- globalization is expected to bring substantial welfare gains to EU citizens in the long-run, estimated as 8% of GDP per capita,
- real gains from globalization are dynamic in nature and they result from the restructuring and innovation, induced by the increase in competition and technology spillover effects and skill transfers.

² International macro model (QUEST) has been used as simulation tool.

As for other studies on quantitative assessment of globalization, they usually focus on specific global processes, mostly trade liberalisation. Various trade liberalization processes are believed to have had a significant effect on the volume in the world GDP – the estimated total effect of the Uruguay round was annual increase in the world GDP growth by 1pp (see e.g. Krugman and Obstfeld 2005, p. 335). Effects of the current Doha round of the WTO are yet unknown since the negotiations are still in progress, however, the recent study by Francois, van Meijl and van Tongeren 2005, estimates the static gains to be equal to 0.5% of the world GDP. The estimated world service trade increase amounts to 12%. Merchandise exports of the developing countries to the EU are expected to increase by 16%. Global trade in selected goods that was previously heavily protected is believed to increase considerably, eg. 41% (processed foods), 34% (textiles and clothing) and 16% (sugar).

There have been several papers estimating the effect of the accession of Poland to the European Union and the Single Market. A recent one, by Hagemeyer and Michalek (2007), estimates the GDP increase resulting from the removal of non-tariff barriers at the level of 1-1.2% (short-long run) and the total welfare effect at the level of 0.5-0.7% of GDP.

In the paper by Yusuf (2001), the effects of globalization are discussed from the point of view of developing countries. The author defines globalization similarly to Denis et al. (2006) paper, ie. as a combination of the following processes: growth of trade, capital flows, migration, IT and the diffusion of technology. Author starts with the hypothesis that it is only a relatively small number of upper and middle income countries that profit from globalization. Then he takes a policy-oriented approach to arrive at recommendations on 'good policies' that would enable developing countries to gain pro-growth effects of globalization. The general policy conclusion from the study may be expressed, following the author, as: *to gain pro-growth effects of globalization, developing countries should combine greater integration with the world economy with simultaneously conducted proper policy measures and institutional change*. As for the latter, author highlights:

- lifting protection measures on trade and capital flows to provide domestic economy with competition and modernisation,
- investment in the skills of domestic labour force, to increase absorption of technical advance
- regulatory reform to unleash domestic entrepreneurship.

The author finds it important to apply these measures in the comprehensive policy framework to embrace all the key elements of globalization together.

Poland is a middle-income country that combines the features of both developed and developing countries. With respect to globalization, Poland may be treated as a developed country being a member of the EU, considerably integrated as far as trade and capital flows are concerned, with marginal role of agriculture (but still employing a relatively high share of unskilled labour force), with relatively well educated labour force. On the other hand, Poland is affected by globalization processes in a similar way as the developing countries, for instance with respect to its dependence of productivity growth on FDI inflow and imports or large emigration. Some stylized facts on impact of global factor on the Poland's economy are discussed in the next section.

2.2 Stylized facts on globalization effects in Poland

Progress of globalization manifests itself mainly through increasing opening of the domestic economy to goods and services, capital and labour flows. Since the beginning of 1990s, the economy of Poland significantly increased its links with the world economy. For instance, trade openness, measured by the ratio of exports and imports to GDP increased from 49% in 1991 to 82.9% in 2006. As for capital inflows, the stock of foreign direct investment in Poland increased from virtually null in the beginning of 1990s (2.83 bill. USD) to over 92 bill. USD in 2005 (ie. about 31% of GDP). Inward FDI's have been important not only as a source of financing investment (additional to domestic savings), but also the powerful engine of productivity increase. With low intensity of domestic innovation and R&D activities³, the inflow of foreign capital and imports of machinery and equipment have been major sources behind productivity growth in Poland. The impact of FDI's, imports, and other global economy spillovers on TFP growth in Poland is documented in Kolasa and Żółkiewski 2004, Kolasa 2005, Piatkowski and Van Ark 2005, Clarke 2003. FDI's contribute a lot to the increasing openness of the Polish economy, both through the setting up export potential and increasing propensity to imports. According to IKCHZ (2006), in 2006 enterprises with foreign capital were responsible of 66% of total Polish exports vs. 57% in 2004. Since a large number of exporters use imported subcomponents in their activity, more than 86% of importers are exporters at the same time (NBP, 2007).

Globalization processes, and in particular accession to European Union in 2004, affected considerably the labour market in Poland. Due to wage differentials but also a large pool of

³ Expenditures on R&D amounted to 0.57% of GDP in 2005 that is one of the lowest records in EU25. However, it is even lower than in 1995 (0.63% of GDP).

