

Dmitry Gvozdenko

The Development of the Common European
Economic Space between Russia and the EU

Working Paper # BSP/2003/068 E

This paper is based on the Master Thesis prepared at NES in 2003 in the framework of the research project “The effect of WTO accession on Russia” under the supervision of prof. K.V. Yudaeva (Ph.D.,CEFIR) and prof. I.A. Denisova (Ph.D.,CEFIR).

The research was supported by Ford Foundation, World Bank, John D. and Catherine T. MacArthur Foundation.

Moscow
2003

Gvozdenko Dmitry. The Development of the Common European Economic Space between Russia and the EU./ Working Paper # BSP/2003/068 E. – Moscow, New Economic School, 2003. – 48p. (Engl.)

In this paper we consider the consequences of EU's enlargement and establishing the Common European Economic Space (CEES) between the EU and Russia with help of a Computable General Equilibrium (CGE) model. We studied the question whether it is beneficial for Russia to develop the CEES with the EU. The following regions are introduced in our model: Russia, the EU, 10 candidates (7 CEECs and Baltic countries) and the Rest of the world. In the base scenario we assume that EU enlargement is finished and model is calibrated to the data of 1999 base year. Several scenarios of the development of the CEES, which will be something like FTA with an exclusion of some agreements in some industrial and service sectors, were considered in the paper. We have found the effect of the integration processes on trade volumes between regions, production volumes and welfare in each region. We have concluded that the development of the CEES will be beneficial not only for Russia, but also for the EU. The development of Industrial tariff FTA will be preferable for Russia according to our results. We analyzed the scenario of establishing Industrial tariff FTA between Russia and the enlarged EU after Russia's WTO accession. On the bases of our model we have concluded that Russia's WTO accession dose not give significant advantages for Russia. Therefore, the CEES can be developed before or simultaneously with Russia's WTO accession. For modeling we used programme language GAMS.

Key words: free trade area, integration, WTO accession, computable general equilibrium model, Russia and the EU relations, EU's enlargement, trade tariffs

Гвозденко Д.В. Создание Общего Европейского Экономического Пространства между Россией и Европейским Союзом. / Препринт # BSP/2003/068 E. - М.: Российская Экономическая Школа, 2003. - 48с. (Англ.)

В этой работе мы рассматриваем последствия расширения ЕС и образования Общего Европейского Экономического Пространства (ОЕЭП) между ЕС и Россией с помощью компьютерной модели всеобщего равновесия. Мы выяснили, выгодно ли для России развивать ОЕЭП с ЕС. Следующие регионы рассматриваются в нашей модели: Россия, ЕС, 10 кандидатов (7 стран центральной и восточной Европы и страны Балтики) и Остальной мир. В основном сценарии предполагается завершённым процесс расширения ЕС и модель откалибрована по отношению к данным базового 1999 г. Несколько сценариев образования ОЕЭП, которое будет похоже на зону свободной торговли с исключением некоторых соглашений в некоторых секторах промышленности и услуг, рассмотрены в работе. Мы нашли влияние интеграционных процессов на объёмы торговли между регионами, производство и благосостояние в каждом из регионов. Мы получили, что образование ОЕЭП потенциально выгодно как для России, так и для расширенного ЕС. Согласно нашим результатам для России предпочтителен сценарий образования зоны свободной торговли именно в промышленных отраслях. В работе также был исследован сценарий образования зоны свободной торговли в промышленных отраслях и расширенным ЕС после вступления России в ВТО. Мы получили в нашей модели, что вступление России в ВТО не даёт существенных преимуществ России. Таким образом, ОЕЭП может быть создано до или одновременно со вступлением России в ВТО. Для моделирования в работе использован язык программирования GAMS.

Ключевые слова: зона свободной торговли, интеграция, вступление в ВТО, компьютерная модель всеобщего равновесия, взаимоотношения между Россией и ЕС, расширение ЕС, торговые тарифы

ISBN

©Гвозденко Д.В., 2003 г.

© Российская экономическая школа, 2003 г.

Contents.¹

1. Introduction.....	4
2. The history of Russia and the EU relations.....	5
3. Methodology for evaluation of the Common European Economic Space establishment.....	8
4. Data Description.....	13
5. CEES Establishment Scenarios and Results Interpretation.....	18
6. Conclusion.....	28
References.....	30
Appendix 1 Tables and diagrams.....	32
Appendix 2. Model description.....	43

¹ We are grateful to Natalia Turdyeva, Lucio de Souza and Konstantin Kozlov for the data provided.

1. Introduction.

The Russian Federation (RF) and the European Union (EU) are old strategic partners. During recent years, trade relations between Russia and the EU have been rapidly expanding and plenty of new trade agreements between the two regions have been concluded. The relations between Russia and the EU are developing not only in political and trade spheres, but also in the field of science and technology, education and other scopes of activities.

Due to numerous transformations and reforms that presently are underway in these two regions and in the rest of the world, Russia and the EU conduct consistent, ceaseless negotiations within the framework of joint summits on developing their relations status. For instance, the European Union is in the process of eastern enlargement. The candidates to the EU (further – candidate countries) are the following 10 states: Poland, Hungary, the Czech Republic, Slovakia, Slovenia, Estonia, Latvia, Lithuania, Cyprus and Malta. Thus, by 2004 the EU will consist of 25 countries after the 10 candidate countries become full members of the EU.

Besides, Russia and the EU are on the way of establishing the Common European Economic Space (CEES) between Russia and the EU. It is suggested that CEES will be based on previously concluded agreements taking into account the EU enlargement and possibility of future agreements aimed at the closer economic relations between the two regions. The possibility of Russia's World Trade Organization (WTO) accession is also taken into consideration while developing the CEES concept. CEES will represent something similar to a traditional free trade area with some limitations and additions in certain economy sectors. The contents of CEES concept are currently under consideration by the High Level Group (HLG), which was set up by the EU and Russia in 2001. At Russia – EU summit in November, 2002 it was agreed that the CEES concept would eventually be formed by October, 2003. A more detailed history of the relations between Russian Federation and the EU is presented in the second chapter of this paper.

In connection with the changes in the relations between Russia and the EU listed above, it is necessary to evaluate the consequences of these changes and their impact on economies of Russia, the EU member states and the countries of the rest of the world. From the world practice it is known, that a free trade agreement becomes effective only after all the evaluations have been made and it is clear that the agreement is favorable for all of its participants. Therefore, construction of models aimed at receiving numerical evaluations of CEES establishment effects, is extremely urgent in the period, when the contents of CEES concept is being developed.

To accomplish the most complete evaluation of CEES establishment consequences, it is necessary to review the literature devoted to analysis of free trade areas creation results, as well as the effects of customs unions creation and other types of agreements concluded in the past. The literature review has helped us to formulate various scenarios of CEES establishment, to predict possible results and to distinguish possible advantages and disadvantages of the CEES. The literature review is presented in chapter 3 below.

This paper will also present the applied computable general equilibrium model for evaluation of possible consequences of CEES establishment. In our model, the data on production, trade consumption and trade tariffs in Russia, the EU, candidate countries and the rest of the world (ROW) for the year 1999 were used as

basic data. The reasons of this model selection are presented in chapter 3 of this paper. In chapter 4, description of the data used in the model is presented. The detailed structure of the model is described in *Appendix 2*.

Since the development of CEES contents is presently underway, five possible scenarios of CEES establishment were considered in this paper. Description of the scenarios and the results interpretation are presented in chapter 5 below.

On the basis of the results received, the conclusions have been made about the most favorable variants of CEES establishment for the regions participating in its creation. These conclusions are presented in the sixth conclusive chapter.

2. The history of Russia and the EU relations.

The issue of Russia - EU integration has arisen inevitably since Russia – historically, culturally and geographically – is a part of Europe. As for the concept of the Common European Economic Space (CEES) between Russia and the EU, it did not appear at once in 2001, but it was based on a number of previously concluded agreements.

Until 1997 the relations between the Russian Federation and the European Union were regulated by the agreement signed between the EU and the USSR. In 1997 the Agreement on Partnership and Cooperation (PCA) came into effect. The PCA is aimed at strengthening political, trade, economic and cultural relations between Russia and the EU.

The PCA contains articles dealing with legal and legislative issues and clauses, regulating trade and financial aspects of the two regions' relations.

The PCA is a really comprehensive agreement, aimed at further development of mutual relations between Russia and the EU, which assumes even possible contacts for negotiations on the issue of a free trade area creation. However, at PCA signing in 1994, the EU reserved the right to apply antidumping measures in relation to Russia in textile, radioactive and steel industries. PCA's entry into force was delayed until 1997 in connection with combat actions in Chechnya and non-observance of the free press rights in Russia.

Non-observance of human rights and free democracy principles in the RF became a real stumbling block in the relations between Russia and the EU, which was keeping the relations from further development.

Until now the PCA represents an agreement, being a basis for the relations between Russia and the EU. The PCA has established the order of holding summits between Russia and the EU twice a year, as well as having various meetings between ministers and members of parliament, which contributes to maintaining of a continuous dialogue.

In 1996 Russia was admitted to the Council of Europe. In 1999 the EU adopted a "Common strategy on Russia". This document emphasizes EU's readiness to accelerate its integration with Russia in all the business spheres. Besides, the EU has expressed its intention to promote formation of stable economy and democracy in Russia, which is considered by the EU as a major strategic partner.

In the same year of 1999, Russia approved a “Mid-term Strategy towards developing relations between the Russian Federation and the European Union (2000-2010)”.

In this document Russia emphasized the following priority directions for further development of its relations with the EU:

- 1) Export of fuel, nuclear cycle goods and other power resources;
- 2) Oil deposits development and creation of energy and transport structures;
- 3) Increase of finished products, machines and equipment share in Russian export;
- 4) Implementation of commercial space launches.

