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# **Ukraine's trade policy choice: pros and cons of different regional integration options**

*Analytical Report*

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## **1. Introduction**

Ukraine is a small open economy highly interested in a favourable environment which allows easy access to external markets and ensures stable trade flows. The membership in the World Trade Organisation (WTO) has significantly contributed to the achievement of this goal, ensuring a certain level of stability and transparency of trade policy in Ukraine and in partner countries. Still, a deeper regional integration provides additional opportunities for trade liberalisation and thus economic development.

Currently Ukraine has appeared in a unique situation sandwiched between two custom unions, the European Union and the Customs Union of Russia, Belarus and Kazakhstan (RBK CU) established in the EurAzEs framework.

Ukraine's has officially declared European integration as a strategic objective of its foreign policy. In 2007, the talks on Association Agreement with the EU were launched, and the negotiations regarding the establishment of deep and comprehensive FTA (DCFTA) have followed in 2008. In October 2011, the technical completion of DCFTA negotiations was announced, though the initialisation and ratification of the agreement is under risk given challenges faced in the political dialog between the partners.

The cooperation with the CIS countries has been also considered as a strategic priority of Ukraine. So far, the officials have emphasized a free trade agreement as the desired level of economic integration with post-Soviet countries. The signature of the CIS FTA Agreement is an important component of this strategy. At the same time, Russia has become increasingly active in trying to persuade Ukraine to join the RBK CU.

This study continues the economic assessment of these two major regional integration options faced by Ukrainian policy makers. The paper compliments the usual qualitative discussion with a quantitative assessment of the integration options.

The paper is structured as follows. Section 2 reviews Ukraine in the world. The trade in goods and services, capital flows and labor mobility is briefly reported in the section. Current economic relations between Ukraine and the European Union are overviewed in the Section 3. Section 4 summarized current economic relations between Ukraine and Russia, Belarus and Kazakhstan. Quantitative estimation of the impact of different types of the regional trade agreements with Ukraine's participation on Ukraine's economy is presented in the Section 5. Section 6 concludes.

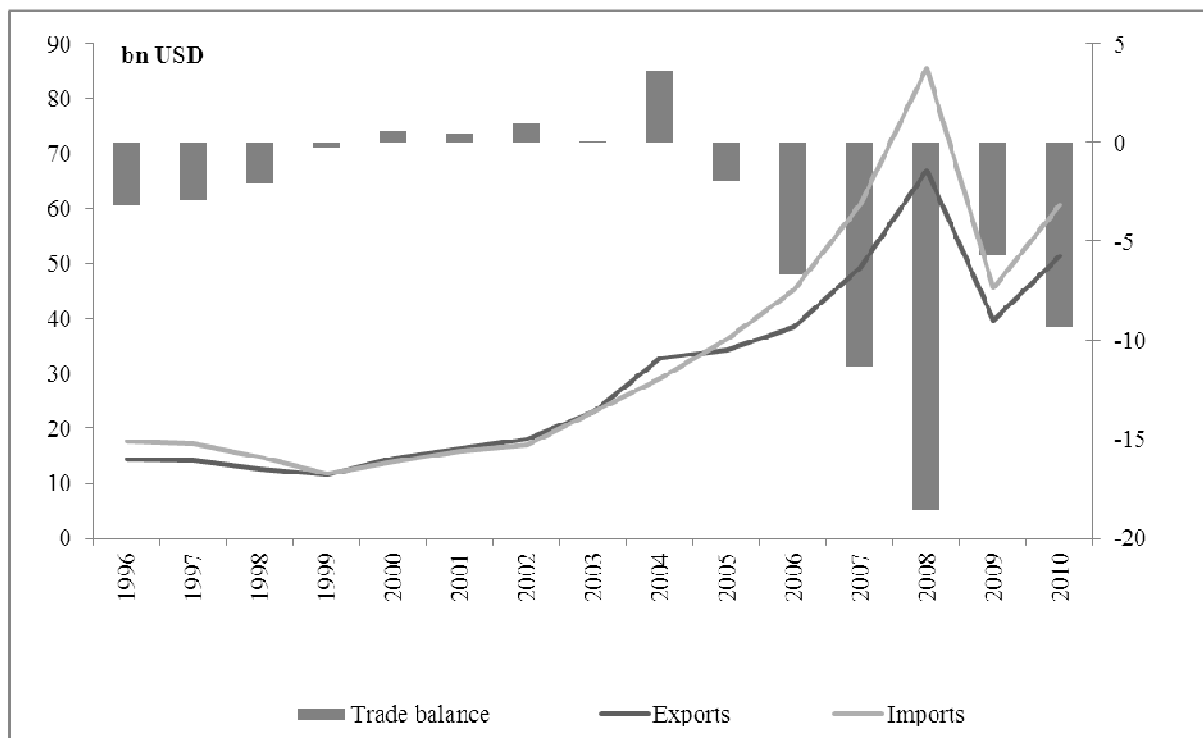
## **2. Ukraine in the world trade**

### **a. Trade in goods and services**

Volume of Ukraine's international trade had been constantly growing for a decade – from 1999 till 2008 (Figure 2.1). In 2009, the volume of trade decreased mainly due to the world economic crisis and its consequences for Ukrainian economy. State Statistics Service of Ukraine reported a 41% decrease in exports and 47% decrease in imports. In 2010, the volume of trade returned to its pre-2008 level: exports increased by 30% and imports by 34%.

From 2000 till 2004, Ukraine had been a net exporter. Since 2004 trade balance of Ukraine became negative and had been growing pretty fast. In 2009, the balance of trade decreased by 70% and constituted USD 5.7 bn. The fall is explained mainly by negative developments on international markets that decreased demand for Ukraine's export and by depreciation of Ukrainian currency and anti-crisis measures of the CMU that limited imports. But in 2010, with economic recovery, trade balance increased again and reached USD 9.31 bn.

**Figure 2.1 International trade of Ukraine, historical data**

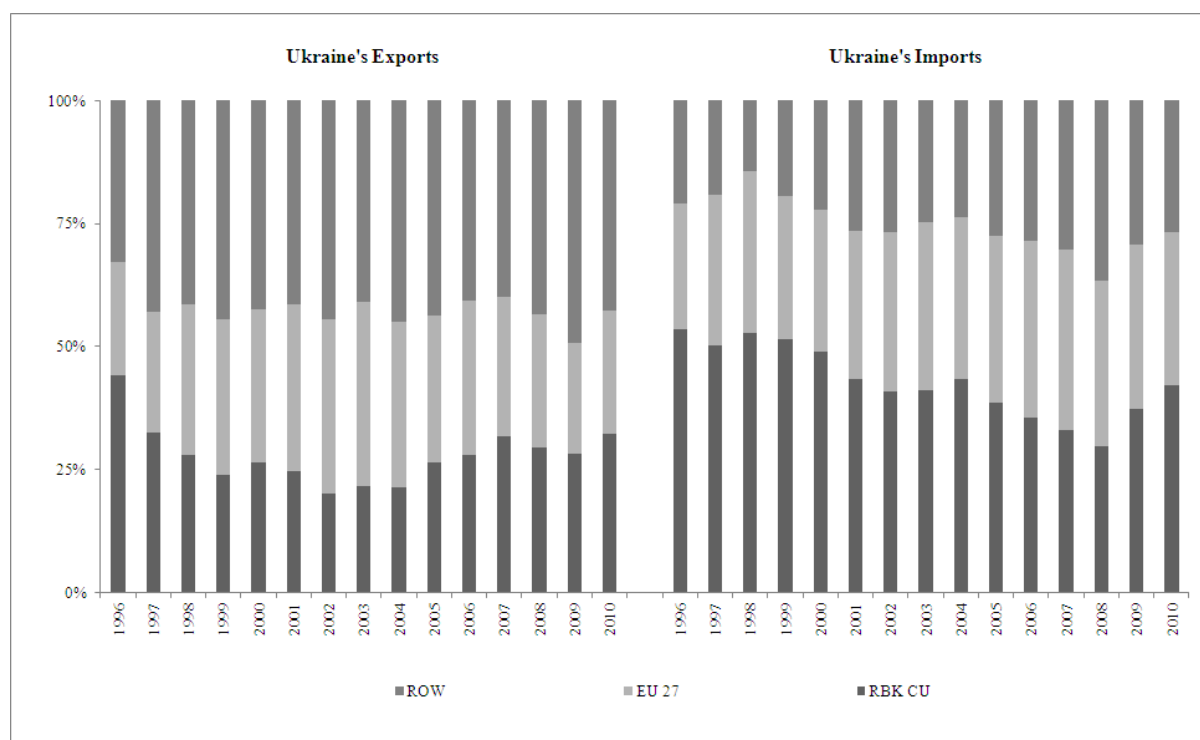


Source: State Statistics Service of Ukraine

The EU and the Customs Union of Russian Federation, Belarus and Kazakhstan (RBK CU) are the major trade partners of Ukraine (Figure 2.2), both in imports and in exports. However, the share of imports from three countries of RBK CU steadily decreased during 1996-2008 years and started increasing again after 2008. At the same time, the share of imports from EU countries remained almost constant during the years. This situation can be explained by reorientation of importers from the Russian market to Asian markets (mostly Chinese). In 2009 and 2010, share of RBK CU in Ukrainian imports started to grow again mainly due to imports of gas from Russia. As for Ukraine's exports, exports to RBK CU started to grow after 2002 and that growth slowed down but didn't stop during the crisis of 2008. At the same time, share of exports to EU countries steadily declined during 2002-2010. One of the reasons is that steel, chemical and agricultural producers shifted their focus from European to Asian and African markets.

Trade with RBK CU countries occupies a lion share of the trade between Ukraine and the CIS - around 80% of the imports and even a larger share of 85% on the exports.