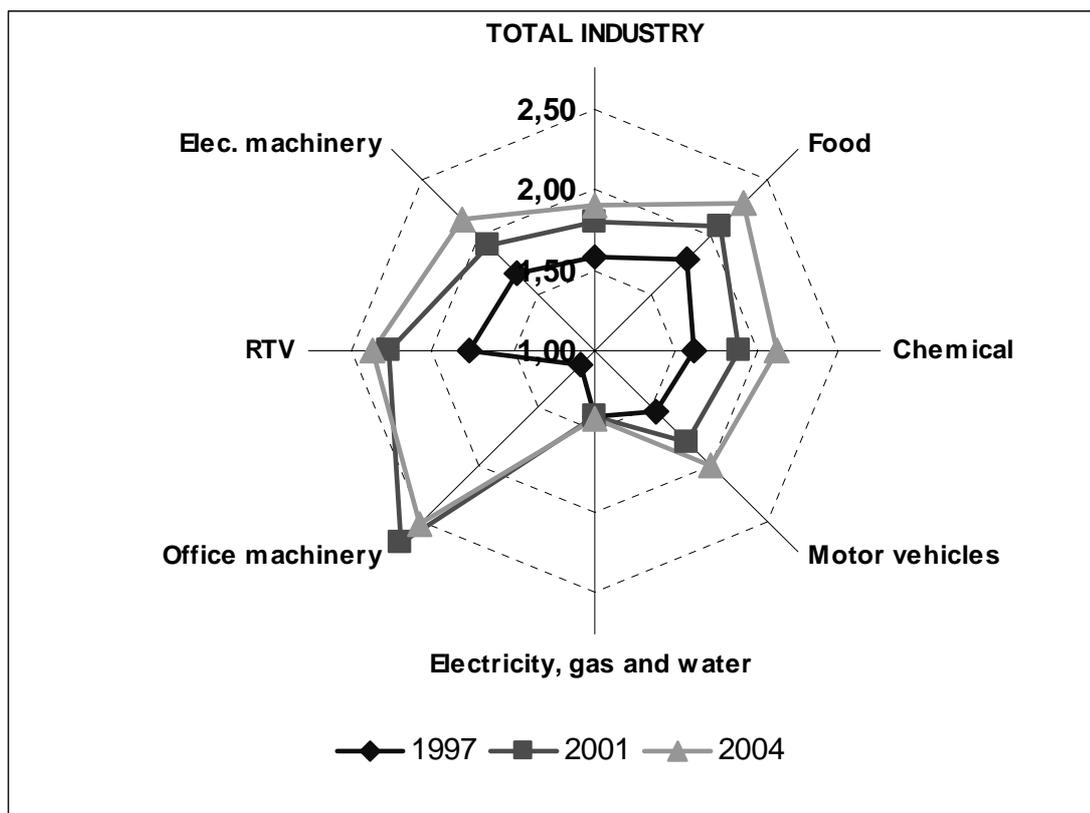
unemployed⁴, migrations accelerated after May 1, 2004 to the level important for both labour market in Poland and countries receiving our émigrés (mainly Great Britain and Ireland). There are different estimates of the actual size and duration of outward migrations since accession. If we take as the most reliable (probably rather conservative) estimate of the Centre for Migrations Research of University of Warsaw (Okólski 2006) we arrive at 3% of labour force, that is a already substantial size. Moreover, double of that may still emigrate. This large leakage of labour force already affects domestic labour market, especially that migrants are relatively better educated than the population on average⁵ (Kaczmarczyk 2006). This is one of the major reasons of increasing shortages of skilled workers as perceived by enterprises. For instance, according to the National Bank of Poland survey of enterprises, as of first quarter of 2007, firms reported the shortage of skilled labour as the second major barrier to growth while this barrier was perceived among the least important only a year earlier⁶. Another phenomenon observed at the labour market in Poland that may be hypothetically attributed to globalization is increasing wage inequalities between skilled and unskilled workers. Figure 1 illustrates how the ratio of skilled to unskilled wage changed in some branches over the period 1997 – 2004.

Figure 1 Skilled to unskilled wage ratio, 1997 - 2004

⁴ Unemployment rate is still relatively high in Poland (about 13% by the end of 2006) even if it has been decreasing fast over the last quarters (almost 17% by the end of 2005).

⁵ However, this author clearly states that there is no ground for declaring “exodus” of highly skilled specialists or “brain drain” as sometimes proclaimed in public discussion.

⁶ It was a barrier for 10.7% of the firms surveyed as of the first quarter of 2007 while only 1.8% reported this problem in the first quarter of 2006.



The general conclusion from his graph is that in the branches mostly affected by globalization (ie. with intensive import penetration, FDI inflow and exports creation) wage inequalities considerably increased (eg. food products - from 1.8 in 1997 to 2.3 in 2004, motor vehicles - from 1.5 to 2.0, office machinery - from 1.1 to 2.5). On the other hand, in the branch relatively sheltered from global economy impact, like electricity, gas and water, wage inequalities hardly changed over the analysed period.

While, by its very nature, globalization affects primarily tradable sector of the economy, it is also important for non-tradable activities, eg. through capital inflows changing both the market structure (competition effect) and boosting modernization (productivity effect). This is of particular importance for the service sector of the Polish economy part of which is, generally speaking, overregulated and protected. In particular, this refers to telecommunications (excessive prices of connections and internet), financial services (relatively expensive and underdeveloped, eg, with respect to financing of SMEs), network industries (like transport or energy generation and supplies) where state ownership with its typical inefficiencies dominates. According to Gradzewicz and Hagemeyer 2007a, particularly high monopoly markups are observed in transport, post and telecommunications, real estate and business services. In the case of telecommunications, fixed line

telecom market is highly monopolized – in 2005 the incumbent operator, Polish Telecom, had a 85 percent market share. The mobile segment is operated by an oligopoly of three firms. According to the UKE 2006 (telecom regulator) report, the costs of total monthly usage for an average retail customer of fixed line telephony were the 6th highest in the enlarged EU in 2005. Similarly, mobile phones were the 2nd most expensive among selected 13 EU countries. High monopoly markups lead to inefficient level of service provision – e.g. Poland had the 2nd lowest rate of broadband internet penetration⁷ in the EU-25 in 2005 .

3. Simulations of effects of globalization on Poland's economy

3.1. Modeling approach

The impact of the globalization on the behaviour of the Polish economy is analyzed using the Computable General Equilibrium model (see Appendix for a short description, for model details also see Gradzewicz, Griffin, Żółkiewski, 2006). Since the simulated globalization shocks (to be defined below) are expected to have long-run consequences, the authors decided to assess only long-term impact of globalization. Starting from the basic comparative static version of the model, the long-run has been modelled by introduction, in a simplified way, of long-run changes of capital supply. The following two step procedure has been used to calculate the long run response of the economy to the globalization shocks, taking into account capital accumulation. First, effects of globalization have been calculated subject to fixed capital stock constraint. In the second step (period), the investment dynamics from the first step was used to calculate the resulting long run response of capital accumulation to additional investments⁸, according to the formula:

$$\frac{\Delta K}{K} = \frac{1}{\delta} \cdot \frac{\Delta I}{K} = \frac{1}{\delta} \cdot \frac{\Delta I}{I} \frac{I}{K}$$

where K is the capital stock, I is investment and δ is the depreciation rate of capital. General equilibrium solution for this “long-run” level of capital is then interpreted as representing long-run equilibrium after globalization shock has been absorbed.

As for labour market, it is allowed to freely adjust (in terms of employment and wages) to changes in economic activity, highlighting the long-run consequences of the simulations. With

⁷ All data come from the UKE 2006.