In general, this document maintains the idea of a free trade area creation. Besides, Russia is aimed at developing cooperation in the industries, which are the most advanced in Russia. This is confirmed by 1997 and 2002 agreements dealing with steel trading, by 1999 agreement on cooperation in the field of science and technology, by agreements on power industry.

Further rapprochement of Russia and the EU was promoted by the events of September 11, 2001 in the USA, when there was a necessity of a joint solution regarding terrorism problem. Besides, Russia and the EU made a number of joint statements within the Council of Europe in relation to actions by the USA in Afghanistan and Iraq.

In 2002 Russia was recognized by the European Union as a country with market economy, which has resulted in antidumping measures reduction towards Russia.

Thus, on the basis of all the agreements mentioned above, since 2001 the High Level Group (HLG) has been developing the concept of the CEES between Russia and the EU. The HLG considers that “to a wide extent, the general goal of the CEES should consist in establishing privileged relations between the EU and Russia, first of all in the field of legislation and regulations rapprochement and encouragement to trade and investments”².

At November, 2002 summit it was noted that coordination in the following areas had already finished: accounting and audit, technical standards and aluminum sector. At this point, the following lines of business are under consideration: customs, competition, transport, space technologies, metallurgy and agriculture. By October 2003, when the CEES concept will be ultimately formed, the following business spheres will also be considered: financial and public sectors, telecommunications. In other words, at this moment there are only outlines of the CEES between Russia and the EU, and we can only simulate the scenarios of probable CEES, representing a free trade area with some limitations in certain industries. It also should be noted that Russia is not aspiring to become a full member of the EU, while the candidate countries to the EU will be full participants of the CEES in case the latter is established. Generally speaking, the main purpose of CEES creation is a closer and mutually more beneficial integration of Russia’s and the EU member states’ economies. In its report made at November, 2002 Russia – EU summit, the HLG noted that in the course of creating a basis for medium- and long-term strategy of economic integration between Russia and the EU, the appropriate provisions of the PCA, the effects of EU’s enlargement on relations between Russia and the EU,

the economic interests of both sides, as well as the priority issue on Russia's WTO accession - will be taken into account.

It is important to note that the Russian government actively supports the process of CEES establishment. For instance, the President of Russia Vladimir Putin in his message to the Federal Assembly issued on April 18, 2002 said: "Today it is necessary once again to confirm our priorities in the European direction. Both our consistent policy and numerous concrete steps towards integration with Europe are quite obvious. We shall continue our active cooperation with the EU to establish the common economic space".

At Russia - EU summit on 31 May, 2003 in St.-Petersburg, the heads of states and governments of all the EU member states, Russia and the 10 countries, which will join the EU next year, evaluated the current relations between the EU and Russia and discussed further steps on Russia's integration into the "Big Europe". The summit participants "have agreed to strengthen co-operation so that in the long-term perspective to establish the common economic space, the common space of freedom, safety and justice, the space of cooperation in the field of external security as well as the space of scientific research and education, including cultural aspects"³, the development of which is to occur within the PCA framework. During the summit, the decision on PCA's covering new members of the EU was also adopted.

After marking appreciable progress in the issue of integration between Russia and the EU, it is necessary to designate the advantages of CEES establishment and possible difficulties on the way of its creation.

First of all, it should be noted that the EU is a major trade partner of Russia and an important source of investments into the Russian economy. According to the materials of "Russia in the united Europe" public committee assembly (October, 2002), the EU countries account for about 40 % of foreign trade turnover and 50 % of all foreign investments⁴ in Russia. Thus, we can expect growth of trade volumes between the EU and Russia after CEES establishment.

As it was mentioned above, the CEES will probably be established after completion of the EU's enlargement in 2004. Thus, CEES creation will provide Russia with an opportunity of entering a more extensive and capacious market of the EU, where uniform rules for all the EU member states, potentially capable of consuming more Russian exports, will be in force.

After EU's enlargement and CEES establishment, the length of Russian mutual border with the EU will increase, which will allow to realize various forms of border and regional cooperation, as it is occurring now on the border with Finland.

Russia is an important supplier of energy resources to the EU. During energy dialogue between Russia and the EU, which has been continuously maintained since 1994,⁵ the EU has expressed interest in preservation and raise of Russia's role as an oil and gas supplier.⁶

² From the report made by the High Level Group on the Common European Economic Space at the Russia-EU summit (November 11, 2002).

³ From the joint declaration of May, 31, 2003 St. Petersburg summit participants.

⁴ Our estimates are presented in chapter 4.

⁵ In 1994, Russia signed a treaty to the Energy Charter.

⁶ COMMISSION "Towards a European strategy for the security of energy supply," Brussels, 29.11.2000.

The CEES establishment can result in even closer co-operation between the enlarged EU and Russia in energy sphere.

One of the problems Russia may face after CEES establishment is that candidate countries are going to adopt non-tariff barriers in relation to Russia, which will inevitably influence trade relations between the regions, meaning the quota on Russian steel export and agricultural production requirements in force in the EU.

With the help of our model, we will not be able to verify the influence of non-tariff barriers due to the fact that they are not included in the model. Nevertheless, a number of hypotheses listed above, were verified within the framework of our model, and these results are presented in chapter 5.

It would be desirable to note once again that the CEES concept cannot be realized right away, after it has been approved. A certain time period is required for the CEES provisions to come into life. Perhaps, some provisions will not be realized. Thus, any attempts to evaluate the consequences of CEES establishment can only be a guiding line for decision-making, but nevertheless they are quite important for understanding the essence of the issue.

3. Methodology for evaluation of the Common European Economic Space establishment.

In this paper we consider consequences of the CEES establishment with the help of a computable general equilibrium model. Advantages of this evaluation method, as compared to econometric ones, are the possibilities of including a large number of economy sectors and regions, as well as other details, which allow to investigate numerically both direct and indirect effects of economic policy. A disadvantage of this approach is availability of a large number of parameters, a part of which cannot be fixed by the model's system of equations. In this case, model calibration is applied - when a part of parameters is fixed exogenously; the other part is set through econometric research, and the remaining parameters are selected so that the base year data could represent equilibrium.

The computable general equilibrium model is used to provide estimates of the effects on production level in various sectors of economy, to determine changes in consumer welfare level in the society after a certain trade agreement has been concluded. As a rule, this model does not require a plenty of basic data. Therefore, this model types are used when evaluating the consequences of free trade areas creation, customs unions establishment and other types of agreements conclusion.

The researchers use applied computable general equilibrium models for reviewing the effects of various trade agreements conclusion. The computable general equilibrium models were used to study the effects of WTO accession. Such research was accomplished, for example, in the paper by Jensen, Rutherford and Tarr (2002). So it is reasonable to consider the computable general equilibrium model for CEES establishment evaluation.

The wide range of models, which have different structure, is used for analyzing trade agreements. In the paper by Rim Chatti (2001), a computable general equilibrium model under oligopolistic market structure for assessing the effects of 1995 agreement on free trade between Tunisia and the EU is considered. This free

trade agreement (FTA) regulates gradual removal of tariffs for import from the EU for the goods, competing with Tunisian products.

The author has considered 3 scenarios. In the first scenario, a perfect competitive market, where production has constant return from the volume, is considered. The second scenario considers the oligopoly market structure with barriers to entry and exit, where production has growing return from the volume. The third scenario describes the oligopoly market structure with free entry and exit where production has growing return from the volume.

Rim Chatti (2001) in different scenarios evaluated the influence on welfare after a trade agreement conclusion. The result was that the EU will be the main trade partner of Tunisia and the most favorable scenario in terms of welfare rise will be the third one.

Due to the fact that production sector of the Russian economy has an oligopolystic structure, a model being similar to the one considered in the article, is urgent.

The author has concluded that in the conditions of an oligopolystic market structure after introduction of the FTA between the EU and Tunisia, the price for the majority of locally produced and imported goods will drop. The same result will occur in agricultural production and services sector. As it was the case in Toming's paper (2001), the agricultural sector is a problematic sector of economy. Therefore, in our model attention should be paid to a possible agreement on agriculture between Russia and the EU.

Aussilou and Pajot (2001) have analyzed the influence of NAFTA⁷ on the EU members' share in the Mexican market with help of the gravitational model. The authors have shown that if we exclude both the trade volumes between Mexico and the United States relating for export, and GDP growth difference between the EU and USA from the data, the Mexican market share loss by the EU during the period 1994-1998 due to NAFTA is only 2.7 % at most.

Nevertheless, the authors emphasize that after necessary evaluations and research conducted, the EU and Mexico have entered into the FTA agreement in 2000.

NAFTA is the area involving highly industrialized countries and a low-wage-cost developing country. So, in this respect, the CEES is similar to NAFTA. Mexico, after a successful agreement with NAFTA, has continued by creating another trade agreement. However, this agreement was concluded with the European Union, which started to lose its share of the Mexican market. The same could be expected for Russia, if the CEES agreement appears successful.

Conclusions of Harrison, Rutherford, Tarr and Gurgel (2002) are also interesting. In this paper, the consequences of the following trade agreements for Brazil are considered:

- 1) FTAA: Between MERCOSUR (customs union between Brazil, Argentina, Uruguay and Paraguay) and NAFTA;
- 2) Between MERCOSUR and the EU (European Union).

For their analysis, the authors have used the computable general equilibrium model with 22 economy sectors, based on the 1996 input-output data. The peculiarity of the model is a consideration of the gains

⁷ NAFTA – North American Free Trade Agreement.

distribution after implementation of the trade agreement by incorporating 20 different types of Brazilian households, characterized by particular income levels.

Harrison, Rutherford, Tarr and Gurgel (2002) have concluded that both trade agreements will be beneficial to Brazil. And the maximum profit for Brazil will be achieved if it holds negotiations on both agreements. This result supports the idea, mentioned above: the more diversified the set of trade agreements, the better for the particular region.