**Figure 2.2 Geographical structure of Ukraine's trade**

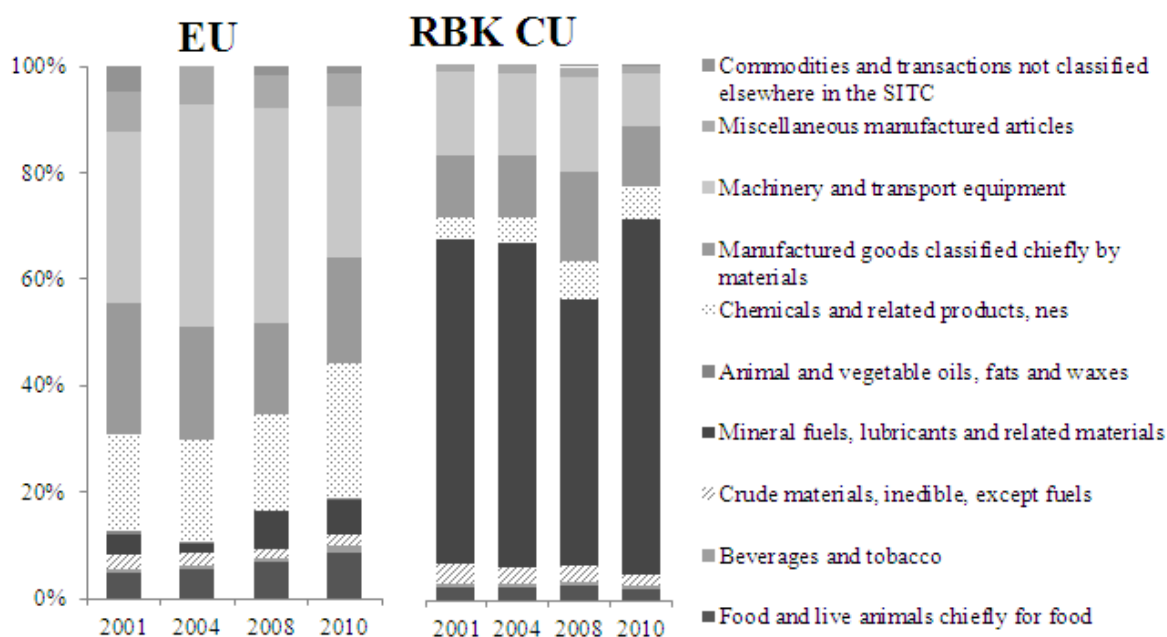


Source: State Statistics Service of Ukraine

Ukraine mostly imports mineral fuels, lubricants and related materials (32.3% in 2010, this is mostly gas and oil from Russia), machinery and transport equipment (19.5%) and manufactured goods (14.4%). And it exports manufactured goods, mostly steel products, (37.1%), machinery and transport equipment (17.3%) and food and live animals (11%).

With the EU and RBK CU countries Ukraine trades in different groups of goods (Figure 2.3). From the EU Ukraine imports machinery and transport equipment (although its share decreased in 2010), chemicals and related products, and manufactured goods. While from the RBK CU countries it mostly imports gas: share of mineral fuels, lubricants and related materials reached 66% of the total imports from RBK CU counties in 2010.

**Figure 2.3 Imports of Ukraine from the EU and RBK CU countries by goods**



Source: United Nations Commodity trade database

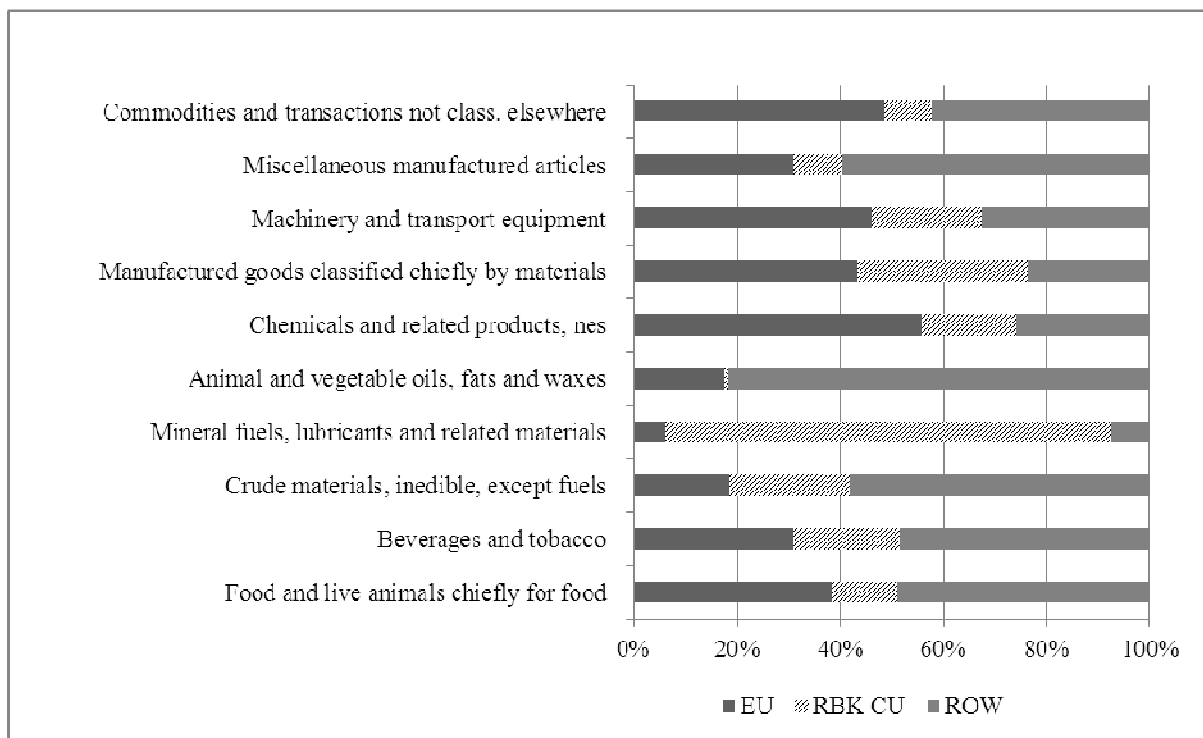
At the same time, commodity structure of Ukrainian exports is not that different. To the EU and RBK CU countries Ukraine mostly exports machinery and transport equipment and manufactured goods. The share of exports of machinery and transport equipment to the RBK CU countries is higher (64% vs 21%).

The RBK CU countries are the most important partners in imports of mineral fuels to Ukraine (Figure 2.4). In 2010, these countries accounted for 86% of imports in this category. 33% of manufactured goods were also imported from there.

At the same time, imports from the EU countries are more varied. In 2010, Ukraine imported from EU 56% of chemicals and related products, 46% of machinery and transport equipment, 43% of manufactured goods, 39% of foods and live animals, and 49% of other nonclassified goods.

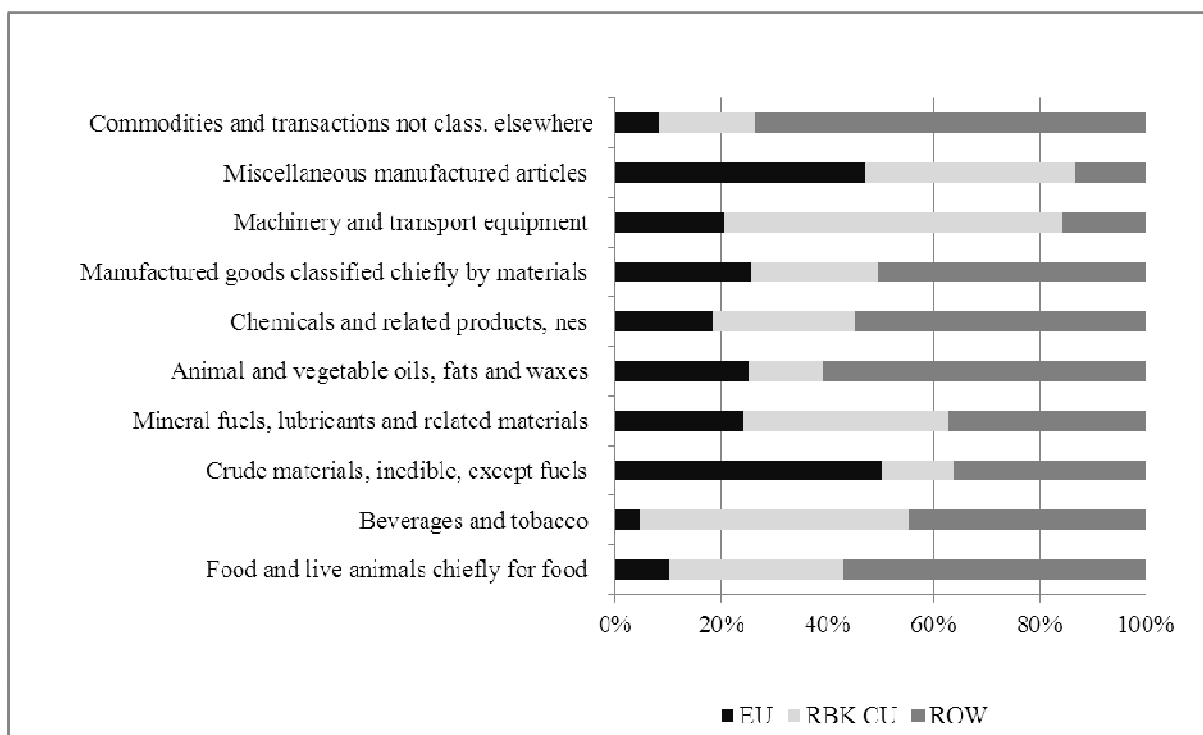
Countries of the EU and RBK CU are of equal importance to Ukraine as its export destinations. However, Ukraine exports different goods to each union. While most machinery and transportation equipment (64%) and beverages and tobacco (51%) are exported to the RBK CU countries, a lion share of crude materials (50%) and miscellaneous manufactured goods (47%) are exported to the EU.