⁸ In other words, the procedure assures that additional capital accumulation/decumulation originates only in investments triggered by globalization changes. The investments arising from capital accumulation do not augment its stock in the long run

respect to the product market, the model has imperfect competition features. According to the findings of Gradzewicz and Hagemeyer (2007b), who investigate monopolistic markups and economies of scale, Polish economy exhibits significant deviations from perfect competition. Following the empirical evidence, authors assumed that in case of most industries, companies are operating under Bertrand oligopoly with scale economies stemming from fixed costs of production. Additionally, authors introduced firm-level product differentiation, which is based on Dixit-Stiglitz 1977 love-for-variety formulation. Initial markups and the number of firms in the model are calibrated using results of Gradzewicz and Hagemeyer 2007a.

3.2. Assumptions of the globalization simulations

In our simulations, we distinguish four channels of globalization's impact on the Poland's economy:

- Trade liberalization,
- Productivity shock,
- Migrations of labour
- Liberalization of services

Merchandise trade liberalization is assumed to have a direct effect on prices of imported goods. Liberalization of trade with the EU involves removal of only non-tariff barriers (except agriculture), because most of the tariffs for manufactured goods are effectively zero since 2000. For non-EU imports, the scope of liberalization due to both completing of the Uruguay Round and future commitments in the Doha Round of the WTO is higher. Therefore it is assumed that prices of imports from the EU go down by 2.5 percent, while prices of imports from the rest of the world fall⁹ by 10 percent. It is also assumed that due to liberalization of EU imports from the rest of the world prices of goods imported from to Poland the EU fall by 1 percent.

In our simulations we assume that an increased foreign direct investment inflow combined with a surge in imports increase the total factor productivity. The overall TFP change in the economy increases by 1 percent, however, the exact size of change in a given sector is proportional to the relation of FDI inflow to the sector's production.

Opening of most of the EU-15 labour markets to workers from new member states (entering the EU in mid-2004) triggered an intense outflow of labour force from Poland (especially into the

⁹ For instance, the price of the basket of goods mostly affected by globalization (mostly, clothes, shoes, electronics and computer equipment) fall over 2006 by about 7% (over 2005 – 2006, by about 12%).

United Kingdom), mainly due to substantial wage differentials. The size of the migration from Poland is estimated between 0.5-0.6 million workers (Okólski 2006), which constitutes over 3% of labour force. This phenomenon is apparent especially among skilled people, which allow the authors to assume that globalization triggers a 2% decrease of in the number of people with tertiary and secondary education. Part of the income earned abroad by migrating workers is transferred back to the home country. Such remittances amount to roughly 12 billion PLN (about 1.2% of GDP) according to official balance of payment statistics (official private foreign transfer statistics report a 3 billion PLN inflow in the 1st quarter of the 2006 alone). It is assumed that these transfers affect only households where members are assumed to migrate (employees and self-employed). The transferred amounts are distributed among different types of households according to their proportion in the number of people migrating.

Liberalization of trade in services is in many cases different from merchandise trade liberalization. It entails the establishment of service providing enterprises in the host country that directly compete with incumbent firms. Globalization is therefore assumed to cause an inflow of firms into the service sectors (where entry was previously barred) that drives the profits to zero. Profits are calibrated in such a way, that it requires a 20 percent increase in the number of firms for the economy to reach this long run equilibrium. In other words, when entry barriers are removed, 20% more firms have to enter the market in order to reach the zero-profit equilibrium.

3.3. Results of simulations

3.3.1. Trade liberalization

Trade liberalization is expected to have a downward effect on prices of imported goods. Manufactured imports from the rest of the world will experience deeper price reduction than imports from the EU, since the former is believed to be still subject to more trade barriers (both tariffs and non-tariff barriers). At the same time, globalization is expected to lower the price level of manufactured goods in the EU.

The drop in import prices directly affects consumption of imported goods, both final and intermediate. The total increase in imports is 3.7% (macroeconomic results for all simulations are given in Table 11). Also total exports increase (by 1.9%) since lower costs of production, due to less expensive imported intermediate inputs, makes exporters more competitive. With a domestic demand increase by about 1.5% (consumption by 1.4% and investment by 1.6% - see table 11) trade liberalization results in an rise of GDP by 0.6% and 0.2% in employment.

Table 1 Simulated sectoral changes - trade liberalization

	Production	Costs	Export	Import	Employment
Agriculture	-0.5	-0.5	-2.0	1.0	-0.7
Mining	-0.6	-0.3	-0.8	0.7	-0.5
Manufacturing	0.8	-1.0	3.1	4.3	0.0
Construction	1.4	-0.8	1.3	1.5	1.3
Market services	0.5	-0.3	-0.3	1.5	0.3
Non-market services	0.3	0.0	0.0	1.7	0.1

Foreign trade is mostly affected in the case of manufacturing where imports increase by 4.3% and exports by 3.1%. (Table 1). The reason for the latter is competitiveness enhancement due to cost reduction resulting from lower prices of imported intermediate goods (by 1%). Production of manufactured goods increases by 0.8%. The total long run investment in the economy increases by 1.6% which in turn creates demand for construction services, going up by 1.4%.

Table 2 Detailed sectoral changes - trade liberalization

	Production	Costs	Exports	Imports	Capital	Employment
Agriculture	-0.5	-0.5	-2.0	1.0	-0.5	-0.7
Mining	-0.6	-0.3	-0.8	0.7	-0.2	-0.5
Food	-1.6	-0.3	-3.4	11.6	-1.2	-1.3
Light*	1.8	-1.1	2.9	4.8	1.3	1.9
Intermediate Light**	0.8	-1.4	4.2	5.9	-0.3	-0.4
Intermediate Heavy***	-0.6	-1.0	-1.2	3.9	-0.2	-0.6
Investment goods****	0.1	-1.3	0.7	2.3	-0.4	-0.3
Motor Vehicles	10.5	-2.1	11.2	3.0	8.9	2.6
Energy	0.4	-0.3	0.2	1.5	0.4	0.1
Construction	1.4	-0.8	1.3	1.5	1.4	1.3
Trade and Tourism	0.6	-0.3	-0.4	1.6	0.6	0.4
Transport and Comm.	0.4	-0.3	-0.1	1.5	0.4	0.2
Financial Services	0.6	-0.2	-0.1	1.5	0.5	0.4
Non-market Services	0.3	0.0	0.0	1.7	0.6	0.1

* Includes manufacturing of textiles, wearing apparel, leather products, publishing and furniture

** Includes manufacturing of wood, pulp rubber and plastic RTV and precision products

*** Includes manufacturing of petroleum, chemicals, mineral, metal products and basic metals

**** Includes manufacturing of machinery and equipment, of office machinery and electrical machinery

Detailed sectoral changes of major indicators are given in Table 2. The largest increase in imports takes place in the food sector (11.7%), followed by intermediate light (5.9%) and light (4.9%) industries. Food sector, having only a small share of imported intermediates in production costs, experiences a decline in exports. On the other hand, motor vehicles production, where the share of imported intermediate is higher than the share of domestic intermediates, experiences a surge in exports amounting to 11.2 percent.