According to the authors, distribution of the gains from trade agreements to different Brazilian households is progressive for Brazil.

In the paper by Whalley, Abrego and Riezman (2002) it is emphasized that there are no generally accepted theory and facts describing trade agreements effects. Viner in his paper (1950) for the first time noted that regional trade agreements not necessarily lead to positive results for their participants, even in the case of tariff barriers removal. Generally speaking, those trade agreements are considered good, which lead to trade volumes growth. However, there are no generally accepted results. Thus, before making a list of CEES establishment scenarios (to be considered in our model below) and analyzing the results, it is reasonable to investigate the attempts of evaluating the consequences of free trade areas creation, customs unions establishment and conclusion of other types of agreements in Russia and in the rest of the world.

For instance, in the paper by RECEP (Russian-European Center for Economic Policy) (2002), the applied computable general equilibrium model for several countries aimed at evaluating the consequences of CEES establishment between Russia and the EU is used. The authors consider the detailed representation of EU-15 states, candidate countries and the rest of the world. However, Russia is not included into the model as a separate region; it is included in the structure of the former Soviet Union. The model uses 1997 data as benchmarks. Therefore this model can give just approximate evaluations of the effects of the CEES for Russia, and these evaluations can give a guiding line for our model's results. From this point of view, consideration of this paper could be useful.

In Russian economy structure, the authors single out agriculture, raw materials branches, metallurgy, chemical and textile industries, aggregating all other industry branches.

The RECEP researchers have carried out four scenarios. The first scenario (S1) considered an enlargement of the EU only by seven candidate countries less Baltic states. (S1) has been built to be compared with other scenarios. In the second scenario (S2), as compared to (S1), a higher substitutability between domestic and imported goods at the expense of doubled values of Armington elasticities is allowed. The third scenario (S3) considers a free trade area between Russia and EU. The fourth scenario (S4) represents expansion of (S3) through investments flows modeling.

The authors have received the following results:

- 1) In scenario (S1), GNP of the regions participating in the CEES, except for the Former Soviet Union (FSU), will grow. The FSU will also feel a general drop in the volumes of export and import;

- 2) In scenario (S2), GNP of all the regions participating in the CEES, will grow. In the FSU, exports and imports, as well as consumer welfare, increase;
- 3) In scenario (S3), the effect in terms of GNP is positive only for the FSU and Finland. There is a significant increase of FSU's exports in agriculture, textiles and raw materials. In scenario (S3), a minor negative effect for the EU and candidate countries is observed;
- 4) Scenario (S4) is closer to the concept of the CEES than all the other scenarios. In (S4) the same results were received as in (S3), but the welfare effect for the FSU is the most positive among other scenarios.

In (S2), (S3) and (S4) scenarios, import increased more than export in the FSU. The authors explain this by FSU's backlog in competitiveness.

At economy sectors level, the RECEP researchers observed growth of trade volumes in FSU's agricultural sector. The authors have concluded that there are no significant changes in power resources trade between the FSU and the EU. This fact is explained by lack of obstacles to trade in this sector. Besides, in (S3) and (S4) scenarios, the authors have received the increase of finished products and equipment export from the FSU.

So, the RECEP researchers have concluded that (S4) is the most favorable scenario for the FSU, but unfortunately, the effect of CEES establishment is negative for the EU and candidate countries. These results mean that the EU will have some doubts in the rationality of CEES development. The main drawback of RECEP model (2002) is that it gives results for the FSU, not for Russia. Hence, the conclusions for Russia should be interpreted cautiously. In general, the authors have shown that the CEES establishment is potentially beneficial for Russia, which is expressed in both GNP and welfare increase.

The CEES will be created after the EU enlargement, therefore papers devoted to EU's enlargement are also of interest to us. In the paper by Bardazzi, Grassini (2002), the effect of EU's enlargement on a single EU member state, is analyzed, namely - Italy. For modeling the Italian economy, the authors used the Interindustry Italian Model. It contains 44 sectors, 40 of which are private, and three are governmental. The three governmental sectors include: general administration, education and national health services.

From the data presented by the authors it is clear that a significant part of candidate countries' import accounts for the EU, while each candidate state represents only a minor part of EU's trade volume. In that characteristics the candidate countries are similar to Russia. But the candidate countries' economies are closely integrated with the EU even nowadays.

Some assumptions made by the authors during modeling, are interesting enough. For example, EU's tariffs lowering in relation to candidate countries' production was simulated by the authors as reduction of relative prices for Italian import.

Bardazzi and Grassini used the assumption that the removal of non-tariff barriers (NTB) in the trade between the EU and the candidate countries is equivalent to the abatement of 5 %, 10 % and 15 % tariffs in the heavily, mildly and unprotected economy sectors.

During their research, Bardazzi and Grassini concluded that the candidate countries would gain more from EU's enlargement than the EU member states in terms of GNP growth. And the trade flows between the EU and the candidate countries will be concentrated in the following sectors: machinery and mechanical appliances and electric equipment. During the research, it was discovered that Slovenia will be the main trade partner of Italy among the candidate countries. This is an interesting fact, since Slovenia is the only candidate that borders on Italy. It can be expected that the biggest increase of trade volumes will be between Russia and the EU-25 states, bordering on Russia.

Now we can briefly describe our model's structure and emphasize its advantages and disadvantages. The detailed structure of this model is presented in *Appendix 2*. The model is static. In the model, the following regions are presented: Russia, the European Union, the Baltic states, 7 other candidate countries and the countries of rest of the world. ROW represents one aggregated region. In each region, 17 products are considered. The model assumes perfect competitiveness and unavailability of production factors, i.e. there is no division into labor and capital. Production possibilities in each of the regions are fixed by the production possibility frontier with constant elasticity of transformation.

Each region is represented by a single representative consumer with the utility function with constant elasticity of substitution. The consumer demand is calculated from the problem of consumer utility maximization with constraints. The consumer consumption is determined as the sum of consumption of a product made inside a country (a difference of production and export) and the imported product's consumption.

The equilibrium prices are determined on the basis of demand and supply equality.

In the model, the tariffs and taxes on production are considered. Besides, Armington assumption for the goods, which allows treating the same product as import and export in bilateral trade flows of trade, is also used. We shall also evaluate the effect on society's welfare at modeling various scenarios of CEES establishment with the help of the equivalent change measure.

In the base scenario, the process of EU's enlargement is assumed as completed and the model is calibrated in relation to the base year of 1999. In the alternative scenarios, to be compared with the base one, establishment of the CEES will be simulated by introduction of a free trade area, when all or a part of the tariffs are considered equal to zero depending on the degree of trade liberalization in certain sectors of the economy.

Thus, the model structure is rather simple. Our model is not capable to simulate an oligopolystic market, since it assumes a perfectly competitive one. It will not allow us to simulate the direct foreign investments flows, which would be urgent when analyzing Russian economy. There is only one representative agent in our model; therefore we will not have the ability of analyzing the trade agreement effects for Russia in terms of gains distribution between different households, which were considered in the paper Harrison, Rutherford,

Tarr and Gurgel (2002). But the simple structure of the model will allow us to accomplish a large number of simulations, changing the model's parameters and considering various scenarios, overcoming a somewhat static character of the model. Another advantage of our model is that we consider Russia as separate region and use rather detailed classification of industries and relevant data.

4. Data Description.

In our model, the data on production, consumption⁸, taxes and trade tariffs in each of the regions for the year 1999 were used as basic data. Data sources and procedures used at data aggregation, are presented below.

4.1 Classification of Industries.

Our task was, first of all, to find correspondence between classification of economic activities, production and services in Russia and the European Union. At our disposal, we had correspondence between the All-Russian Classifier of National Economy Branches (OKONH) and ISIC⁹ classification, as well as correspondence between classification of economic activities in the EU (NACE) and ISIC classification. Basing on the five-digit OKONH, 17 industries were segregated. Their complete list is indicated in **Table 1**, **Appendix 1**. In fuel and energy complex, four industries were segregated and so were seven industries in production. Agriculture was separately segregated, and the services sector was split into 5 components. Using the "Transitional key between OKDP and OKONH" (Goskomstat of Russia, Economic Classifications Center, Moscow, 1994), four items of the four-digit ISIC, corresponding to the segregated 17 industries were found. Then, for the discovered ISIC items, the appropriate NACE items were found with the help of NACE revision 1.1 (2002). The indicated correspondences are not mutually univocal. For instance, item (9400) in ISIC classification corresponds to several items in OKONH, and fails to correspond to any item in NACE. The results of received correspondence between OKONH and NACE are indicated in **Table 2**.

It can be noted here that in the candidate countries, as well as in the EU, NACE classification is in force. For the Rest of the world (ROW), the received splitting into 17 industries was used in this paper.

4.2 Production.

In this section, data sources on production and the procedure of bringing production data in various regions to the uniform standard, are presented. The production data for 1999 in mln. EURO used in our model, are presented in **Table 7**. The process of this table's data receipt is described below.

⁸ Consumption of goods, produced within the region as well as imported goods, has been received using trade statistics (export, import).

⁹ International Standard Industrial Classification of all Economic Activities.

4.2.1 Production in Russia.

As a basis for Russia, production data from Table 12.20 “Production account on branches in 1999” in mln. rubles (“Russian Statistical Year-Book 2001”, Goskomstat of Russia) were taken. As our model deals with comparison of regions, in order to transfer the data into US Dollars, we used the purchasing power parity (PPP), which for Russia in 1999 constituted 5.41 rubles for 1 USD. Then the data were transferred in EURO under 0.94 EURO / \$ exchange rate.