**Figure 2.4 Imports to Ukraine in 2010**



Source: United Nations Commodity trade database

**Figure 2.5 Exports from Ukraine in 2010**



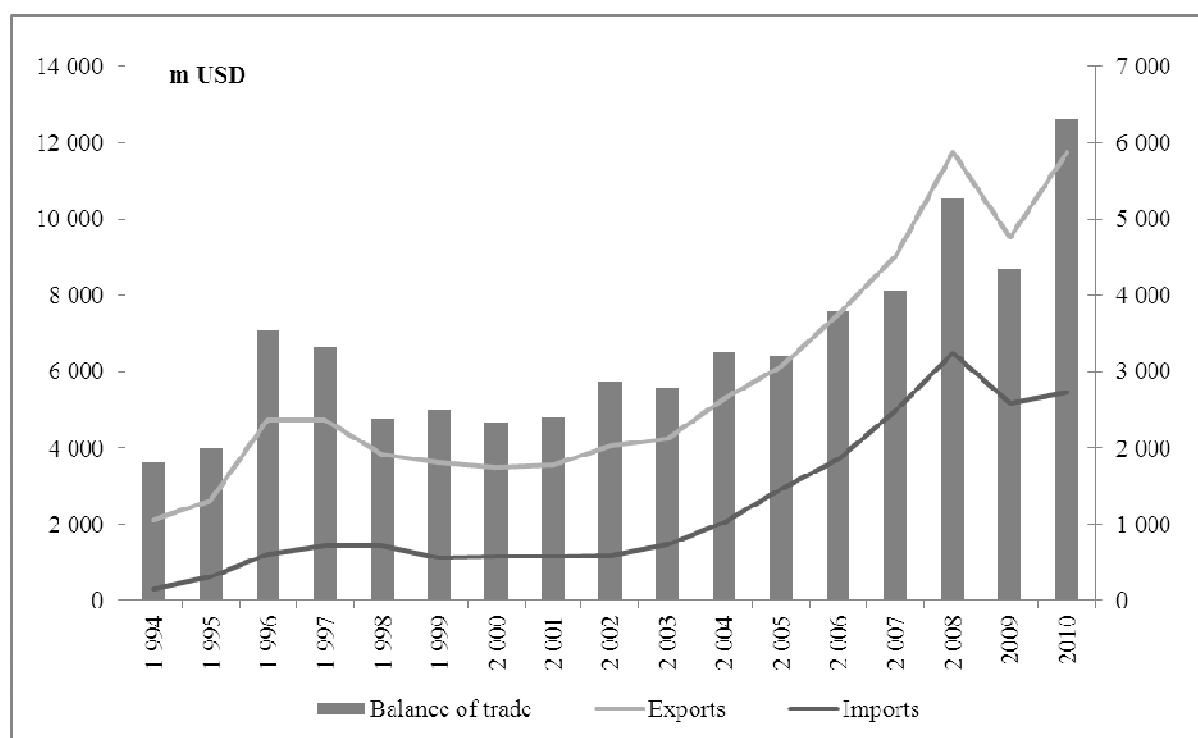
Source: United Nations Commodity trade database



## b. Trade in services

The volume of international trade of Ukraine in services had been growing till 2008 just as the volumes of trade in goods (Figure 2.6). However, in contrast to goods balance of trade which remained negative since 2005, trade in services balance had always been positive. According to the State Statistics Service of Ukraine, volume of trade in services declined in 2009 by 19% and reached USD 14.7 bn. As exports fell faster than imports, the balance of trade in services decreased by 19% in 2009<sup>1</sup>. In 2010, the volume of trade in services resumed its upward trend and returned to its 2008 level. Balance of trade in services also increased because exports grew faster than imports.

**Figure 2.6 Dynamics of foreign trade in services of Ukraine**



Source: State Statistics Service of Ukraine

Trade in transport services occupies the biggest share in Ukraine's foreign trade in services (Figure 2.7). The most important export segment there is pipeline transportation of oil and gas from Russia to Europe (29% of exports). The next important trade item is business, professional and technical services and railway (mostly cargo) transportation (13% each). As for the imports, Ukraine imports financial (20% of imports), business, professional and technical services (16%).

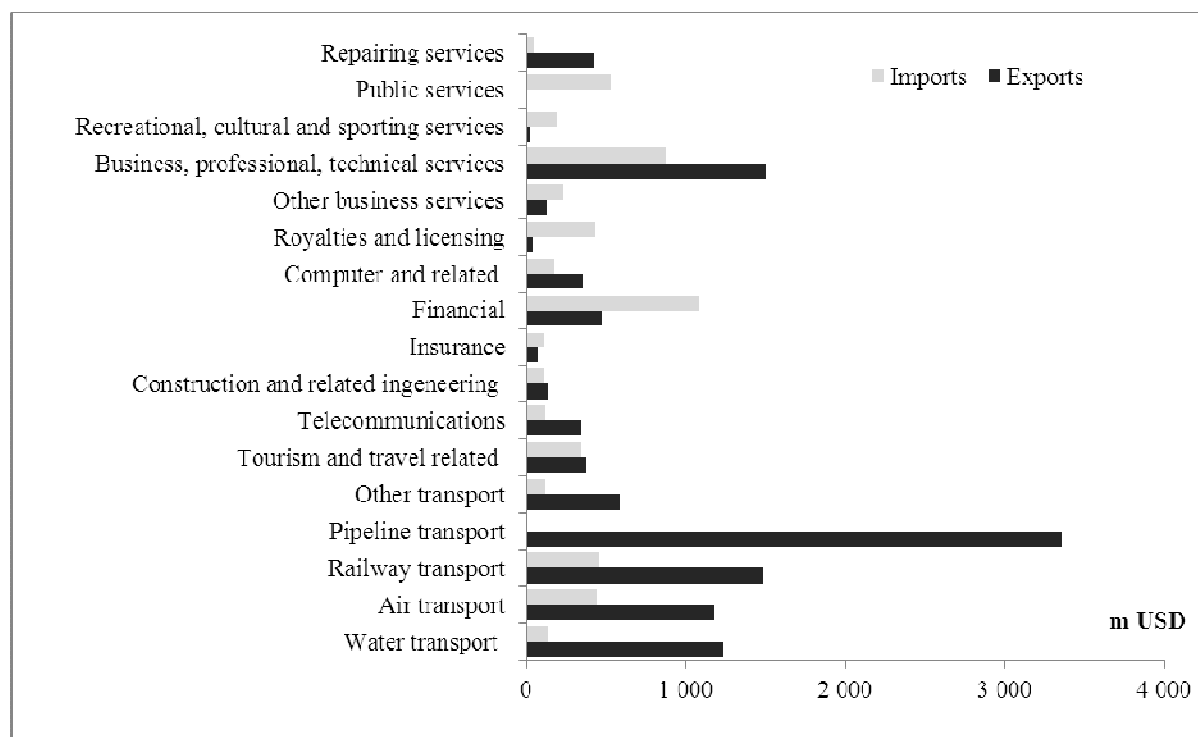
In 2010, the biggest decrease was observed in exports of public (-85%) and insurance services (-12%). At the same time, exports of royalties and licensing skyrocketed, its volumes increased by 185%.

In imports of services pipeline transportation and construction and related engineering declined the most in 2010, their volumes decreased by 72% and 32% respectively. In

<sup>1</sup> National Bank of Ukraine reports different numbers for volumes and balance of trade in services. The numbers are different since the NBU uses different methodology.

comparison, imports of royalties and licensing, other business services and air transportation raised by 74%, 49% and 37% respectively.

**Figure 2.7 Structure of foreign trade in services of Ukraine in 2010**



Source: State Statistics Service of Ukraine

In 2010, the geographical structure of trade in services has undergone minor changes, but the dominance of trade with the European Union and CIS countries (mostly Russian Federation) preserved: 48% of services is exported to the CIS countries, another 27% to the EU.

The EU countries are more important in the services imports: 55.5% of services are imported from those countries and 17% from the CIS.

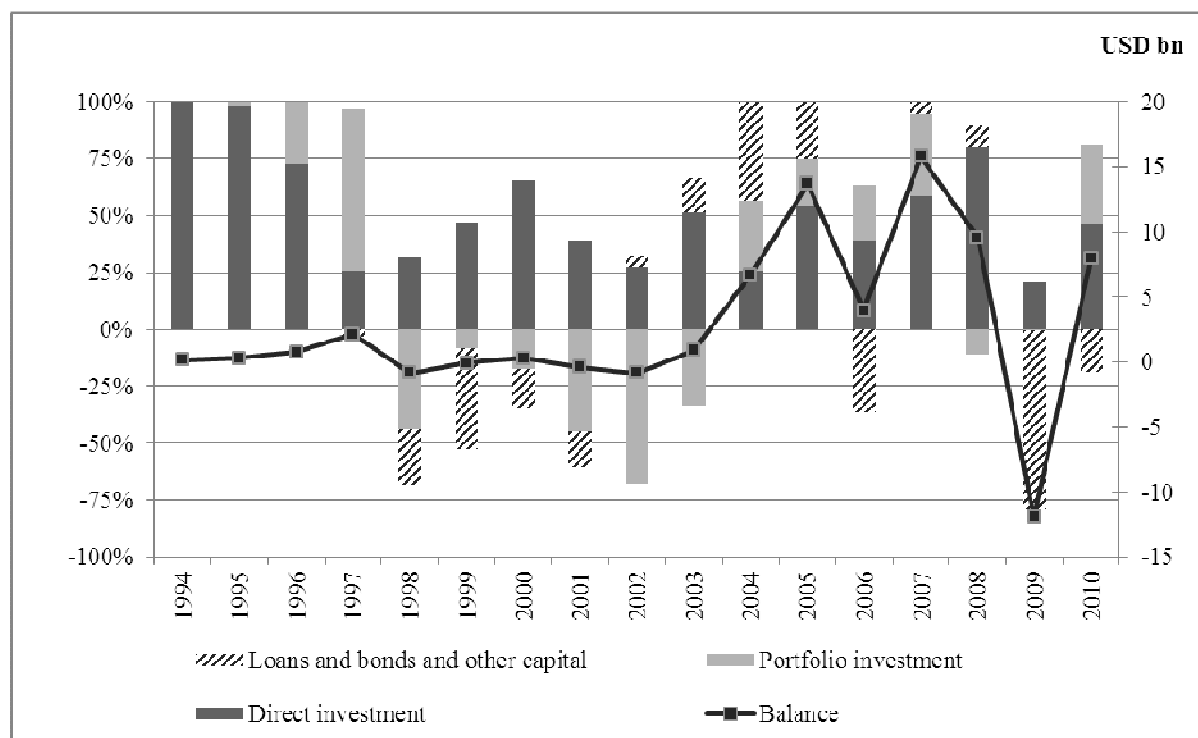
Countries of RBK CU dominate the trade in services between Ukraine and the CIS countries – the shares are respectively 96 and 93.5%.