Trade liberalization causes an increase in output mainly in those manufacturing branches that are intensive in labour with medium and higher education. As a result, the gap in wages between skilled and unskilled labour widens (Table 3). The skilled labour wages increase by 0.7% and

unskilled labour wages increase by only 0.4%. At the same time employment of skilled labour increases by 0.2-0.3% (high and medium education respectively), while employment of unskilled labour drops by 0.2%. Correspondingly, the participation rate of skilled labour force goes up by 0.14-0.20% and that of unskilled labour drops by 0.14%. The total effect on unemployment is -0.03 pp.

Table 3 Labour market - trade liberalization

	Education			Total
	High	Medium	Basic	
Employment	0.2	0.3	-0.2	0.2
Wages	0.7	0.7	0.4	0.7
Participation	0.1	0.2	-0.1	0.2

Trade liberalization shifts also the income position of different groups of households¹⁰. All households benefit from the trade liberalization, as their disposable incomes rise, but this growth is more pronounced in non-poor households (4.5% in nominal terms) than in poor ones (3.2%). This shift is mainly due to the differences in wages and employment of different labour types. Poorer households supply mainly less-educated labour, which meets lower demand and is paid less than better educated labour.

3.3.2. Productivity increase

In reaction to an increase of productivity of labour and capital by an average of 1% (resulting from increased FDI inflow and increased imports of technologically advanced goods from EU), GDP is higher by 3.4% in the long run. Considerable increase of GDP is, in part, a consequence of additional capital accumulation (capital is by 3.4% higher in the long-run), which results from the larger investment. Expansion of the economy and an increase of output shift the labour demand curve – in consequence employment level is higher by 1%. Increased labour demand, combined with an increase of labour productivity boosts wages, which are 3.3% higher in the long-run. Relative abundance of capital pushes its price down by 0.35%. Increased income from labour and renting capital to production activities results in a growth of disposable income of households and an 3% increase of consumption. Increased wages and overall positive development of the labour market induces inactive people to enter the market, which results in an increase of the participation rate. However, this effect is reduced to some extent by an adverse income effect, being a consequence of higher wealth.

¹⁰ Although there are ten types of households in our model, we will focus here only on poor (two first percentile groups) versus non-poor households.

Higher output of domestic firms, combined with a small decrease of costs of production in tradable sectors induces a strong reaction of exports, which is higher by over 5% in the long-run, although the appreciation of the exchange rate hampers the growth of exports. Increased domestic demand (and export activity), combined with an appreciation of currency by 0.4% increases the demand for imports by 4.4%. In consequence, current account in relation to GDP improves by 0.13%.

The assumed increase of productivity (TFP) is heterogeneous across different sectors and is proportional to the stock of FDIs in various industries. The highest productivity increases include: food, tobacco, light (wearing apparel, etc), motor vehicles, post and telecommunication and financial services. Table 4 shows changes in the structural development of the economy after the TFP increase. As the manufacturing and market services are mostly affected by increased productivity, the costs of production in these industries decline. On the other hand, in labour-intensive industries like mining and non-market services, the costs of production increase considerably. Considerable increase in production of manufacturing and market services is partly exported to the trade partners. Relatively modest consumption growth (in relation to investment or exports) results in quite weak increase of output of agriculture and non-market services. In turn, high investment demand pushes up the production of the construction. The increasing costs in agriculture, mining and non-market activities drive down the growth of exports in these industries, but simultaneously induce relatively high increase of imports, strengthened by appreciating currency. Considerable increase of production in manufacturing, market services and construction results in a higher than average increase of demand for labour in these sectors. The increase of employment in agriculture¹¹, mining and non-market activities is in turn moderate.

Table 4 Sectoral changes - productivity increase

	Production	Costs	Export	Import	Employment
Agriculture	2.2	0.3	0.7	3.9	1.7
Mining	1.4	1.6	0.5	3.0	0.8
Manufacturing	4.8	-0.2	6.2	4.7	3.6
Construction	5.0	0.3	4.6	5.3	4.5
Market services	3.5	-0.1	3.6	2.7	2.7
Non-market services	0.8	1.7	0.7	3.7	0.3

The increase of wages in different labour market segments is slightly skewed towards better educated labour, where the higher wages occur – see Table 5. This effect is due to relative increase of

¹¹ Since labour input is measured here in time units, increase of employment does not necessarily mean more farmers. Given low productivity of labour in agriculture, increase of employment resulting from simulations should be interpreted rather as more hours worked by existing (or even smaller) number of farmers than as enlargement of the population of farmers. The same applies to other industries.

participation, which hampers the wage growth of less educated labour force. Relatively low increase of employment of highly educated labour force is a consequence of relatively modest increase of production of non-market services, where most of people with higher education are employed. Moreover, this group to relatively small extent increases its participation in labour market. This is a consequence of an income effect, i.e. incomes from renting capital to enterprises rise and it is this group of households that most own capital

Table 5 Labour market - productivity increase

	Education			Total
	High	Medium	Basic	
Employment	0.6	1.1	1.5	1.0
Wages	3.3	3.3	2.7	3.3
Participation	0.6	0.8	1.1	0.8

Due to the increased wage dispersion, the income position of non-poor households improves against poor households (disposable incomes of non-poor are higher by 2.6% and by 2% for poorer ones). This tendency is amplified by increased income from capital (although the price of capital falls, its supply rises substantially), which has a higher share in incomes of richer households. One should keep in mind, that despite increasing income differentials, the income position of all types of households improves in general.