It is well known that the production data in fuel and energy complex, which includes a major part of Russian export, are underestimated by exporters because of the export rent levied. Thus, to assess production in fuel and energy complex branches, the following approach is applied. Production in these branches is split into two components: 1) production consumed inside the country; 2) manufactured production exported from the country. The second component, as against the first one, was assessed according to export prices. For this purpose, Table 14.23 “Power Resources Balance for 1999” (“Russian Statistical Year-Book 2001”, Goskomstat of Russia) was used. From this table, 1999 production and export volumes in fuel and energy complex branches were taken. Then the evaluations of Russian export in 1999 in mln. EURO were received, using the prices for Russian power resources export to the EU received through the base on export from the European Union and import to the European Union COMEXT (EUROSTAT, 2002).

4.2.2 Production in the EU.

Production in the EU for 1999 in mln. EURO was assessed with the help of **Table 2** and the book “European Business 2002” (EUROSTAT). One of the problems was that the data on several items were not related for 1999, but for the previous years. In these cases, the tables “Production in constant prices (1995-2000)” (EUROSTAT) and “Development of output prices in the EU (1995-2000)” (EUROSTAT) were used to consider the change of prices and production volumes in the EU for the period until 1999. For the branches of fuel and energy complex, non-ferrous metallurgy, forest industry, pulp and paper and timber industries¹⁰, the production data were accessible only in metric units. These data were transferred in mln. EURO, using the export prices from the EU¹¹ in the branches mentioned above.

4.2.3 Production in Candidate Countries.

As a basis for production evaluation in candidate states, the data in mln. EURO for 1998 from the book “Business in candidate countries: facts and figures (1995-1999)” (European Commission, 2002) were taken. As it was the case with the data for the EU, 1999 production in candidate countries was assessed in view of production and prices volumes growth. For this purpose, the following tables were used: 1) “Industrial production volumes by activities (1999-2001)” (CONSTAT); 2) “Manufacturing volume indices by selected branches (1999-2001)” (CONSTAT).

¹⁰ In terms of our model, they are G1, G2, G3, G5 and G11 industries.

¹¹ The base used - COMEXT (EUROSTAT, 2002).

It can be noted here that the data in the book “Business in candidate countries: facts and figures (1995-1999)” (European Commission, 2002) were received through exchange rates of the candidate countries’ national currencies in relation to EURO. To make the comparison of the regions look more solid, the data from the book were transformed with the help of exchange rates and the purchasing power parities in relation to EURO. Namely, the data from the book for each of the candidate countries were divided by the exchange rate and multiplied on the purchasing power parity. The purchasing power parities used from EUROSTAT¹² sources are indicated in Table 3. It should be noted that in the main source the data for Malta were unavailable. Therefore, the data on production in Malta were used from the Website <http://www.nso.gov.mt/>. Agricultural production in candidate countries was assessed with the help of “Preliminary economic accounts for agriculture in 12 candidate countries (1998-1999)” (EUROSTAT).

4.2.4 Production in the Rest of the World (ROW).

The world’s total GDP except for Europe was used as a basis for production evaluation in 17 industries in ROW. This GDP was calculated in view of the purchasing power parity¹³. Using the percentage structure of the segregated 17 branches in overall production, the world’s total GDP, except for Europe, was split into several components. Namely, from “World development report” (The World Bank, 2003), the following percentage structure of ROW production was received: 1) agriculture constitutes 5 %; 2) industries constitute 31 % (production component makes 21 %); 3) services constitute 64%. The percentage structure of production component is indicated in *Table 4*.

4.2.5 Dominant Branches in the Regional Production Structure.

Dominant branches in each of the regions’ production structure are listed below:

Russia: fuel and energy complex, metallurgy, food-processing industry and agriculture;

EU: machine building, food-processing industry and agriculture, trade and communications;

Candidate countries: a food-processing industry and agriculture, machine building, trade and communications;

ROW: services sector¹⁴.

4.3 Trade.

It is TNVED classification that is applied in Russia. TNVED is close to HS classification used abroad. We have found correspondence between TNVED and our classification. For this purpose, we used correspondence between TNVED and OKONH (Goskomstat of Russia). In the result of that, correspondence was found between the four-digit TNVED (1265 items) and the classification of 17 industries used in our model. In cases when one product relates to several branches, we used correspondence with equal weights.

¹² “Statistics in focus: economy and finance. Prices and purchasing power parities”, European communities, 2002.

¹³ GDP_1999 (World without the EU) = 36509619,66 (mln. USD).

¹⁴ For each of the regions, enumeration is conducted in decreasing order of the appropriate industry’s importance.

To evaluate Russian trade, we used the year 1999 base. For the EU, COMEXT base was used. Candidates countries' trade was evaluated according to UNCTAD-TRAINS database.

The export into ROW in other four regions was received as the difference of region production and the sum of region's production consumption in the regions which are distinct from ROW.

4.4 Tariffs.

All the trade tariffs for all the regions can be found in *Table 5*.

4.4.1 Tariffs of Russia.

Russian tariffs system is represented by both equivalent and mixed type tariffs. To discover the effectively applied tariff rates, we used the "Consultant +" base. The four digit tariffs weighted in conformity with import volumes, were correlated with 17 branches in our model through averaging. To assess the tariffs in services sphere, we used the evaluations from A. Zemnitsky's paper "Evaluation of tariff barriers removal consequences for foreign companies in Russian economy's services sector: structural approach".

4.4.2 Tariffs of the EU.

As approximation of EU's tariffs, we used the limiting tariff values of WTO's Uruguayan round for the EU for 2000, which are accessible at WTO's website. The eight digit limiting tariffs were transferred into the effectively applied tariff rates, which then were aggregated into four digit tariffs weighted according to EU's import volumes in 2000. Then we passed over to classification in our model.

Owing to favorable treatment approach in the trade between the EU and candidate countries, the EU tariffs in relation to the candidates were made twice less compared to the EU tariffs in relation to Russia and ROW.

4.4.3 Tariffs of Candidate Countries.

For candidate countries, we used the six-digit tariff TRAINS base. It should be noted that when evaluating the tariffs, preferences in trade in each of the candidate countries were taken into account. Aggregation procedure was also applied when classifying branches in our model.

4.4.4 ROW Tariffs.

ROW tariffs were received as average weighted tariffs of Russia, EU and candidate countries.

4.5 Consumption.

When composing the initial consumption matrix, we considered consumption of goods by each of the regions which were produced inside this region and the goods imported into this region and valued in mln. EURO. The region's consumption of goods produced inside this region, was evaluated as the difference between production of these goods and their export. Consumption of goods imported into each of the regions, was evaluated according to the export and import data in each of the regions. It should be noted that

export and import data for Slovakia, Malta and Cyprus were available only on official statistical websites of these countries: <http://www.statistics.sk/>, <http://www.nso.gov.mt/>, <http://www.pio.gov.cy/dsr/index.html>. Due to the fact that the data on export from Russia to the EU and import from the EU to Russia are frequently underestimated, EU's trade statistics data from COMEXT base were used when making consumption evaluation. Due to the fact that the data on export from candidate countries were unavailable for us, the data on EU and Russia import from candidate countries were used when making consumption evaluation. ROW consumption of other regions' goods was assessed as the rest of production in each of these regions after consumption of goods produced in this region, in two remaining regions. Consumption by the regions of goods from ROW was evaluated according to the data on import from ROW into each of the considered regions.

Our model's consumption matrix is entirely presented in *Table 8*.

4.6 Taxes.

The taxes for Russia were received through tables "Costs - output" (Goskomstat of Russia, 1998-1999). The taxes for the EU and candidate countries were received through Paul evaluations. ROW taxes were received as simple average taxes of Russia, EU and candidate countries.

Complete information on taxes is presented in *Table 9*.

4.7 Russia – EU Trade Structure.

On the basis of data used in the model, the following conclusion can be made about the structure of trade relations between Russia and the EU in 1999.

For Russia, the EU is one of the main trade partners. The structure of export and import in relation to the EU and candidate countries is indicated below:

	Russian Import (1999)
From the EU	37.7 %
From candidate countries	7.3%

	Russian Export (1999)
To the EU	38.7%
To candidate countries	19.5%

On the other hand, Russia is a small trading partner for the EU. According to our data, Russia's trade volume share makes as little as 2 % of EU's export and 3.66 % of import to EU countries. A major share in the structure of import from the EU to Russia, is represented by agricultural products, production of machine-building and chemical industries. In the structure of EU's import from Russia, power resources prevail. Their

share amounts to 55,5 % in the total volume of EU's import from Russia. Thus, the EU is highly interested in oil and gas shipments from Russia.

Candidate countries are also minor trading partners for Russia. In candidate countries' import from Russia, power resources prevail, and Russia exports to candidate countries more than it imports from them, as it is the case with the EU. According to our data, Russia's trade volume share makes only 2 % of candidate countries' export and 9 % of import to candidate countries. Primarily, Russia imports industrial products from candidate countries.

Thus, the data analysis shows that both Russia and the EU are interested in the CEES establishment, which can result in the even greater increase of trade flows owing to tariffs reduction.

5. CEES Establishment Scenarios and Results Interpretation.

It should be noted that our model does not include non-tariff barriers. Thus, the CEES establishment is simulated in the model only through trade tariffs modification. As the issue of the CEES establishment is currently under discussion, the most probable scenarios of the CEES formation are presented below. Besides, each subsequent scenario will imply a closer integration between Russia and the enlarged EU in relation to the previous scenario except for the fifth one.

5.1. Scenarios.

Base scenario – EU enlargement.

In the base scenario, the process of EU enlargement is considered as completed since 10 candidate countries will become EU's full members in 2004.