### c. Capital flows

In 2010, the net inflow of foreign capital, which had been observed for the last several years and changed to net outflow in 2009, returned to pre-2009 levels (Figure 2.8). The National Bank of Ukraine reported a surplus of capital account and financial operations of USD 7.9 bn in 2010 compared to USD 11.9 bn deficit a year ago. Such a huge change in capital and financial operations accounts was provoked mainly by inflow of debt capital (USD 8 bn comparing to negative USD 9 bn in 2009). The main reason for this was successful refinancing of existing loans which allowed Ukraine to return to the world financial markets and take more loans. As a result, volumes of foreign direct investments increased, volumes of portfolio investments became positive, inflow of new external loans exceeded external debt payments.

Volumes of FDI increased by 24% and constituted USD 5.8 bn in 2010. Net inflow of the FDI was reached mainly by investments into the real sector of Ukraine.

**Figure 2.8 Capital account and financial operations historical data, USD**



Source: National Bank of Ukraine

Net inflow of foreign capital was observed also for portfolio investments. In 2010 as in the previous year, there was an outflow of foreign currency from the banking system of Ukraine through the cash market. During 2010, USD 5.6 bn were withdrawn from the banking system of Ukraine comparing to USD 9.6 bn in 2009.

During the year, banks and non-financial companies restructured debts of prior periods. At the same time, external debts of government and monetary regulation authorities increased by USD 7.2 bn to USD 25 bn and by 1.3 USD bn to USD 7.5 bn respectively, mainly due to inflow of the IMF stand-by transfer, exchange rate fluctuations and issuance of government bonds.

According to State Statistics Service of Ukraine estimates, as of January 2011 the total amount of FDI to Ukraine has reached USD 44.7 bn, corresponding to USD 974 of investment per capita, which remains extremely low compared to other Central and Eastern Europe. Major investing countries remained the same and include the Russian Federation and the EU, mainly Cyprus, Germany, Netherlands, Austria, Britain and France. In total, these seven countries brought in 72.5% of total FDI in Ukraine. Sectoral structure of FDI in Ukraine in 2010 remained virtually unchanged. The biggest investments came into manufacturing and financial sectors.

#### **d. Labor mobility**

State Statistics Service of Ukraine reports a slowdown of interstate migration in 2010. The interstate movements declined to 45 500 persons (by 13% yoy) in 2010 due to both lower number of arrivals (decline of 6.4%) and lower number of those who left (decline of 24.6%). The demand for labor in recipient countries of Ukrainian labor migrants increased partly due to the introduction of the EU Visa Code since April 2010. The Visa Code envisages further harmonization of visa procedures of the EU countries. Overall net immigration increased by 16.6% to 16 133 persons.

In November 2010, an Action Plan on Visa Liberalization was signed at the EU-Ukraine Summit. Realization of this plan will allow Ukrainian citizens to use visa-free regime for trips to the EU countries.

In 2010, the Verkhovna Rada of Ukraine ratified the Council of Europe Convention on Action against Trafficking in Human Beings<sup>2</sup>. The Convention aims at preventing and combating trafficking in human beings while guaranteeing gender equality, protection of human rights of the victims of trafficking, designing a comprehensive framework for the protection and assistance of victims and witnesses while guaranteeing gender equality, as well as ensuring effective investigation and prosecution, promotion of international cooperation on action against human trafficking.

Further slowdown of migratory flows in 2010 may be connected to the consequences of the world financial and economic crisis which decreased demand for labor in major recipient countries for Ukrainian emigrants, in particular, countries of the EU.

### **3. Current Ukraine – EU economic relations: brief overview**

#### **a. Trade regime**

Currently trade between Ukraine and EU is regulated by the Partnership and Cooperation Agreement (PCA)<sup>3</sup> and Generalized System of Preferences (GSP)<sup>4</sup>. According to the PCA, the parties apply to each other Most Favored Nation treatment (MFN). At the same time, GSP allowed to apply lower tariff rates than MFN for more than 6000 goods. According to CARIS report (2010)<sup>5</sup>, preferences in the framework of the GSP are potentially applied to between 10% and 25% of the overall Ukrainian exports. Therefore, Ukrainian producers are actively using given preferences. Level of usage is estimated between 75% and 100% which features a rather high level of GSP utilization. However, since Ukraine has a higher level of protection than other countries involved in the Eastern Partnership project, it encounters the highest share of non-zero tariffs under the GSP preferences among these countries.

The negotiations on Deep and Comprehensive Free Trade Area (DCFTA) started in 2007. In 2010, countries continued negotiations on harmonization of tariff regulation but did not reach a final agreement. The new agreement is expected to become a first document of new “deep and comprehensive” trade agreements. It will involve a wide range of trade issues and its main goals are to diminish any trade challenges that occur “outside of state borders” and to open EU interior markets to Ukraine<sup>6</sup>.

After Ukraine became a member of World Trade Organization (WTO) in 2008, quotas on rolled metal exports to the EU were cancelled and now trade between partners is conducted

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<sup>2</sup> Law of Ukraine “On Ratification of the Council of Europe Convention on Action against Trafficking in Human Beings”, #2530 of 21 September 2010.

<sup>3</sup> Entered into force in 1998

<sup>4</sup> Version of January 1, 2008

<sup>5</sup> CARIS (2010). Mid-term Evaluation of the EU’s Generalized System of Preferences. Report. - [http://trade.ec.europa.eu/doclib/docs/2010/may/tradoc\\_146196.pdf](http://trade.ec.europa.eu/doclib/docs/2010/may/tradoc_146196.pdf)

<sup>6</sup> Kutsenko K. Negotiations on the issue of free trade policy with the EU // Monthly Economic Monitoring of Ukraine. – 2010. - # 11. – [www.ier.kyiv.ua](http://www.ier.kyiv.ua)

without quantitative restrictions.<sup>7</sup> Also risk of new trade restrictions by EU reduced after Ukraine's accession to the WTO.<sup>8</sup>

During the last crisis Ukraine introduced a 13% temporary import surcharge on some products.<sup>9</sup> The surcharge was applied<sup>10</sup> for the period from March to September 2009 to the very narrow list of goods including cars<sup>11</sup> and refrigerators<sup>12</sup>. The imposition of temporary surcharge had almost stopped import of goods from EU to Ukraine, which already began to fall in 2008 due to sharp devaluation of hryvnia and decline in population incomes. Import of these goods did not restore even after abolishment of the surcharge.

In 2005, the EU granted Ukraine a market economy status which ensures that possible anti-dumping investigations against Ukrainian exporters to the EU are conducted applying normal value of exports based on the prices paid or payable in Ukraine, and not in the third country, as it is required for non-market economies. However, this status did not eliminate the use of commercial defense instruments between the parties.

Antidumping cases and special measures applied by countries to different commodity groups of reciprocal import continue to be important components of Ukraine-EU trade regime. In 2010, EU applied six antidumping measures to Ukraine, four of which are currently in force. The measures are against exports of Ukrainian pipes, cables from ferrous metals, mixture of ammonium nitrate and urea and ironing boards. There is an undergoing antidumping revision on black metals ropes, lines and twisted strips and on seamless pipes.

At the same time, Ukraine applies 3 antidumping measures against separate groups of goods of some EU countries<sup>13</sup> and 2 measures are applied irrespective of country of origin. Specific measures apply against syringes (Spain, Germany, and Great Britain). Irrespective of origin measures are applied to steel pipes and matches.

Another obstacle to increasing Ukraine-EU trade is standards regulation. According to the State Committee for Technical regulation and Consumers Protection, by the end of 2010 only about 25% of national standards were harmonized with the EU and international standards.<sup>14</sup> There are also delays with harmonization of sanitary and phyto-sanitary standards with the EU norms and many Ukraine's husbandry products cannot be exported to the EU due to standards mismatch.

Thus, Ukraine and EU trade regime was preserved in 2010 with EU remaining Ukraine's largest trading partner. However, there is a tendency towards a gradual decrease of EU's role as a main trading partner. Countries of EU accounted for 35.9% of the overall Ukrainian turnover of goods in 2003 and 28.4% in 2010. Partly such a decrease can be explained by the increase of the share of import from the CIS countries. But mostly the reason is geographical diversification of trade with increased significance of Asian countries.

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<sup>7</sup> Except for those restrictions that are applied to all Ukrainian exports or imports regardless the country of origin/destination.