3.3.3. Labour migrations

In reaction to the outflow of workers from domestic country, combined with increased remittances flowing from abroad, we are observing a decrease of GDP by 0.5%. The negative labour supply shock (being a direct result of migrations and an additional income effect of increased disposable income of households) pushes the wages up by 2.2% and employment down by 1.4%. Decline of the participation rate leads to a drop of unemployment rate by 3.4%. As a result of an increase of income from labour and increased transfers from abroad, disposable income of households surge, as well as consumption, which is higher by 1.6%. The increase of investment is very moderate and amounts to 0.6%, with the resulting slight rise of capital supply (by 0.2%) in the long-run. Increased supply of capital, combined with a drop of demand for production factors pushes the price of capital (relative to the average price of goods produced) down by 2.4%.

Due to the inflow of transfers from abroad, the demand for domestic currency surges and the currency appreciates by 0.6%. Currency appreciation, combined with the growing costs of

production in tradable sectors lead to a drop of exports by 5.9%. That is to a large extent explanation for almost no change of imports even if domestic demand increases. As a consequence of drop in exports and stable imports, the current account to GDP ratio declines by 0.24%.

The pattern of macroeconomic growth shapes the branch structure of production (see Table 9). Increased consumption demand drives up the demand for agricultural, market and non-market services production. Also the slightly increased investment demand results in some increase of output of construction sector. On the other side, a sharp decline of exports drives down the production in tradable sectors – manufacturing and mining contribute negatively to output of market activities. The production sold abroad declines in almost all industries, especially in manufacturing. Only the exports of agricultural products increase – being a consequence of a drop of costs of production. Agriculture sector is relatively capital intensive (in comparison to other tradables in the economy) and employs mostly work force with basic education. The price of capital falls and wages of less-skilled labour rises only moderately, so the costs of production in agriculture sector is lower in the long-run. The demand for imported goods across almost all sectors rises only moderately, mainly due to the appreciation of the. Increased wages (combined with decline of price of capital, triggering the substitution effect) drives down the demand for labour of most industries (with manufacturing sector experiencing the highest contraction of employment). Only the employment in agriculture grows slightly, due to relatively strong increase of production and demand for factors of production. The substitution between capital and labour is mostly apparent in construction, where production increases slightly, but due to high relative costs of labour, employment declines (the overall costs of production decline). Contraction of employment also occurs in production of non-market services, as it employs mainly well-educated labour whose price increases the most.

Table 9 Simulated sectoral changes - migrations

	Production	Costs	Export	Import	Employment
Agriculture	1.3	-0.7	2.0	0.8	0.6
Mining	-1.4	0.7	-2.3	-0.8	-1.8
Manufacturing	-4.2	0.1	-9.1	0.0	-3.8
Construction	0.2	-0.1	-0.1	0.4	-0.5
Market services	-0.1	-0.4	-0.6	0.4	-0.9
Non-market services	0.2	0.7	-0.5	0.6	-0.3

The changes in the structure of labour market are presented in Table 10. Outflow of workers with secondary and tertiary education drives up their the wages by over 2.3%. Participation rates and employment are also declining. The relative abundance of work force with basic education, combined with declining price of capital (in the model less educated labour is assumed to be relatively substitutable with the capital) constrains the increase of wages in this market segment (they

increase by only 0.5%). Growing wage differentials between less and better educated work force result in a huge decline of participation rates among the workers with basic education. This fact, together with the relatively weak demand for labour in the economy drives down the employment in this labour market segment.

Table 10 Labour market - migrations

	Education			Total
	High	Medium	Basic	
Employment	-1.0	-1.5	-1.2	-1.4
Wages	2.3	2.4	0.5	2.2
Participation	-4.3	-3.1	-12.5	-4.1

Changes in the labour market result in the incomes of all household types rising (on average by 1.4%), with poor households' incomes higher by 2% and the income of non-poor households – by 1.3%. On the one hand, the income from labour grows faster for better educated labour (richer households), but on the other the income from renting capital to production activities is declining and affects adversely the richer households (capital income has share in total disposable income of these households). Additionally, although the bulk of the transfers from abroad flows to richer households, there is also an upward shift of social transfers (government expenses related to non-working of people, like unemployment benefits, pre-retirement pensions or disability allowances) flowing to poorer households as labour market situation deteriorates. The net effect is favourable to income position of poorer households.

3.3.4. Liberalization of services

Opening of service markets induces entry of new firms. The new long-run equilibrium is where the profits are zero. With new entry, firms move up their average cost curves until price equals average cost. As a result, output per firm drops. Compared to the benchmark equilibrium, entry of new firms amounts to 19-24% (Table 6). The corresponding drop in firm output is the highest in business services, trade and hotels/restaurants and amounts to 21-24%. Such a large decrease in firm output is due to the relatively high calibrated love-for-variety elasticity of substitution in those sectors (low initial markups), making consumers value more the increase in the number of varieties offered than the quantity of a single variety. The lowest drop in firm output is expected to be experienced in post and telecommunications, where the calibrated elasticity of substitution between varieties is low (high initial markups) and market can accommodate more large firms.

The resulting decrease in prices varies depending on the initial level of monopolistic markups. It amounts to 13.4% in telecommunications, where initial profits were high (more than 12% of total revenue) and only 3.5% in trade, where initial profits amounted to less than one percent of 1 % of total revenue. As a result of a drop in prices, the total output of market services goes up by 4.6%, the increase being highest in post and telecommunications (8.9%) where the amount of the initial loss of efficiency due to monopoly markups was relatively high and the lowest in trade where costs to entry were low and market structure was initially relatively competitive.