EU enlargement is modeled as follows. EU's trade tariffs in relation to the candidates shall be considered as equal to zero – as it is the case with candidates' tariffs in relation to the EU. The countries of Central and Eastern Europe as well as the Baltic states consider the tariffs in trade between these two regions as equal to zero. Besides, the candidates accept the same trade tariffs that are in force in the EU in relation to Russia and ROW. Since candidate countries become full members of the EU, the taxes in candidate countries are accepted the same as in the EU. As it is seen from **Table 5**, after EU enlargement, trade tariffs in the countries of Central and Eastern Europe¹⁵ in relation to Russia and ROW will drop practically in all the industries. On the contrary, in the Baltic states¹⁶ trade is currently liberalized, and trade tariffs there in relation to Russia and ROW will increase after EU enlargement.

¹⁵ Further in the tables: the following 7 countries of Central and Eastern Europe: Poland, Hungary, Czech Republic, Slovakia, Slovenia, Cyprus and Malta.

¹⁶ Further in the tables: the following Baltic states: Estonia, Latvia, Lithuania.

Scenario 1-Industrial tariff FTA

From **Table 5** it is seen that the highest trade tariffs of the EU in relation to Russia are the tariffs in industrial branches¹⁷. Thus, the most plausible scenario of CEES establishment is creation of a free trade area only in industrial branches. In this connection, trade tariffs of the enlarged EU-25 in relation to Russia and Russia's tariffs in relation to EU-25 in 11 industrial branches of our classification¹⁸ are considered to be equated to zero.

Scenario 2-FTA with Removal of Tariffs on Industrial and Agricultural Goods

In the second scenario, we are considering creation of a free trade area between Russia and the enlarged EU not only in industrial branches, but also in agriculture. Under this scenario, trade tariffs of the enlarged EU-25 in relation to Russia and Russia's tariffs in relation to the enlarged EU-25 in 11 industrial branches and agriculture will be equated to zero.

Scenario 3-Comprehensive FTA

In the third scenario, creation of a total free trade area between Russia and the enlarged EU-25 is considered. Under this scenario, trade tariffs of the enlarged EU-25 in relation to Russia and Russia's tariffs in relation to the enlarged EU-25 in all the 17 industries will be equated to zero.

Scenario 4-Comprehensive Custom union

In scenario 4, we are considering creation of a total free trade area between Russia and the enlarged EU, similar to the previous scenario. In addition, Russia accepts the same trade tariffs in relation to ROW, which are in force on the part of the EU in relation to ROW.

Scenario 5-Industrial tariff FTA after Russia's WTO accession

As the issue of Russia's WTO accession is presently negotiated, it is reasonable to consider the scenario, when after EU enlargement and Russia's WTO accession CEES will be established. Under this scenario Russia, first of all, accepts new tariffs in relation to other regions after its accession in WTO. These tariffs are indicated in **Table 6**. Then the trade tariffs of the enlarged EU-25 in relation to Russia, and Russia's tariffs in relation to the enlarged EU-25 in 11 industrial branches will be equated to zero.

5.2. Results Interpretation.

At the first stage we received results for four regions: Russia, EU, 10 candidate countries and ROW. At model calibration, the data for 1999 were used. In **Table 5.1** and **Table 5.2** below, we can see the results of economic welfare¹⁹ change and consumer income change in the base scenario and the first scenario for four

¹⁷ Especially in food processing and light industries.

¹⁸ G0-G10 industry branches in our markings.

¹⁹ In our model, economic welfare means consumer utility.

regions. The base scenario was compared to a situation when there is no EU enlargement. The first scenario (Industrial tariff FTA) was compared to the base scenario.

Table 5.1

Economic Welfare Change (in %)		
	Base scenario	Scenario 1
Russia	0,049	-0,3
EU-15	0,004	0,033
10 candidate countries	-0,152	0,17
ROW	0,004	-0,009

Table 5.2

Consumer Income Change (in %)		
	Base scenario	Scenario 1
Russia	0,0009	-0,37
EU-15	-0,1	2,7
10 candidate countries	-2,4	4,3
ROW	0,005	2,1

As it is seen from the tables above, we have received negative results for candidate countries after EU enlargement, which fail to comply with the results of other papers²⁰, according to which candidate countries will benefit more than the EU after its enlargement. Thus, there was an idea of dividing the 10 candidate countries into two regions: 7 countries of Central and Eastern Europe and the Baltic states.

In **Table 5.3** and **Table 5.4** below we can see the results of economic welfare change and consumer income change in all the scenarios, except for the scenario, where Russia's WTO accession is considered. Further, the results for five regions are analyzed. It should be kept in mind that in all the tables, comparison of each of the scenarios is further presented except for the base one in relation to the previous scenario in the order the scenarios are presented from the left to the right. The base scenario was compared to a situation, when there is no EU enlargement.

²⁰ For example, Rossella Bardazzi, Maurizio Grassini "European enlargement: modeling framework and simulations," January 2002, www.mittelforum.org

Table 5.3

Economic Welfare Change (in %)					
	Base scenario	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Russia	0,03	-0,3	-0,018	-0,03	-0,3
EU-15	0,004	0,04	0,003	0,004	-0,003
7 Countries of Central and Eastern Europe	-0,16	0,16	-0,0003	0,004	-0,05
Baltics	0,13	0,6	0,0001	0,03	-0,1
ROW	0,004	-0,01	-0,0004	-0,0006	0,02

Table 5.4

Consumer Income Change (in %)					
	Base scenario	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Russia	-0,005	-0,3	-0,02	-0,03	-0,2
EU-15	-0,08	2,7	0,2	0,3	2,3
7 Countries of Central and Eastern Europe	-2,6	4,3	0,1	0,3	1,7
Baltics	1	5,6	0,1	0,5	0,8
ROW	0,03	2	0,1	0,2	2,7

Below you can see the results of production level change in five regions in all the scenarios, except for the scenario, where Russia's WTO accession is considered. The latter will be analyzed separately.

Table 5.5

Production Level Change (in %)					
	Base scenario	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Russia	-0,0000003	-0,0007	-0,00005	-0,0001	-0,001
EU-15	-0,0000006	-0,00003	0,000001	0,000003	0,00001
7 Countries of Central and Eastern Europe	-0,004	-0,00006	0,000004	0,0001	-0,00004
Baltics	-0,005	-0,0009	0,000007	0,0006	0,00003
ROW	-0,00000003	-0,0000003	-0,00000004	-0,00000008	-0,0000005

From **Table 5.3** it is seen that after EU enlargement, economic welfare in the Baltic states tends to grow, and in the countries of Central and Eastern Europe (CEE) it tends to decrease. Therefore, our model proves the result of several other papers saying that it is the small economies, which mostly benefit from EU enlargement²¹. From **Table 5.3** and **Table 5.4** it is seen that in all the CEES establishment scenarios considered, the countries of both Central and Eastern Europe and the EU benefit in terms of welfare and consumer income compared to the base scenario. The only exception is the scenario of a Custom union establishment between Russia and the enlarged EU (Scenario 4). We have received the result that all the regions lose in terms of welfare compared to the comprehensive free trade area formation scenario (Scenario 3). Here the result of the paper written by Whalley, Abrego and Riezman (2002) is confirmed. According to this result, the Custom union participants benefit only with 0.23 probability index as compared to free trade area creation. In other words, a deeper integration will not necessary lead to participants' welfare increase.

In the Baltic states, we can observe consumer income growth in all the scenarios and minor welfare decrease only in the last scenario. Theoretically, the regions, which are not participating in integration processes, tend to bear losses. In our model, this statement has been proved for ROW countries, which observe welfare decrease in the free trade area formation scenarios between Russia and the enlarged EU. In percentage, production changes in each of the regions are insignificant, but it is the trend of these changes itself, which is really important for us.

It should be noted that the price level for ready-made production, has shown less than 1% growth from one scenario to another in all the regions. The only exception was the base scenario for EU-15 and 7 CEE countries, where decrease in prices for all the production with subsequent growth in CEES formation scenarios was observed. It was just the growth of price level, which has reduced the effect of both production drop influence and trade tariffs on consumer welfare. Due to this reason, we are observing growth of consumer income in EU-15, candidate countries, ROW in CEES establishment scenarios.

In Russia, a minor decrease of welfare, consumer income and production is observed in all of the scenarios. Thus, our model's results are quite opposite to those received by the Russian-European Center for Economic Policy²², according to which in Russia (being according to their model a part of the former Soviet Union structure), welfare will grow, and in the EU and candidate countries a small negative effect will be observed. However, it should be noted here that RECEP researchers considered 1997 data, a rather large branches aggregation and did not segregate Russia as a separate region. Besides, it is intuitively clear that Russia can slightly lose from the CEES establishment since it participates only in one integration process, while the EU-15 and candidate countries participate not only in the CEES formation, but also in the EU enlargement. We have seen a confirmation to that in Chapter 3, when considering the paper by Harrison, Rutherford, Tarr and Gurgel (2002).

Basing on the preliminary analysis, it can be concluded that due to positive results, the enlarged EU will not be against the CEES establishment.

²¹ Richard E. Baldwin, Anthony J. Venables "Handbook of International Economics," Vol 3 (1995), chapter 31, p. 1633.

Welfare and consumer income fail to make a full description of an economic situation, therefore the analysis of change in interregional trade and production structure in various scenarios is presented below.