<sup>8</sup> Movchan V, Kobylanskaya A. Sysenko N. "Economic integration and cooperation: The EU and Ukraine. Results in 2009". – International Review, # 4, 2009. - [www.dipacadem.kiev.ua/assets/files/bullets/Review-4\\_Ukr.2009.doc](http://www.dipacadem.kiev.ua/assets/files/bullets/Review-4_Ukr.2009.doc)

<sup>9</sup> Law of Ukraine On amending some laws of Ukraine to improve the balance of payments of Ukraine in connection with the global financial crisis, No 923\_VI. 04.02.2009.

<sup>10</sup> Decree of Cabinet of Ministers of Ukraine of 18.03.09 № 230

<sup>11</sup> HS 8702, 8703 and 8704

<sup>12</sup> HS 8418

<sup>13</sup> Spain, Germany and Great Britain.

<sup>14</sup> Movchan V. (2010) "Reform of Technical Regulation in Ukraine: what has been done and what should be done". Materials for the round table "Problems of quality control and product safety and conformity", the Verkhovna Rada of Ukraine Committee on Industrial and Regulatory Policy and Entrepreneurship. Kyiv

## **b. Ukraine-EU Free Trade Area Agreement**

Upon approval by the WTO General Council of the package on Ukraine's accession on 5 February 2008, the EU and Ukraine commenced talks concerning an agreement on a deep and comprehensive FTA. These followed preliminary consultations between the parties which had begun much earlier. Within the framework of the future Association Agreement, the FTA should deepen Ukraine's access to the European market and promote further European investment in Ukraine.

The FTA will be an integral part of the future Association Agreement. This FTA is supposed to become the first of a new type of 'deep and comprehensive' trade agreement involving the EU, covering a wide range of trade-related matters and aiming to remove barriers to trade not only related to 'behind the border' obstacles to trade, but also to provide for deep regulatory rapprochement, thus partially opening the EU's internal market to Ukraine. The agreement must be compatible with the rules of the WTO and take the possible results of the WTO Doha Round into consideration.

The DCFTA has one distinctive feature as compared to the FTA agreements in the framework of the CIS, namely strong regulatory and institutional character. While the CIS FTA Agreement would cause hardly any regulatory adjustments in the country, the DCFTA with the EU should result in significant harmonisation of Ukraine's regulatory practices to European rules and norms in trade-related spheres.

According to available information, major clauses of the DCFTA envisage the following trade regime between the EU and Ukraine.<sup>15</sup>

- Duty free exports to the EU for industrial products starting the date when the Agreement comes into force;
- Significant quotas on duty-free exports of selected agricultural products, including dairy products, grain and cereals, and sugar, to the EU;
- Transition periods for tariff liberalisation in Ukraine;
- Duty free imports of majority of EU agricultural products in Ukraine;
- Special regimes for imports of motor vehicle (HS code 8703) and for second-hand clothes in Ukraine;
- Abandonment of EU agricultural exports subsidies in trade with Ukraine;
- Gradual elimination Ukraine's export duties, but introduction of temporary surcharges on exports of sunflower seeds, nonferrous metal scrap, and cattle skins under so called "bilateral protection measures";
- Further service trade liberalisation.

In addition, the DCFTA envisages significant adjustment of Ukraine's regulations in such spheres as competition policy, state aid, public procurement, sanitary and phyto-sanitary measures, technical regulation, protection of intellectual property rights, sustainable development (ecological issues, labour and social issues) etc. At the same time, the EU committed to provide technical assistance to ensure implementation of necessary changes.

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<sup>15</sup> Interview with Valeriy Pjatnitsky, Authorized Government Representative in European Integration Issues, to newspaper "Dzerkalo Tyzhnya", 26 October 2011 Available at: [http://dt.ua/POLITICS/valeriy\\_pyatnitskiy\\_duzhe\\_hochetsya\\_schob\\_tsya\\_ugoda\\_vidbulasya-90518.html](http://dt.ua/POLITICS/valeriy_pyatnitskiy_duzhe_hochetsya_schob_tsya_ugoda_vidbulasya-90518.html)

The implementation of the DCFTA with the EU would bring important benefits including:<sup>16</sup>

- **Improved welfare of Ukrainian people** through better access to higher variety of products, stricter safety requirements for products on domestic market, and higher incomes thanks to new business opportunities and improved domestic resource allocation;
- **Duty-free access to the largest world market** for vast majority of Ukrainian products creating considerable opportunities for exports. The EU GDP measured in purchasing power parity (PPP) reached USD 14.8 trillion in 2010, while same indicator for the RBK CU was USD 2.5 trillion, while potential economic gains from any regional integration project are positively correlated with the size of the market with which this integration occurs;
- **Improved access to markets of the third countries** through harmonization of standards with the EU and thus acquisition of internationally acceptable standards;
- **Better domestic investment climate** as the adjustment to the EU regulations would mean changes in national legislation. In turn, these changes would result in transparent set of rules familiar to foreign investors that would make domestic environment more attractive for them providing higher economic growth potential.

These gains would come at important costs that include:

- **Increased domestic competition** due to elimination of tariff barriers and a significant reduction of non-tariff barriers resulting in market restructuring and reallocation of factors of production. Although higher competition is definitely beneficial for the country in the medium-term, short-term effects of reallocations could be painful;
- **Higher costs of standard obedience**, as the EU standards are generally more stringent and thus compliance with them would require more efforts and expenses. The experience of Poland shows that higher standards could even drive some business out of specific market segments;
- **Spending associated with legal and administrative adjustments** taking into account that immediate costs could be rather high (establishment of independent regulatory bodies, introduction of new – likely technologically more advanced – procedures, etc.).

Summing up, the DCFTA with the EU seems to have important medium- to long-term benefits, but is likely to bear some short-term costs. However, some of these costs are likely to be shared with the EU as it is ready to provide necessary technical assistance. Quantitative assessment of medium- and long-term economic impact of the DCFTA with the EU on Ukraine's welfare and other macroeconomic parameters is discussed in Section 5.

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<sup>16</sup> Gains and costs are partly discussed in Movchan, Gucci and Kutsenko (2010) "Trade policy in Ukraine: Strategic aspects and next steps to be taken", Policy Paper 02, April 2010. Available at: [www.ier.com.ua](http://www.ier.com.ua)

#### 4. Current Ukraine- CU-RBK economic relations: brief overview

##### a. Trade regime

In May 1993, soon after the dissolution of the USSR the CIS countries adopted a declaration to establish an Economic Union and signed an Economic Union Treaty in September 1993. The goal was to foster free trade area, reduce internal tariffs, create common external tariffs, and establish common system for payments and settlements. The treaty was buttressed by a series of impressively sounding but ultimately ineffectual subsidiary agreements on free trade (April 1994), payments (October 1994), and customs (January 1995), legal harmonization (January 1996), customs classification lists (February 1996), and railway tariffs (October 1996). In reality, the CIS agreements incorporated little in the way of effective sanctions and enforcement powers. The agreements expressed intentions, but did little to create working mechanisms.

The low efficiency of a ‘wide’ integration within the CIS has resulted in the active sub-regional integration processes.<sup>17</sup> In particular, it has led to a series of bilateral agreements on free trade among the RBK CU members, including the agreement between Ukraine and Belarus (signed in 1992), between Ukraine and Russia (in 1993<sup>18</sup>), and between Ukraine and Kazakhstan (in 1994). Formation of RBK CU started on January 1, 2010 with the implementation of the common tariff scheme. The next major step was taken on July 1, 2010, when the Customs Code of RBK CU came into force<sup>19</sup>. Finally, in mid-2011, a common border control in the Customs Union has been established.

The texts of the agreements are rather similar.<sup>20</sup> They stipulate duty-free trade in all goods while allowing for unspecified potential exemptions. The core exemptions, frequently introduced in the protocols of bilateral agreements, include sugar, tobacco and cigarettes, alcohol and sometimes non-alcoholic beverages. In addition, there is a practice of reciprocal exemptions in response to export duties set by a trading partner. For instance, currently the list of Russian export duties applied to products exported from RBK CU (and thus exempt from free trade regime) includes 359 positions in 26 commodity categories, including fishery products, mineral products, fertilizers, some nonferrous metals, metal scrap etc.<sup>21</sup> Ukraine applies export duties to several products, namely sunflower seeds, skins, and metal scrap. It is important that none of these bilateral FTAs cover service sectors or other trade-related topics including intellectual property rights protections.

The countries intensively use trade defense measures to protect specific sectors against unfair competition practices (anti-dumping measures) and excessively growing imports (safeguard measures). As of October 2011, Ukraine applies five anti-dumping measures against imports from Russian Federation, and two against imports from Belarus. Ukraine also launched two anti-dumping investigations against imports of slate and thermally polished glass from Belarus and two investigations against imports of methanol and thermally polished glass from Russia. In addition, Ukraine applies two safeguard measures independent of the country of origin.

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<sup>17</sup> Burakovsky I. (2003) Economic Integration and Security in the Post-Soviet Space // *Swords and Sustenance: The Economics of Security in Belarus and Ukraine*. Edited by Robert Legvold and Celeste A. Wallander

<sup>18</sup> The agreement was never ratified, but nevertheless it entered into force via the exchange of letters between ministers

<sup>19</sup> [http://tsouz.ru/news/Documents/Custom\\_Union\\_Glaziev1.pdf](http://tsouz.ru/news/Documents/Custom_Union_Glaziev1.pdf)

<sup>20</sup> Freinkman, L., Polyakov E. and Revenco C. (2004). “Trade Performance and Regional Integration of the CIS Countries” Policy Research Working Paper 38. Washington, DC: World Bank

<sup>21</sup> [http://www.rusimpex.ru/Content/Custom/readlist\\_out.php3?par=/Content/Custom/readlist\\_out.php3&group=81](http://www.rusimpex.ru/Content/Custom/readlist_out.php3?par=/Content/Custom/readlist_out.php3&group=81)



In turn, the RBK CU launched one safeguard investigation against Ukraine in August 2011, and another one has been opened by Kazakhstan in 2010. RBK CU applies three anti-dumping measures against Ukrainian exports in addition to one in Russia and one in Kazakhstan.