Table 6 Firm level changes – liberalization of services

	Firm no	Firm output	Output	Prices	Profits
Trade	23.6	-21.0	3.5	-0.5	-0.9
Hotels and restaurants	21.8	-21.3	2.2	-0.4	-2.4
Transport	22.6	-20.0	6.8	-5.8	-4.7
Post and telecommunication	19.2	-15.3	8.8	-13.4	-12.3
Financial services	22.1	-20.1	4.2	-2.2	-2.2
Business services	22.5	-23.6	4.6	-4.8	-5.5

The simulated increase in output in the service sector leads to a considerable increase in investment in a short run (3.2%). This, due to the long-run capital accumulation, causes long run increase in investment of about 10%. Such a surge in investment strongly affects the demand for construction services, that consequently go up by 6%. Expansion in production and increased investment demand also affects the price of capital, which is expected to rise, by approximately 3%.

Table 7 Simulated sectoral changes – liberalization of services

	Production	Costs	Export	Import	Employment
Agriculture	0.7	1.3	-2.1	3.8	0.4
Mining	1.1	2.3	-0.1	3.1	0.5
Manufacturing	1.9	0.8	0.9	5.1	1.3
Construction	6.0	1.2	5.5	6.4	5.6
Market services	4.6	0.6	6.8	-2.2	4.1
Non-market services	0.6	2.6	0.4	3.3	0.2

Liberalization of services has a long run impact on the labour market. Employment is expected to go up on average by 2.1 percent, and the increase varies depending on a skill level. Detailed breakdown of labour market effects is presented in Table 8. Due to the structure of employment in services, wages of skilled labour force is expected to go up by a higher amount (4.9%) than those of unskilled labour force (3.9%). Total wage increase is 4.9%. The participation rate is expected to go up by 1.6% (skilled labour force) and 2% (unskilled labour force). The latter effect is mainly driven by the increase in output of the construction sector characterized by a high share of unskilled labour in total employment.

Table 8 Labour market - liberalization of services

	Education			Total
	High	Medium	Basic	
Employment	1.7	2.2	2.6	2.1
Wages	4.9	5.0	3.9	4.9
Participation	1.6	1.7	2.0	1.7

The income position of different household types mainly results (as in the previous channels of globalization considered) from increased wage differentials. Although the additional employment of less skilled labour is higher, the relatively higher wages of skilled labour tends to have bigger effect on income from labour of non-poor households. This effect is reinforced by increased income from renting capital to production activities, as both the price and the supply of capital increase. Due to the higher shares of income from labour in total income of non-poor households, the contribution of higher rental payments is more pronounced in case of richer households (their total incomes are higher by 4.5% vs. 3.2% in the case of poor households).

Liberalization of services is expected to add 3.2% to the level of real GDP in the long run. Apart from a 10% surge in investment, there is also a considerable increase in consumption (3%) due to increased variety of goods. Imports and exports increase (by respectively 4.3 and 2.8%), what leads to worsening of current account (ca. -0,52% GDP) .

3.3.5. Overall globalization simulation outcomes

The overall effect of the globalization shocks is an increase of GDP by 6.7% in the long run (Table 11). This effect is mainly driven by positive effects of services liberalization and an overall increase of productivity, being a consequence of an increasing imports and foreign direct investments. The main source of growth is the investment demand, which is higher by almost 20% in the long run while consumption is higher by almost 9%. Increased investments result in a considerable build-up of capital – it is higher by 7.8% in the long run. The increase of employment is much more moderate – it is higher by almost 2% in the long run. Unemployment drops by over 3.8 percentage points, mainly as a consequence of lower labour participation induced by migrations. All the effects of globalization considered contribute positively to wage growth (the highest contribution comes from liberalization of services and migrations), which are higher by almost 11% in the long run. Although capital supply increases substantially, its price is almost unchanged, and the differential between price of labour and capital increases.

The overall growth of exports is quite moderate – it amounts to almost 4%. Services liberalization, trade development and productivity improvements contribute positively to exports growth, but their impact is hampered by contraction of exports in reaction to increased transfers from abroad and lower economic activity level induced by migrations (see footnote 2). In turn, almost all channels of globalization considered (except for migrations) affect positively the development of imports. As a consequence they grow by 12% in the long run. The build up of imports and relative weak growth of exports is also supported by appreciating exchange rate. In consequence of these trade developments, current account declines in relation to GDP by 0.25% and net exports contribute negatively to GDP growth.

Table 11 Breakdown of overall effects

	Services	Migrations	Trade	Productivity	Total
GDP	3.3	-0.6	0.6	3.4	6.7
Consumption	3.0	1.6	1.4	3.0	8.9
Investments	10.1	0.6	1.6	7.1	19.4
Exports	2.8	-5.9	1.9	5.1	4.0
Imports	4.3	0.0	3.7	4.4	12.1
Unemployment	-0.3	-3.4	0.0	-0.2	-3.8
Employment	2.1	-1.4	0.2	1.0	1.9
Wages	4.9	2.2	0.7	3.3	10.9
Capital	3.6	0.2	0.5	3.4	7.8
Price of capital	3.0	-2.4	0.0	-0.4	0.2
CA/GDP	-0.5	-0.2	0.4	0.1	-0.2
Exchange rate	0.0	-0.6	-0.3	-0.4	-1.3

The rapid growth of investment demand induces a shift in the branch structure of the economy – the growth of construction sector is the highest in the long run (Table 12). Construction generates also considerable growth of new jobs. Production of market services is also considerably higher and is mainly driven by services liberalization and productivity improvements. This industry is also generating a considerable growth of demand for labour. A moderate production and labour demand increase occurs in manufacturing and agriculture and the growth of mining and non-market services is rather limited.

Table 12 Overall sectoral changes

	Production	Costs	Export	Import	Employment
Agriculture	3.8	0.4	-0.9	9.2	2.2
Mining	0.7	4.2	-2.5	6.0	-0.8
Manufacturing	3.4	-0.4	1.3	13.9	1.3
Construction	12.6	0.6	11.4	13.6	10.9
Market services	8.5	-0.1	9.6	2.3	6.2
Non-market services	1.9	5.0	0.9	9.2	0.3

In reaction to globalization processes, the highest growth rates of exports occur mainly in market services and construction products, although there is also an increase of exports of manufacturing product (which have the highest contribution to overall export increase). The economy experiences a contraction of exports in agriculture and mining industry. The highest growth of imports occurs in manufacturing and construction (over 13%). Also the imports of agriculture goods and non-market services grow considerably. Dynamics of Imports of market services is in turn very limited.