Table 5.6

Change of Export and Import (in %)					
	Base scenario	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Russian export to EU-15	-0,07	4	0,2	0,2	1,6
Russian export to 7 CEE countries	-0,06	5	0,15	0,3	1,1
Russian export to the Baltics	-0,2	6,7	0,14	0,5	0,4
Russian export to ROW	0,03	1,2	0,09	0,15	2
Russian import from EU-15	0,05	5,6	0,4	0,4	-2,3
Russian import from 7 CEE countries	1,8	4,8	-0,02	0,1	-1,7
Russian import from the Baltics	-0,6	2,6	0,02	0,3	-1
Russian import from ROW	-0,02	-2,2	-0,1	-0,2	1,8
EU's export to 7 CEE countries	0,6	1,4	-0,01	0,003	-0,6
EU's export to the Baltics	2,8	2,5	-0,05	0,2	-1,3
EU's import from 7 CEE countries	3,7	-1,4	0,02	-0,009	0,5
EU's import from the Baltics	1,8	-2,8	0,04	-0,1	1,3

From **Table 5.6** it can be seen that in the base scenario dealing with EU enlargement, trade volumes between the EU and candidate countries are growing as it should be the case according to theory and intuition, while

²² RECEP "Common economic space: Prospects of Russia- EU relations", Moscow, October 2002.

the influence on Russian trade volumes is insignificant. As a result of such a minor effect, after the EU-15 enlargement Russia has benefited slightly in terms of welfare.

It is obvious that after free trade area creation in industrial branches (Scenario 1), trade volumes between the enlarged EU and Russia are growing considerably. Decrease of Russian imports from ROW is insignificant and equals 2,2%. From the changed trade statistics inside the enlarged EU it is clear that after creation of a free trade area in industrial branches, substitution of the goods from candidate countries with Russian-made goods in the EU import structure is taking place, which corresponds to the intuition. Russia has reduced tariffs in relation to the enlarged EU, so EU's import from Russia will be growing.

Intuitively it is clear that trade volumes between the enlarged EU and Russia will grow in the cases of deeper integration. This is confirmed by our model's results. For instance, in the scenarios corresponding to deeper integration between the EU and Russia, growth of Russian exports in all the regions is observed. There is just a minor decrease of Russian imports from candidate countries in the scenario of a custom union establishment between the enlarged EU and Russia (Scenario 4).

It is also important to note that in all the scenarios, except for the latter, Russian import from ROW is dropping. It is explained by the fact that the goods from ROW are substituted with goods from the enlarged EU, observing low Russian tariffs. In the scenarios dealing with creation of a comprehensive custom union between the enlarged EU and Russia, the latter accepts lower European tariffs in relation to ROW, which explains growth of Russian import from ROW.

Thus, the CEES establishment promotes growth of trade turnover between the enlarged EU and Russia and insignificantly influences trade volumes inside the enlarged EU. This result speaks for the benefit of the CEES establishment. Having analyzed the changes in trade turnover between regions, it is necessary to clarify changes in trade at industries classification level.

It is possible to analyze the changes in Russian trade in scenario 1 as compared to the base scenario with the help of *Diagram 1, Appendix 1* in the final part of this paper. Russian export considerably grows in the following branches: oil, metallurgy, chemical industry, machine building and food-processing industry. Thus, we have received the increase of finished products and equipment exports from Russia, which coincides with the results of the Russian-European Center for Economic Policy. In neither of the industry branches, decline of Russian exports is observed. As we can see from *Table 5.6*, a major part of Russian export growth accounts for the enlarged EU.

Growth of services sphere export from Russia also should be noted, especially in transportation and communication fields. This result complies with the fact that the movements and migration of both goods and people between the regions tend to increase after formation of a free trade area.

Russian import considerably grows in the following branches: chemical industry, machine-building industry, light industry. Russian import is declining only in agriculture. In general, Russian export to the enlarged EU grows more intensively than Russian import from the enlarged EU, which complies with expectations that Russia will be an export-oriented country after the CEES establishment.

After creation of a free trade area not only in industrial branches but also in an agriculture (Scenario 2) between Russia and enlarged EU, it is natural to expect interregional trade turnover growth just in agriculture in comparison with the first scenario. A confirmation to that effect can be seen in **Diagram 2**. In other branches, trade volume between the enlarged EU and Russia has changed insignificantly, which is quite natural since in the second scenario, as compared to the first one, only the tariff for agricultural production importation changes in the regions considered in the model.

At creation of a comprehensive custom union between Russia and enlarged EU (Scenario 4), slight changes of Russia's trade turnover are taking place. Therefore, they are presented in percentage structure on **Diagram 3**. Having summarized the changes of export and import, we have received the total trade growth value for Russia. This value is confirmed by the result, received by Whalley, Abrego and Riezman (2002), according to which the custom union participants benefit as compared to creation of a free trade area in terms of trade volumes with 0.3 probability. However in general, creation of a comprehensive custom union is not favorable for Russia as opposed to a comprehensive free trade area since in this case welfare, consumer income and production rate tend to decrease in spite of the insignificant trade volumes growth.

Now let us pass over to analysis of Russian production structure change in the most probable scenario 1. As it can be seen from **Diagram 4**, in comparison with the base scenario, production growth is observed in the following branches: oil, metallurgy, chemical and light industry, machine building industry. Thus, production tends to grow in the branches, where export growth is observed.

Nevertheless, Russian production decreases in agriculture and services sector, which results in overall production drop. Since production in Russia generally decreases, and export tends to grow, home made production consumption drops within the limits of 0,01 %. In this scenario, structural changes in production are important, i.e. growth of finished products and equipment production. Most economists expect such a result, namely, Russia's exit from the state of rental economy, which is proved by our results.

In scenario 2, production growth in agriculture is taking place, which is quite natural thanks to trade conditions improvement in this branch. The problem is that presently, agricultural sector in the EU is protected by high trade tariffs. After the tariffs for agricultural trade between Russia and the enlarged EU had been removed in scenario 2, growth of production and export in agricultural sector of Russian economy became real.

In other scenarios, some changes in Russian production structure, which are similar to scenario 1, are observed, but they are insignificant.

To make the analysis completed, it is necessary to review structural changes in trade and production in the enlarged EU after the CEES establishment. From **Diagram 5** it can be seen that in the EU, under scenario 1, import in all the branches grows as compared to the base scenario, while export considerably grows in light and food processing industries. In general, overall growth of trade turnover in the EU in scenario 1 is observed. This growth is promoted through closer trade relations with Russia, which is quite logical thanks to interregional free trade area formation. It should be noted that export growth in all the branches is observed only in the Baltic states from the enlarged EU structure. And a major part of this export growth

goes to the EU. Thus, trade relations of the Baltic states are also improving. Our results have proved once again that especially small regions really benefit from integration. In candidate countries from Central and Eastern Europe there are minor changes in trade, which are structurally similar to changes in the EU.

Special attention should be given to scenario 2. In this scenario, as in Russia in general, we are observing growth of agricultural production's export and import in all the regions in the structure of the enlarged EU. Thus, in scenario 2, growth of agricultural products trade between Russia and the enlarged EU is observed.

Changes in EU's production in various branches are insignificant (approx. 0,001 %). In the Baltic states only, production growth of about 0,1 % in scenario 1 in fuel and energy branches, machine building industry, light industry is observed.

It is interesting to analyze scenario 5 (Industrial tariff FTA after Russia's WTO accession) since Russia can join WTO prior to the CEES establishment. It is natural to compare scenario 5 results with results of scenario 1, which differs from the first one in absence of Russia's WTO accession. Thus, we can discover the effect of agreements conclusion sequence for Russia. Tables with the results are indicated below. The first scenario of the CEES establishment is compared to the base scenario, and the fifth scenario is compared to the first one.

Table 5.7

Change of Economic Welfare (in %)		
	Scenario 1	Scenario 5
Russia	-0,3	-0,13
EU-15	0,04	0,004
7 Countries of Central and Eastern Europe	0,16	-0,01
Baltics	0,6	0,009
ROW	-0,01	0,005

Table 5.8

Change of Consumer Income (in %)		
	Scenario 1	Scenario 5
Russia	-0,3	-0,1
EU-15	2,7	1
7 Countries of Central and Eastern Europe	4,3	0,9
Baltics	5,6	0,8
ROW	2	1,1

Table 5.9

Change of Export and Import (in %)		
	Scenario 1	Scenario 5
Russian export to EU-15	4	0,8
Russian export to 7 CEE countries	5	0,6
Russian export to the Baltics	6,7	0,6
Russian export to ROW	1,2	0,8
Russian import from EU-15	5,6	-0,3
Russian import from 7 CEE countries	4,8	-0,5
Russian import from the Baltics	2,6	-0,02
Russian import from ROW	-2,2	0,4
EU's export to 7 CEE countries	1,4	-0,15
EU's export to the Baltics	2,5	-0,2
EU's import from 7 CEE countries	-1,4	0,2
EU's import from the Baltics	-2,8	0,3

At a model level, scenario 5 differs from scenario 1 by lower Russian tariffs in agriculture and services sector in relation to four other regions. As it was the case with analysis of the previous four scenarios, we receive the result that Russia loses in terms of welfare and consumer income due to the fact that its economy is more open. Nevertheless, Russian export is growing in all the branches by approximately 0,7 %, which can be regarded as a positive effect for its economy.