Trade relations with Russia have not been smooth. Further development of bilateral cooperation is hindered by a number of unresolved issues in trade and economic relations. Tariff and non-tariff restrictions (quotas, sanitary, veterinary standards), and antidumping investigations are the main obstacles for growth of Ukrainian exports.

The most pronounced example of tensed trade relations between two countries had been a ban on exports of livestock products to Russia introduced in January 2006.<sup>22</sup> The restrictions hit mainly manufacturers of dairy products (butter, cheese, cream), 90% of which are exported to Russia. The formal reason for banning livestock products' exports was violations of Russian veterinary legislation by Ukrainian meat exporters. However, it remained unclear why this ban has been extended to dairy products instead of tackling meat products directly, as no complaints on dairy products were filed. This decision significantly harmed Ukraine's dairy production, inflicting losses to both dairy industry and raw milk producers. In August 2008, the Russian Federal Service for Sanitary and Phyto-Sanitary Supervision banned import of dry milk originating from Ukraine to Russia for the reason of its non-compliance with phyto-sanitary norms and reduced the number of Ukrainian suppliers of cheese.

At the same time, standards are lesser problem in trade with the RBK CU countries than with the EU due to initially common standards dataset inherited from the Soviet Union. However, all RBK CU countries have been gradually modifying standards with their economic and security needs and harmonizing them with international practices. As a result, a share of common standards among the CIS countries has been gradually diminishing as standards have been diverting.

## **b. CU-RBK: overview**

The establishment of the RBK CU occurred within the Eurasian Economic Community (EurAsEC) integration process. The EurAsEC agreement signed in Astana in October 2000 was designed to function as a regional international organization recognized by the United Nations. It is managed through the Inter-State Council, the Integration Committee, the Inter-Parliament Assembly, and the EEC Court. However, actual co-operation within the EurAsEC remains largely virtual and politicised. Although a free trade zone has been implemented in the EurAsEC, it operates with exemptions and not to the fullest possible extent.<sup>23</sup>

Since 2008 the EurAsEC top priority has become the establishment of a Customs Union – first of all within the framework of Russia, Belarus and Kazakhstan. A supranational body of the customs union – the EurAsEC Customs Union Commission – was established on December 12, 2008. The Customs Union members (Kazakhstan, Belarus and Russia) reached an agreement on a unified customs tariff in June 2009 and endorsed a schedule for creating a unified customs territory.

The formation of the RBK CU started on January 1, 2010 with the implementation of the common tariff scheme. The next major step took place on July 1, 2010, when the Customs

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<sup>22</sup> Nivyeveskiy, O. (2006) "Ukraine's dairy industry lost access to its largest export market", IER MEMU Supplement No.3, [http://www.ier.kiev.ua/English/MEMU/2006/memu2006\\_eng.cgi](http://www.ier.kiev.ua/English/MEMU/2006/memu2006_eng.cgi)

<sup>23</sup> Shynkaruk K. (2010) Overview of the Customs Union of Russia, Belarus and Kazakhstan // IER (2010) Ukraine's trade policy choice: pros and cons of different scenarios. Report commissioned by the World Bank

Code of the Customs Union came into force,<sup>24</sup> the Commission of the Customs Union became active, and customs clearance of goods originated in countries-members were abolished. Finally, in mid-2011, a common border control in the Customs Union has been established.

Apart from common tariff policy, the CU has envisaged unification of non-tariff measures in commodity trade, including development of common technical regulations, and sanitary and phyto-sanitary standards, extension of anti-dumping and safeguard measures applied by any country-member of the CU to the entire CU, unification of customs procedures and customs valuation, statistics etc.

It should be emphasized that this customs union is focused on trade in goods primarily, leaving aside trade in services and other trade-related issues. Further harmonisation of regulatory issues has been envisaged at the next stage of regional integration of Russia, Belarus and Kazakhstan.

Currently, the countries declared their intention to establish the Single Economic Space since January 1, 2012. This level of integration is expected to encompass common policies in such spheres as macroeconomic policy, competition policy, state aid, protection of intellectual property rights, exchange rate policy, migration policy, etc.

Participation of Ukraine in the RBK CU would impose important costs<sup>25</sup> including:

- **Loss of independence in trade policy**, including right to negotiate free trade agreements with other countries, like the DCFTA with the EU. The Commission of the RBK CU is entitled to conduct new foreign trade related negotiations on behalf of the member states. Thus, Ukraine would forego all efforts devoted to the EU FTA talks and lose opportunity to obtain privileged access to largest world market;
- **Slower pace of modernisation** as increased tariffs on investment imports from the third countries, including the EU, would hamper renewal of fixed assets and imports of new technologies and know-how; and
- **Burden of renegotiations and compensations within the WTO** as Ukraine's bound import tariffs has been generally lower than in the RBK CU (Figure 4.1). The revision of these commitments is theoretically possible, but costly as other member countries have a right to request compensation or impose additional duties on Ukrainian goods or services to compensate for the losses caused by the change in commitments.

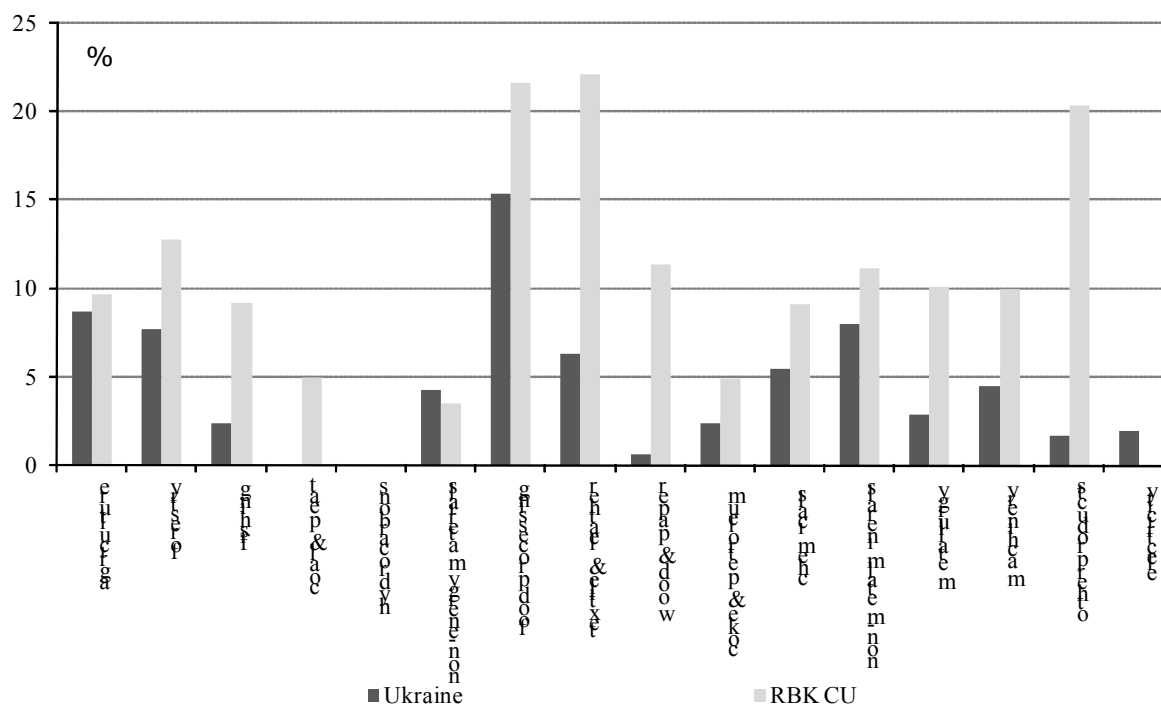
The latter two statements are based on the assumption that Ukraine accepts the tariff schedule of the RBK CU.

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<sup>24</sup> Available at: [http://tsouz.ru/news/Documents/Custom\\_Union\\_Glaziev1.pdf](http://tsouz.ru/news/Documents/Custom_Union_Glaziev1.pdf)

<sup>25</sup> Discussion of gains and costs is partly based on "Between two customs unions" by Veronika Movchan. MEMU No. 4 (126), April 2011. Institute for Economic Research and Policy Consulting, [www.ier.com.ua](http://www.ier.com.ua)

**Figure 4.1 Imports tariffs of Ukraine and of the RBK CU**



Sources: Ukraine bound import tariffs schedule ([www.wto.org](http://www.wto.org)), RAKURS (2011)<sup>26</sup>

What could the RBK CU offer Ukraine to compensate these current and future losses? Ukraine has been proposed to have cheaper energy, elimination of customs control, and stronger bargaining power.

- **Cheaper energy.** It would have important short-term impact, but stable long-term energy price discounts are highly questionable. Russia plans to deregulate internal market, and thus its domestic prices will go up. Moreover, world energy prices are soaring, and fossil fuels stocks are finite. Increase in energy efficiency and supply diversification would be sounder economic strategy than a search for short-term price discounts;
- **Elimination of customs control.** This step would result in lower trade costs, but comparable cost reduction could be achieved by simplification of customs procedures in the FTA framework. Moreover, in case of customs reforms, trade with all partners would be boosted, causing no trade diversion effects likely to occur in the case of joining the CU;
- **Stronger bargaining power.** As the CU member Ukraine would face multi-stage bargaining process. It would need to balance its interests with interests of other members of the CU, and not only with interests of the third countries, involved in the FTA talks with the CU. It is questionable that resulting FTAs would be more beneficial to Ukraine.