Table 13 Overall labour market changes

	Education			Total
	High	Medium	Basic	
Employment	1.5	2.0	2.8	1.9
Wages	11.1	11.2	7.4	10.9
Participation	-2.0	-0.3	-9.2	-1.4

Globalization processes induce a widening of wage differentials among labour with different skills (ie., education level). The wages of skilled workers increase by about 50% faster than the wages of unskilled workers (Table 13). Slower growth of wages of workers with basic education occurs despite higher demand for their services. Also the participation rate differs among work force with different skills. Although the participation rate declines overall, a decrease experienced for low-skilled workers is much larger.

The distribution of income among different household types also changes in response to globalization processes. Almost all channels of globalization considered (except for migrations) induce higher level of disposable income of non-poor households (overall effect is 8.9%) than of poorer ones (where incomes are higher by 7.4%). Increasing income inequalities in favour of non-poor households may be related mainly to changing wage differentials on labour sub-markets and increased income from renting capital to productive activities, which have a stronger impact on incomes of richer households.

4. Conclusions

Our simulations show substantial growth effects of globalization for Poland in the long-run. These effects amount to 6.8% of additional GDP compared to a scenario without globalization processes. This is a result of a similar order of magnitude to globalization effects estimated by Denis et al. 2006 for the EU-15 countries in the long-run (8.0% higher GDP per capita in 2050). The main channels of pro-growth impact of globalization on Poland's economy are: productivity growth,

triggered mainly by FDI inflow (3.4% of GDP) and pro-efficiency effects of liberalization of services sector (3.3% of GDP). Globalization changes growth pattern in favour of investment (19.4% in the long – run vs. 8.9% in case of consumption) what supports long-run growth. The propensity to import of domestic agents increases (19.4 % of GDP in the long – run vs. 4.0 for exports) what is also favourable to long-run growth as imports are an important channel of modernisation in Poland. Globalization contributes positively to evolution of the labour market by additional growth of both wages and employment (respectively, 10.9% and 1.9% in the long – run) and it leads to increasing wage inequalities between high-skilled (11.1% over the base-run) and low-skilled (7.4% over the base-run). The globalization processes turn out to be favourable to welfare of households (due to globalization, their disposable income is in the long-run higher by 8.8%). However, together with increasing wage inequalities globalization slightly deteriorates relative income position of poor households as compared with the rest (respectively, 8.9% and 7.4% over the base-run). Relative well-being of non-poor households increased because of increasing wage inequalities and increasing capital income that is more important source of living for this group of households than for the poor. As for the latter, the deterioration of their position is to some extent reduced by government transfers.

If the results on long-run impact of globalization for EU-15, obtained in the above quoted study of Denis et. al. 2006 were treated as the benchmark for our results, one might be surprised that we produced the figures smaller than in this study. If pro-growth effects of globalization happen mainly through FDIs and import channel creating productivity acceleration, one might expect that it should have stronger impact for relatively poorer (comparing to EU-15) countries like Poland. We find this hypothesis as plausible and treat our results as the lower bound for the long-run impact of globalization on Poland's economy. Our assessment of effects of globalization is rather conservative since the following channels are not taken into account in our simulations First, we underestimate trade creation effects of globalization for Poland since exports are modelled in a simplified way: they are only supply-determined and are explained by relative prices changes only. Second, since our model does not explain the general price level, we could not take into account the significant impact (downward pressure) of globalization on inflation¹². That results in smaller cost of stabilising

¹² Allard 2006 estimates downward impact of globalization on inflation in Poland on ½ to 1 percentage point per year since the middle of the 1990s.

inflation and in lower interest rates with eventual consequences for, first of all, investment and potential output growth. Third, one of other prospective channels of impact of globalization on Poland's economy is further economic integration with Europe in the form of accession to the euro area. As assessed by the National Bank of Poland (NBP 2004), the long-run effects of this process are up to 0.4% additional GDP growth in the long-run. According to the authors of that report, if this effect occurs the GDP in 2030 would be by 11.8% higher than in no-accession scenario. Taking all these factors into account, we hypothesize that the prospective effects of globalization may be larger for Poland than reported in this paper.

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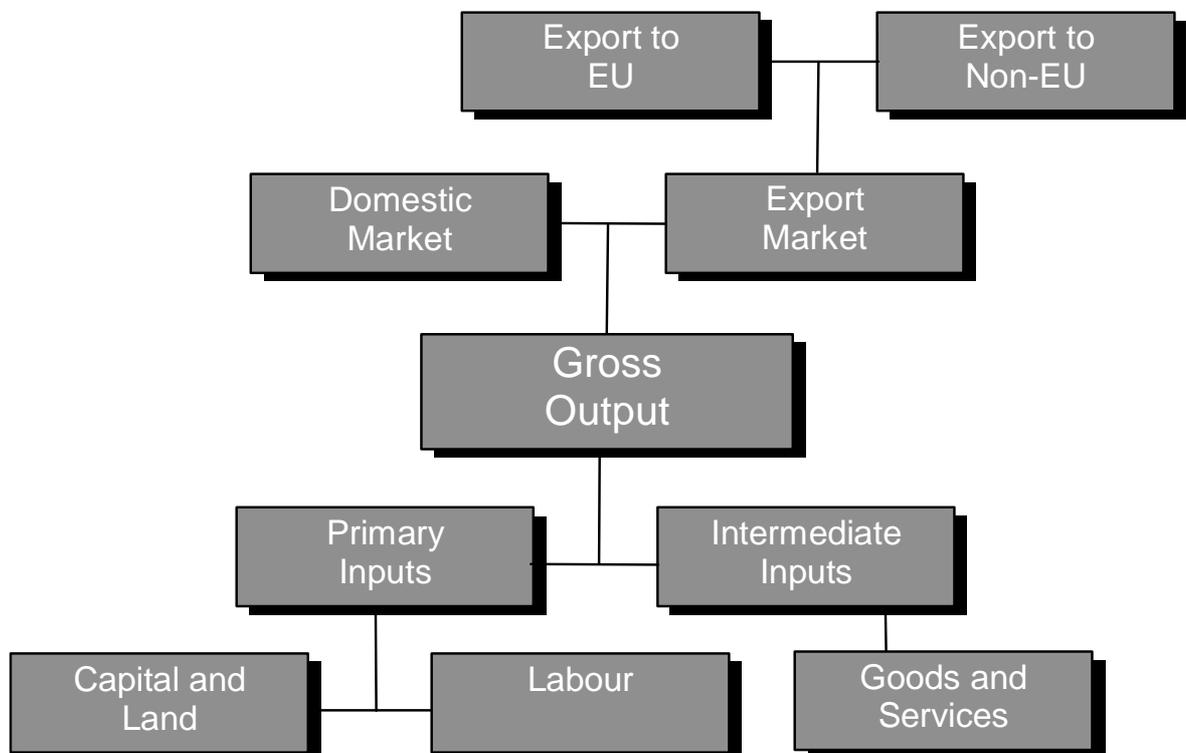
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Appendix. Brief description of the CGE model