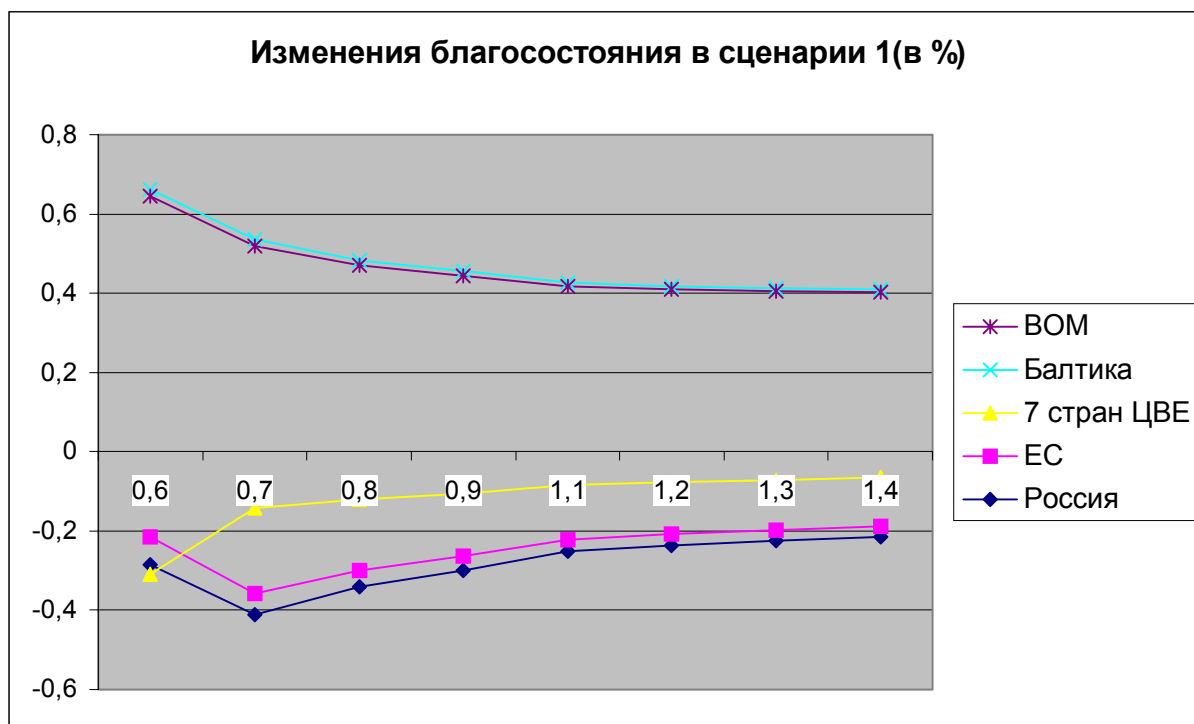
Russian import is decreasing by average 0,8 % in all the branches, except for services sector, where a significant growth by 17% is observed. As it can be seen from **Table 5.9**, consumption of goods from the enlarged EU is decreasing in Russia, but consumption of goods from ROW is growing. Thus, in Russia's trading structure, substitution of goods from the EU with goods from ROW is taking place as expected.

Russian production is growing in scenario 5 as compared to scenario 1 in the following branches: oil, metallurgy and chemical industry (approximately by 0,2 %). In other branches, only minor production changes are observed. In general, Russian production level drops in scenario 5.

Thus, Russia's benefits from the CEES establishment just after WTO accession seem doubtful within our model. Namely, a minor increase of Russian export is progressing while general standard of living, consumer income and production levels are lowering. Moreover, export drop and growth of Russia's import in the enlarged EU are observed, which emphasize doubtful profits for the EU in scenario 5.

Since we have not evaluated substitution elasticity for the regions except for Russia, it is necessary to conduct the analysis on our results sensitivity depending on the substitution elasticity used. For example, we shall be testing dependence of welfare percentage changes in the free trade area formation scenario in

industrial branches as compared to the base scenario from substitution elasticity varying in the range from 0,6 up to 1,4.



On the diagram it is seen that welfare percentage changes vary insignificantly at the change of substitution elasticity drawn on the axis of abscissas, which proves robustness of our results.

6. Conclusion.

Basing on the results received, certain conclusions may be made for the regions, participating in the CEES establishment. It is necessary to note that in this paper, analysis of the CEES establishment was conducted only by using trade tariffs changes. Trade quotas and tariff barriers in trade were not considered.

In our model, for Russia we have received both positive and negative results after the CEES establishment. For instance, in all the considered five scenarios, economic welfare, consumer income, overall production volume in Russia drop insignificantly. However, for Russia's transitory economy, positive structural changes in production and trade are more important: growth of production and export of finished products, machines and equipment. Nevertheless, after the CEES establishment, significant growth of production and export of oil is also observed in our model. In this situation, the process of exit from the state of rental economy has a key significance for Russia. It is also important to note the tendency of Russian export growth in all the scenarios of the CEES formation. Trade turnover volume between Russia and the enlarged EU-25 has considerably increased.

Certainly, when concluding an agreement it is important to take into account the interests of the other party. We have received prevailing positive results for the enlarged EU within our model. Economic welfare,

consumer income are growing in all the regions in the structure of the enlarged EU in all the considered scenarios of the CEES establishment, except for the scenario of a custom union creation between Russia and the EU. The results for the custom union are explained in such a way that a deeper integration will not necessarily lead to improvement of participants of the trade agreement. It is also important that the CEES establishment inserts minor influence on trade inside the EU. In our model, the following hypothesis is confirmed: when concluding a trade agreement, trade relations tend to develop most intensively between the regions with a common border. So just between Russia and the Baltic states in the structure of the enlarged EU, the most intensive growth of trade volumes was observed. The Baltic states in percentage expression had more essential positive results, as compared to other regions of the enlarged EU.

Thus, the CEES establishment is potentially favorable both for Russia and for the enlarged EU. However, there is a question about the most preferable scenario of the CEES development for Russia. Basing on analysis results of scenarios considered by us in Chapter 5, it can be concluded that the scenario of a free trade area establishment in industrial branches, could be preferable for Russia. Though in this scenario Russia is surviving welfare drop, this drop is compensated with significant growth of trade volumes and positive restructuring of production and export in Russia. A deeper integration of Russia and the enlarged EU in other scenarios, results in decrease in welfare and consumer income on the background of minor growth of trade volumes. Besides, it is easier to realize a free trade area in industrial branches in practice other than deeper agreements. Here it should be noted that we have analyzed the effects of tariffs decrease up to zero, though in reality, an agreement can be reached only about some proportional reduction of tariffs. Natural enough, establishment of a free trade area not only in industrial branches, but also in agricultural sphere between Russia and the enlarged EU contributes to Russian agricultural sector growth, but the effect will be much lower in case of minor reduction of tariffs in agriculture.

In this paper, the scenario of a free trade area establishment in industrial branches after Russia's WTO accession also was investigated. In our model, we have received the result that Russia's WTO accession will not give any essential advantages to Russia. Thus, the CEES could be established either up to or simultaneously with Russia's WTO accession.

References.

1. Richard E. Baldwin, Anthony J. Venables "Handbook of International Economics," Vol. 3 (1995), chapter 31.
2. Carl B. Hamilton "Russia's European Integration. Escapism and current realities". Paper for CEFIR conference, June 24-25, 2002.
3. RECEP "Common economic space: Prospects of Russia- EU relations", Moscow, October 2002.
4. COMMISSION "Towards a European strategy for the security of energy supply". Brussels, 29.11.2000.
5. Rossella Bardazzi, Maurizio Grassini "European enlargement: modelling framework and simulations," January 2002, www.mittelforum.org.
6. Kristina Toming "Trade political impact for the Estonian economy on joining the European Union", Brussels, July 5-7, 2001.
7. Rim Chatti "An AGE Assessment of FTA between Tunisia and EU under oligopolistic market structures", 2001.
8. Vincent Aussiloux and Michaël Pajot, "Is NAFTA Discriminatory Against European Exports to Mexico?", 2001.
9. Glenn W. Harrison, Thomas F. Rutherford, David G. Tarr and Angelo Gurgel "Regional, Multilateral and Unilateral Trade Policies of MERCOSUR for Growth and Poverty Reduction in Brazil," February, 2002.
10. Miller, M.H. and Spencer, J. E. "The static economic effects of the UK joining the EEC: a General Equilibrium approach", 1971.
11. Shoven and Whalley, "Applied General-Equilibrium Models of Taxation and International Trade: An Introduction and Survey", Journal of Economic Literature, Vol 22 (September 1984), pp 1007-1051.
12. Jensen, Rutherford and Tarr, "Economy-Wide Effects of Russia's Accession to the WTO", Paper for CEFIR conference, June 24-25, 2002.
13. Whalley, Abrego and Riezman, "How often are propositions on the effects of regional trade agreements theoretical curiosa and when should they guide policy?", 2002.
14. Viner, J., "The Customs Union issue", New York, 1950.
15. A. Zemnitsky, "Assessment of consequences for foreign companies in the result of tariff barriers removal in Russian economy's services sector: structural approach".

16. High Level Group's report on the issue of Common European Economic Space at Russia – EU summit (November 11, 2002), www.eur.ru
17. Joint statement of Russia – EU summit participants (May 31, 2003, St.-Petersburg), www.eur.ru
18. “Transitory key between OKDP and OKONH”, Goskomstat of Russia, Economic Classifications Center, Moscow, 1994.
19. “Russian Statistical Year-Book of 2001”, Goskomstat of Russia.
20. “European business 2002”, EUROSTAT, 2002.
21. “Business in candidate countries: facts and figures (1995-1999)”, European Commission, 2002.
22. “Preliminary economic accounts for agriculture in 12 candidate countries (1998-1999)”, EUROSTAT, 1999.
23. “Statistics in focus: economy and finance. Prices and purchasing power parities”, European communities, 2002.
24. World development report”, The World Bank, 2003.
25. Materials of “Russia in Unified Europe” Public Committee's assembly, October, 2002.

Appendix 1
Tables and Diagrams.

Table 1. List of Industries in the Model.

Electric power industry	G0
Oil	G1
Gas	G2
Other fuels	G3
Ferrous metallurgy	G4
Non-ferrous metallurgy	G5
Chemical and petrochemical industry	G6
Machine building and metal working	G7
Light industry	G8
Food-processing industry	G9
Other industrial productions	G10
Agriculture and Forestry	G11
Construction	G12
Trade and public catering	G13
Transport and communication	G14
Other services	G15
Finance, crediting, insurance	G16

Table 2. Correspondence between OKONH and NACE.