Summing up, benefits offered to Ukraine in case of joining the CU could be achieved with current level of regional integration, namely the FTA, while the costs of the CU would be

<sup>26</sup> RAKURS (2011) Indicative level of Tariff Protection in Kazakhstan: Before and After the Customs Union (Part I)." Discussion Paper #5.3, March 2011. RAKURS Centre for Economic Analysis

quite significant. Quantitative assessment of medium- and long-term economic impact of joining the RBK CU on Ukraine's welfare and other macroeconomic parameters is further discussed in Section 5.

## 5. Quantitative estimation of impact of different types of RTA with Ukraine's participation upon Ukrainian economy

### a. Model description (CGE)

To evaluate the consequences of the regional integration options for Ukraine, we employ the computable general equilibrium model for Ukraine. The model used in this study is the single-country model developed in the framework of the project "Analysis of the Economic Impact of Ukraine's WTO Accession" conducted by Copenhagen Economics, Denmark; Institute for East European Studies Munich, Germany; and Institute for Economic Research and Policy Consulting, Ukraine, in 2005 (Copenhagen Economics *et al.*, 2005), and then elaborated to meet the needs of this study. Below an overview of the model is provided. Algebraic formulation of the model is presented in the Annex.

The CGE model is based on the social accounting matrix (SAM) for Ukraine with 2008 as the base year. The SAM predominantly relies on information provided by the State Statistics Service of Ukraine, in particular input-output tables in consumer and basic prices, matrices for imports, trade and transportation margins, and for taxes and subsidies. Also, the National Accounts for Ukraine for 2008 were used to calculate the transfers between institutional agents in the SAM. Information about households has been derived from the Household Budget Survey. The aggregate SAM is presented in Table 5.1.

**Table 5.1. Aggregate social accounting matrix for Ukraine with base year 2008, UAH billion**

		Activities	Commodities	Factors	Households	Government	Savings-investments	Changes in inventories	Rest of the World	
Accounts / Transactions		<b>a</b>	<b>b</b>	<b>c</b>	<b>d</b>	<b>e</b>	<b>F</b>	<b>g</b>	<b>h</b>	<b>Total</b>
Activities	<b>a</b>		2,333.6							<b>2,333.6</b>
Commodities	<b>b</b>	1,483.4			589.7	169.2	250.5	14.4	444.9	<b>2,952.0</b>
Factors	<b>c</b>	831.3							19.0	<b>850.3</b>
Households	<b>d</b>			840.2	0.0	180.0			-10.0	<b>1,010.2</b>
Government	<b>e</b>	19.0	97.8	10.0	245.2	0.0			-0.6	<b>371.4</b>
Savings-investments	<b>f</b>				175.2	22.3			67.4	<b>264.9</b>
Changes in inventories	<b>g</b>						14.4			<b>14.4</b>
Rest of the World	<b>h</b>		520.6		0.0	0.0	0.0			<b>520.6</b>
<b>Total</b>		<b>2,333.6</b>	<b>2,952.0</b>	<b>850.3</b>	<b>1,010.2</b>	<b>371.4</b>	<b>264.9</b>	<b>14.4</b>	<b>520.6</b>	

Source: State Statistics Service of Ukraine, constructed by authors

Note: Due to rounding procedures figures in some rows and columns may not sum up to totals

The production side of the economy is summarized in 38 sectors following Ukraine's input-output data. Production in each sector requires the use of intermediate inputs of goods and services as well as primary factors such as capital and labour, the latter distinguished by two

skill levels. With the exemption of the capital stock in extractive industry, both production factors – capital and labour – are assumed to be perfectly mobile. This assumption implies that the results of the model present the economic adjustments to the shock over medium- or long-term horizon, although time is not explicitly defined in the model.

Aggregate output can either be exported to several different regions or sold on domestic markets. Together with imports from all trade partners it forms the total aggregate of goods and services available for domestic consumption.

To sufficiently reflect the technical characteristics of Ukraine's economy, production is divided into perfectly and imperfectly competitive sectors following Jensen, Rutherford and Tarr (2007). Each sector of the Ukrainian economy belongs to one of three distinct categories:

- competitive goods and services sectors where production takes place under constant returns to scale and prices equal marginal costs with zero profits;
- goods-producing sectors with production under increasing returns to scale and imperfect competition, and
- imperfectly competitive services sectors where production takes place under increasing returns to scale.

For the imperfectly competitive goods and services sectors the model applies Chamberlinian large group monopolistic competition within a Dixit-Stiglitz framework, resulting in constant mark-ups over marginal costs. Firms set prices such that their marginal costs equal marginal revenues and free entry implies zero profits. Individual firms regard themselves as too small to influence the composite price in their group. Moreover, the composition of fixed and marginal costs is identical for all firms producing goods or services under increasing returns to scale, leading to constant output per firm for all firm types. As the number of firms in a sector increases, the larger number of available varieties means that output can be more efficiently put to use in the economy. This implies that the effective cost function for users of these goods and services declines in the number of total firms in the industry. Following Jensen, Rutherford and Tarr (2007), there is a one to one correspondence between firms and their differentiated varieties, i.e., each firm is assumed to produce one single variety.

On the consumption side, the model distinguishes between public, investment and intermediate consumption as well as final household consumption.

Households receive labour and capital income, as well as transfers from the state. In turn, they consume, save and pay taxes to the state. Information about households was based on the national households' survey.

Consumers treat imported and domestically produced goods as imperfect substitutes while producers regard sales on domestic markets or exports as imperfect alternatives (Armington assumption). Exports and imports are disaggregated into different trading partners and modelled with constant elasticities of transformation and substitution. Direct taxes/subsidies are modelled as sector-specific taxes/subsidies on the use of primary input factors. Indirect taxes/subsidies are modelled as a commodity specific tax on private (household) and investment demand.

The government receives income from public capital endowments and collects a variety of taxes. These taxes include taxes on output, taxes on consumption, and taxes on foreign trade etc.. Total government revenue is used for public investments and the provision of public goods. The balanced budget is achieved via lump-sum transfers from households in the case the state revenues decline.

The model uses two closure procedures. First, on the macro-economy level, total investments must equal the sum of depreciation, public and private savings and the current account balance. Second, on the government level, fiscal revenue from various direct and indirect taxes must increase to offset the lost revenue in any counterfactual. In other words, there is an equal government yield constraint. This is achieved through adjusting the level of lump sum transfers to households.

The steady state formulation of the model developed by Copenhagen Economics et al. (2005) allows for an analysis of potential long run gains by allowing the capital stock to adjust to new steady state equilibrium. This adjustment is driven by the assumption that investors demand a fixed rate of return on investment. In the model, the rate of return on investment is defined as the rental rate on capital divided by the cost of producing a unit of the capital good. The implication is that if a policy change results in an increase in the rate of return on capital (relative to the cost of investment), investors will respond by increasing investment and thereby expanding the capital stock. The increase in the capital stock will lead to a fall in the rental rate on capital. Investors will keep investing, and expanding the capital stock, until the rental rate on capital has fallen to a level where the rate of return on investment is back to its initial level.

Results using the comparative steady state formulation are normally considered as upper bound estimates (if the capital stock increases). The reason is that the steady state calculation ignores the foregone consumption required to obtain the larger capital stock. However, Rutherford and Tarr (2002) show that a fully dynamic model with similar features (and that takes into account foregone consumption) can produce welfare gains of the same magnitude as comparative steady state results.

The model relies on elasticity parameters identified for Ukraine in the framework of study conducted by Copenhagen Economics *et al.* (2005). These parameters are presented in Table 5.2.

**Table 5.2. Elasticity parameters**

Parameter	Baseline value	Description
esubc	1	Elasticity of substitution in consumer demand
esub	3	Elasticity of substitution between firm varieties in imperfectly competitive sectors
esubt	0	Elasticity of substitution between value added and other intermediate inputs
esubva	1	Elasticity of substitution between primary factors
sigmadm	3	Armington elasticity of substitution between imports and domestic goods
eta_dx	5	Elasticity of transformation between exports and domestic production

Source: Copenhagen Economics et al. (2005)

The CGE model for Ukraine is realized in GAMS/MPSGE software.

## b. Scenarios

To quantify economic impact of two major regional integration options faced by Ukraine – the establishment of the DCFTA with the EU vs. joining the RBK CU – the CGE model for Ukraine has been applied.<sup>27</sup>

In the framework of this study we consider the following three scenarios:

**Scenario 1a: Simple FTA with the EU:** Mutual elimination of import tariffs.

**Scenario 1b: DC FTA with the EU:** Mutual elimination of import tariffs + 2.5% reduction in border dead-weight costs on exports to EU + 2.5% reduction in border dead-weight costs on imports from EU. Reductions in dead-weight costs are associated with approximation of regulatory framework in Ukraine and improvement of customs and other procedures

**Scenario 2: RBK CU:** Ukraine's import tariffs vis-à-vis EU and ROW reach RBK CU level.

Below we present the results of our modelling exercise.

## c. Discussion of results

Before discussing results, several important notices should be made:

- **Time horizon:** Time is not explicitly fixed in the model. Tentatively, we refer to *medium-term horizon* in case when factors reallocate and thus full adjustment of the economy to the shock occurs, but no changes in factor endowment are modelled (static model). We refer to *long-term horizon* when steady-state formulation of the model is applied, and complete factors reallocation is complemented by capital stock adjustment to the new equilibrium.

<sup>27</sup> The model used in the paper has been developed in the framework of the project “Analysis of the Economic Impact of Ukraine’s WTO Accession” conducted by Copenhagen Economics, Denmark; Institute for East European Studies Munich, Germany; and Institute for Economic Research and Policy Consulting, Ukraine, in 2005 by Copenhagen Economics et al. (2005) and later modified by Veronika Movchan.

- **Trajectory:** Results do not give indications concerning the adjustment path from benchmark to the new equilibrium.
- **Shock separation:** The results present economic impacts of pre-specified shocks and don't take into account any other economic developments that might occur in the country at the same time.