This annex delivers a brief description of the CGE model, that was used to perform the simulations presented in the main text. The details of the model one can find in Gradzewicz, Griffin, Żółkiewski (2006).

The model describes the allocations and flows of funds in the economy populated by optimising economic agents, subject to their budget constraints. The model assures that the equilibrium conditions on all markets are met and thus all the quantities and prices are the result of competitive allocation that supports the general equilibrium in the economy.

Picture A.1. Production activity scheme

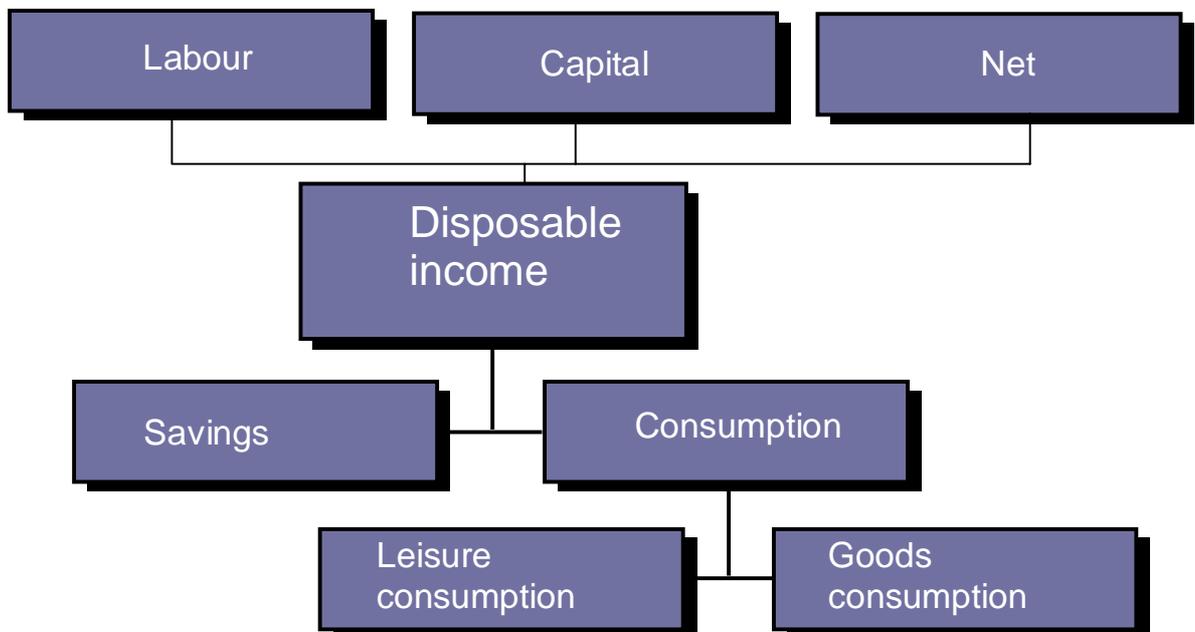


The structure of the model is quite detailed – there are 39 types of producers (and goods that are traded), that use a bundle of intermediate products and a bundle of primary inputs to transform them into the tradable product (see picture A.1), subject to the CES technology. Primary inputs consists of capital good and 3 types of labour (with basic, medium and higher education), supplied by the households. The demand for factors of production is a result of cost minimization by producers. The produced goods are sold by enterprises either to domestic or to foreign markets (EU or non-

EU) in a way that maximise producers' profits subject to demand constraints and relative prices that are given to an individual producer.

Imperfect competition is embedded in the process of gross output formation. It is assumed that a part of gross output is used to pay the fixed cost of production. The total amount of gross output forgone is a function of the number of firms operating in a given sector. Firms produce individual product varieties and each firm has a limited monopoly power stemming from product differentiation. Demand for an individual variety comes from a standard CES Dixit-Stiglitz aggregator. Firms are assumed to compete in the Bertrand fashion taking into account the effect of their actions on the perceived demand. Markups are thus variable and are a function of the CES elasticity and the number of firms.

Picture A.2. Households' decision scheme



There are 10 types of households in the model, divided by socio-economic features (employees, self-employed, farmers, employers and other) and their income (poor and non-poor). Households pool their income from renting labour and capital to the producers and net transfers with other agents in the economy (e.g. social transfers from the government). They spend their income on consumption of goods and leisure, and the rest is saved. As the model does not describe the allocation of consumption in time, the households' propensity to consume (and save) is constant. The inclusion of leisure in the utility function makes the households' labour supply endogenous. It is

affected by the stance of the economy and by the government interventions (labour tax and social transfer changes).

Investments in the model are determined by the available savings and the price of investment good. Pooled savings of households, government, firms and banks and the rest of the world constitute total savings

The households' demand for goods, combined with the General Government's demand (public consumption), the investment and intermediate demand is satisfied either by domestic or by foreign producers (imports), according to the Armington specification.

The government (the General Government sector) collects taxes from producers, taxes on goods (VAT, excise, import tariffs), corporate income taxes from companies and banks, personal income taxes from household and social security contributions (treated as a tax wedge on wages). The government expenses include government consumption, subsidies and transfers to other sectors of the economy (including social transfers to the households that are treated as a disincentive to work in the model).

Model solves in terms of relative prices, i.e. they are defined against some reference price (numéraire). General price level (GDP deflator) was used as numéraire.