The modelling of two key scenarios of Ukraine's regional integration (Table 5.3) reports net welfare gains for Ukraine in case of FTA between Ukraine and the EU, with increase in gains in the case of the DCFTA. At the same time, joining the RBK CU and adopting their trade barriers results in net losses of welfare. Specifically, the establishment of simple FTA with the EU the total welfare of Ukraine will increase by 1.3% in the medium run and by 4.6% in the long run *ceteris paribus*, while for the DCFTA welfare increase would be 4.3% and 11.8% respectively. In case of joining the RBK CU, Ukraine would lose 0.5% in aggregate welfare in the medium run and 3.7% in the long run.

**Table 5.3 Economy-wide effects of different RTA scenarios, % cumulative change**

	<i>Simple FTA EU (Scenario 1a)</i>		<i>DCFTA EU (Scenario 1b)</i>		<i>RBK CU (Scenario 2)</i>	
	static	steady state	static	steady state	static	steady state
<b>Aggregate welfare</b>						
Change in welfare	1.3	4.6	4.3	11.8	-0.5	-3.7
<b>Trade</b>						
Change in imports	1.0	2.4	2.6	5.9	-2.9	-4.3
Change in exports	1.0	2.5	2.8	6.3	-3.1	-4.6
<b>Returns to mobile factors</b>						
Change in the unskilled real wage	0.5	2.5	1.2	5.7	-0.9	-2.8
Change in the skilled real wage	0.4	2.3	1.2	5.5	-0.9	-2.8
Change in the rental return to capital	1.2	0.1	2.2	-0.4	-0.6	0.6
<b>Factor adjustments</b>						
Unskilled labor adjustment	2.3	2.5	2.9	3.5	0.5	0.5
Skilled labor adjustment	0.8	0.9	1.0	1.3	0.2	0.2
Capital adjustment	0.8	0.4	0.9	0.2	0.2	3.2
<b>Capital in steady state</b>						
Capital stock change		3.6		8.1		-3.4

Source: Ukraine model, authors' estimates

Gains in trade and returns to labour (wage) and capital are also observed only in case of the EU FTA scenarios. The RBK CU will lead for losses in trade volumes and decreases in wages of both skilled and unskilled labour and return to capitals in medium and long runs (except for return to capital in medium-run).



The results are also comparable with other studies of the impact of trade regime changes in Ukraine. According to CEPS (2006),<sup>28</sup> the simple FTA results in negligible welfare gains, while for the deep FTA, gains constitute 4-7%. Also, CASE (2007)<sup>29</sup> concluded that the positive welfare effects are largest in the extended FTA between Ukraine and the EU. They estimated that the integration leads to 2% increase in welfare for Ukraine using static model formulation.

## 6. Conclusions

The results of the quantitative assessment confirm our analytical findings and show advantage of the FTA with the EU over the RBK CU integration. The establishment of a DC FTA with the EU would clearly be in the economic interest of the country. Ukraine's exporters would have a better access to a large and stable market and, at the same time, Ukrainian companies would be able to import advanced capital goods at lower prices, thus improving their competitive position. The participation of Ukraine in a customs union with Russia, Belarus and Kazakhstan would bring only limited advantages, since Ukraine already enjoys free trade with the CIS countries.

Moreover, higher import tariffs in customs union mean that Ukraine in case of joining would face higher costs of imports and thus changes in regional trade patterns towards Russia, Belarus, and Kazakhstan, causing trade diversion. Taking into account that the EU is the major supplier of investments and durable goods in Ukraine, more expensive imports from the EU would cause slower modernization and hamper long-term economic development.

In addition, the membership in the customs union with Russia, Belarus, and Kazakhstan would be hardly compatible with Ukraine's WTO commitments and with the DC FTA with the EU, as the customs union has its own Commission that is entitled to conduct new regional integration on behalf of the union member states.

Summing up, from the economic point of view it seems unreasonable for Ukraine to become a member of the customs union, joining Russia, Belarus, and Kazakhstan in this regional integration initiative. Consequently, the strategic decision regarding Ukraine's future trade and regional integration policy should be clearly in favour of establishing a DC FTA with the EU.

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<sup>28</sup> CEPS (2006). *The Prospect of Deep Free Trade Between the European Union and Ukraine*. Report prepared by Centre for European Policy Studies (CEPS), Brussels; Institut für Weltwirtschaft (IFW), Kiel; International Centre for Policy Studies (ICPS), Kyiv

<sup>29</sup> CASE (2007). *Global Analysis Report for the EU-Ukraine TSIA*. Ref: TRADE06/D01. Concept Global Analysis Report prepared by ECORYS and CASE

## Annex . Algebraic description of the basic CGE model

<p><b>Consumers</b></p>	<p><math>U = \sum \theta_j \log(C_j)</math>, where <math>C_j</math> is consumption of good <math>j</math> and <math>\theta_j</math> is its share in total consumption</p> <p><math>M = \sum_s w_s \bar{L}_s + r\bar{K} + T_{hh}^G + T_{hh}^a</math>, where <math>\bar{K}</math> is capital, <math>\bar{L}</math> is labour, <math>w_s</math> and <math>r</math> are prices of labour (by skill level) and capital, <math>T_{hh}^G</math> is net transfers from the government, and <math>T_{hh}^a</math> is net transfer from abroad to households</p> <p><math>\max_{C_j \geq 0, \forall j} U</math>, <math>\sum_j p_j(1 + \tau_j)C_j \leq \theta M</math>, where <math>p_j</math> is the market price index for good <math>j</math> net of consumption tax, <math>\tau_j</math> is the rate of consumption tax for good <math>j</math>, and <math>\theta</math> denotes the constant share of consumption in total income (with <math>0 &lt; \theta &lt; 1</math>)</p>
<p><b>Producers</b></p>	<p><math>y_i = \min \{ F(B_i(a_{si}), VA_i), ID_{ij} \}</math>, where <math>ID_{ij}</math> is the intermediate demand for good <math>j</math> by industry <math>i</math>, and Within the function <math>F_i VA_i</math> is value added given by the Cobb-Douglas function <math>VA_i = xk_i^{(1-\sum_s \alpha_{s,i})} \prod_s l_{s,i}^{\alpha_{s,i}}</math> (with <math>0 \leq \alpha_{s,i} \leq 1</math> and <math>\sum_s \alpha_{s,i} \leq 1</math> and <math>x &gt; 0</math>), and</p> <p><math>B_i</math> characterizes aggregation of business services <math>a_{si}</math>.</p> <p><math>\max_{l_{s,i}, k_i, ID_{ij}} \hat{p}_i y_i - (rk_i + \sum_s w_s l_{s,i})(1 + \tau_i) - \sum_j p_j ID_{ij}</math>, where <math>\hat{p}_i</math> denotes the price index for output<sup>30</sup> of sector <math>i</math>, <math>\tau_i</math> is the rate of direct taxes on capital and labour inputs in sector <math>i</math>, and <math>p_j</math> is the price for intermediate inputs of good <math>j</math></p>
<p><b>Domestic supply</b></p>	<p><math>DS_j = \psi_j \left( \beta D_j^{\rho_{IM}} + (1 - \beta) IM_j^{\rho_{IM}} \right)^{\frac{1}{\rho_{IM}}}</math>, <math>\psi_j &gt; 0</math>, <math>0 &lt; \beta &lt; 1</math>, where <math>D_j</math> is domestically produced goods, <math>IM_j</math> is imported goods, <math>\rho_{IM} = (\sigma_{IM} - 1) / \sigma_{IM}</math>, <math>\sigma_{IM}</math> is the elasticity of substitution</p>
<p><b>Domestic production</b></p>	<p><math>Y_i = \psi_i \left( \gamma H_i^{\rho_{EX}} + (1 - \gamma) EX_i^{\rho_{EX}} \right)^{\frac{1}{\rho_{EX}}}</math>, <math>\psi_i &gt; 0</math>, <math>0 &lt; \gamma &lt; 1</math>, where <math>H_i</math> are domestic sales, <math>EX_i</math> is exports, <math>\rho_{EX} = (\sigma_{EX} - 1) / \sigma_{EX}</math>, <math>\sigma_{EX}</math> is the elasticity</p>

<sup>30</sup> Total output of a sector consists of sales on domestic markets plus exports.

	of transformation
<b>Investments</b>	$INV = \Psi \prod_j INV_j^{\phi_j}$ , $\phi_j \geq 0$ , $\sum_j \phi_j = 1$ , $\Psi > 0$
<b>Government</b>	$\sum_i \tau_i (rk_i + \sum_s w_{s,i} l_i) + \sum_j \tau_{IM,j} p_{IM,j} IM_j + \sum_j \tau_j p_j (C_j + INV_j) + T_G^a$ , where $= \sum_j p_j G_j + p_{inv} SAV^G + T_{hh}^G$ <p><math>T_G^a</math> are transfers from abroad, <math>p_{inv} SAV^G</math> are income for savings, <math>T_{hh}^G</math> are transfers to households, and <math>\sum_j p_j G_j</math> are public goods</p>
<b>Market clearings</b>	$\bar{L}_s = \sum_i l_{s,i}$ , $\bar{K} = \sum_i k_i$ , $IM_j + D_j = \sum_i ID_{ij} + C_j + G_j + INV_j$
<b>Model closure</b>	$p_{inv} (SAV^G + SAV^{hh}) - CA = p_{inv} INV$ , $\sum_j \bar{p}_{IM,j} IM_j + CA = T_{hh}^a + T_G^a + \sum_i \bar{p}_{EX,i} Ex_i$ , <p>aggregate public savings (<math>SAV^G</math>), current account balance (<math>CA</math>), transfers between government and households (<math>T_{hh}^G</math>), transfers between government or households and abroad (<math>T_G^a</math>, <math>T_{hh}^a</math>), real value of public goods (<math>\sum_j p_j G_j</math>) are constant</p>
<b>Numeraire</b>	Price index for investment goods