	OKONH	NACE
G0	(11100)	(40.1), (40.3)
G1	(11210), (11220)	(11.1 /0.5/), (23.2)
G2	(11230)	(11.1 /0.5/), (11.2)
G3	(11300)	(10.1), (10.2), (10.3)
G4	(12100)	(13.1), (40.2), (23.1), (26.26), (27), (37.1)
G5	(12200)	(13.2), (14.5), (27.4), (37.1)
G6	(13000)	(14.3), (19.3 /0.5/), (22.3), (24.1), (24.2), (24.3), (24.6), (24.7), (25)
G7	(14000)	(22.3), (26.2), (27.5), (28), (29), (30), (31), (32), (34), (35), (33 /except 33.1/), (50.2 /0.5/)
G8	(17000)	(17), (18), (19.1), (19.2), (19.3 /0.5/), (52.7)
G9	(18000), (19200)	(14.4), (5), (15), (16), (24.5)
G10	(19700), (19100), (19310), (19320), (19330), (19400), (19800), (19900), (16100)	(20.5), (24.4), (33.1), (15.7), (22.2), (14.1), (14.2), (14.5), (26.1), (26.2 /except 26.26/), (26.3), (26.4), (26.5), (26.6), (26.7), (26.8)
G11	(20000), (40000), (15000), (30000)	(1), (5), (20), (2), (21), (22.2), (36)
G12	(60000)	(11.2), (45)
G13	(70000)	(50 /except 50.2 (0.5)/), (51), (52), (55.3), (55.4), (55.5)
G14	(50000)	(50.2 /0.5/), (60), (61), (62), (63), (64), (71.1),

		(71.2)
G15	(90000 /except 96000/),(80000)	(41), (5), (22.14), (55.1), (55.2), (71), (72), (73), (75), (80), (85), (90), (91), (92), (93), (95), (22.1), (37.2), (70), (74)
G16	(96000)	(65), (66), (67)

Table 3. Purchasing Power Parities for candidate countries.

	1 PPS in National Currency (1999)
The EU (EURO)	1
Cyprus	0,46
Czech Republic	15,21
Estonia	7,01
Hungary	114,71
Latvia	0,26
Lithuania	1,59
Poland	2,01
Slovakia	16,21
Slovenia	133,56

Table 4. Percentage production structure of ROW.

Industry	100%
Food-processing industry	28 %
Light industry	14,2 %
Machine building and metal working	16 %
Chemical and petrochemical industry	9,5 %
Other industrial productions	32,3 %

“World Development Indicators 2002”

Table 5. Trade tariffs.

		Importing region				
	<i>Goods produced in Russia</i>	Russia	EU-15	7 CEE Countries	Baltics	ROW
G0	Electric power industry	0,00	5,00	5,00	5,00	5,00
G1	Oil	0,00	5,00	5,00	5,00	5,00
G2	Gas	0,00	5,00	5,00	5,00	5,00
G3	Other fuels	0,00	5,00	5,00	5,00	5,00
G4	Ferrous metallurgy	0,00	8,41	8,41	8,41	8,41
G5	Non-ferrous metallurgy	0,00	8,67	8,67	8,67	8,67
G6	Chemical and petrochemical industry	0,00	8,82	8,82	8,82	8,82
G7	Machine building and metal working	0,00	10,78	10,78	10,78	10,78
G8	Light industry	0,00	15,19	15,19	15,19	15,19
G9	Food-processing industry	0,00	9,79	9,79	9,79	9,79
G10	Other industrial productions	0,00	11,74	11,74	11,74	11,74
G11	Agriculture and Forestry	0,00	10,70	10,70	10,70	10,70
G12	Construction	0,00	0,00	0,00	0,00	0,00
G13	Trade and public catering	0,00	0,00	0,00	0,00	0,00
G14	Transport and communication	0,00	0,00	0,00	0,00	0,00
G15	Other services	0,00	20,00	20,00	20,00	20,00
G16	Finance, crediting, insurance	0,00	25,00	25,00	25,00	25,00
		Importing region				
	<i>Goods produced in EU-15</i>	Russia	EU-15	7 CEE Countries	Baltics	ROW
G0	Electric power industry	0,00	0,00	0,00	0,00	0,00
G1	Oil	0,61	0,00	0,31	0,31	0,61
G2	Gas	0,71	0,00	0,36	0,36	0,71
G3	Other fuels	0,00	0,00	0,00	0,00	0,00
G4	Ferrous metallurgy	1,14	0,00	0,57	0,57	1,14
G5	Non-ferrous metallurgy	1,37	0,00	0,69	0,69	1,37
G6	Chemical and petrochemical industry	4,47	0,00	2,24	2,24	4,47
G7	Machine building and metal working	3,64	0,00	1,82	1,82	3,64
G8	Light industry	9,50	0,00	4,75	4,75	9,50
G9	Food-processing industry	9,48	0,00	4,74	4,74	9,48
G10	Other industrial productions	2,03	0,00	1,02	1,02	2,03
G11	Agriculture and Forestry	9,26	0,00	4,63	4,63	9,26
G12	Construction	0,00	0,00	0,00	0,00	0,00
G13	Trade and public catering	0,00	0,00	0,00	0,00	0,00
G14	Transport and communication	0,00	0,00	0,00	0,00	0,00
G15	Other services	2,11	0,00	1,06	1,06	2,11
G16	Finance, crediting, insurance	0,00	0,00	0,00	0,00	0,00
		Importing region				
	<i>Goods produced in 7 CEE Countries</i>	Russia	EU-15	7 CEE Countries	Baltics	ROW
G0	Electric power industry	0,96	0,00	0,00	0,96	0,96
G1	Oil	1,71	1,23	0,00	1,71	1,70
G2	Gas	0,47	0,12	0,00	0,47	0,47
G3	Other fuels	2,73	0,77	0,00	2,73	2,73
G4	Ferrous metallurgy	7,45	2,07	0,00	7,45	7,39

G5	Non-ferrous metallurgy	5,16	1,22	0,00	5,16	5,15
G6	Chemical and petrochemical industry	6,66	1,34	0,00	6,66	6,45
G7	Machine building and metal working	7,67	2,63	0,00	7,67	7,55
G8	Light industry	9,77	2,90	0,00	9,77	9,44
G9	Food-processing industry	21,95	17,60	0,00	21,95	21,65
G10	Other industrial productions	6,49	1,79	0,00	6,49	6,35
G11	Agriculture and Forestry	18,13	14,07	0,00	18,13	17,89
G12	Construction	0,89	0,89	0,00	0,89	0,89
G13	Trade and public catering	0,00	0,00	0,00	0,00	0,00
G14	Transport and communication	0,00	0,00	0,00	0,00	0,00
G15	Other services	8,51	1,07	0,00	8,51	8,51
G16	Finance, crediting, insurance	0,62	0,62	0,00	0,62	0,62
		Importing region				
	<i>Goods produced in the Baltics</i>	Russia	EU-15	7 CEE Countries	Baltics	ROW
G0	Electric power industry	0,00	0,00	0,00	0,00	0,00
G1	Oil	0,00	0,00	0,00	0,00	0,00
G2	Gas	0,00	0,00	0,00	0,00	0,00
G3	Other fuels	0,00	0,00	0,00	0,00	0,00
G4	Ferrous metallurgy	0,22	0,18	0,22	0,00	0,33
G5	Non-ferrous metallurgy	0,35	0,27	0,35	0,00	0,49
G6	Chemical and petrochemical industry	0,96	0,92	0,96	0,00	1,21
G7	Machine building and metal working	0,84	0,82	0,84	0,00	0,95
G8	Light industry	7,31	6,97	7,31	0,00	8,91
G9	Food-processing industry	6,08	4,45	6,08	0,00	7,03
G10	Other industrial productions	1,73	1,29	1,73	0,00	2,06
G11	Agriculture and Forestry	4,54	3,83	4,54	0,00	5,10
G12	Construction	3,75	3,75	3,75	0,00	4,38
G13	Trade and public catering	0,00	0,00	0,00	0,00	0,00
G14	Transport and communication	0,00	0,00	0,00	0,00	0,00
G15	Other services	7,92	3,75	7,92	0,00	9,58
G16	Finance, crediting, insurance	0,75	0,75	0,75	0,00	1,13
		Importing region				
	<i>Goods produced in ROW</i>	Russia	EU-15	7 CEE Countries	Baltics	ROW
G0	Electric power industry	5,00	5,00	5,00	5,00	0,00
G1	Oil	5,00	5,00	5,00	5,00	0,00
G2	Gas	5,00	5,00	5,00	5,00	0,00
G3	Other fuels	5,00	5,00	5,00	5,00	0,00
G4	Ferrous metallurgy	9,42	9,42	9,42	9,42	0,00
G5	Non-ferrous metallurgy	8,24	8,24	8,24	8,24	0,00
G6	Chemical and petrochemical industry	9,40	9,40	9,40	9,40	0,00
G7	Machine building and metal working	11,71	11,71	11,71	11,71	0,00
G8	Light industry	17,61	17,61	17,61	17,61	0,00
G9	Food-processing industry	11,16	11,16	11,16	11,16	0,00
G10	Other industrial productions	12,78	12,78	12,78	12,78	0,00
G11	Agriculture and Forestry	12,09	12,09	12,09	12,09	0,00
G12	Construction	0,00	0,00	0,00	0,00	0,00

G13	Trade and public catering	0,00	0,00	0,00	0,00	0,00
G14	Transport and communication	0,00	0,00	0,00	0,00	0,00
G15	Other services	0,00	0,00	0,00	0,00	0,00
G16	Finance, crediting, insurance	0,00	0,00	0,00	0,00	0,00

Table 6. Russia's WTO tariffs in relation to other regions.

G0	Electric power industry	5,000
G1	Oil	5,000
G2	Gas	5,000
G3	Other fuels	5,000
G4	Ferrous metallurgy	8,220
G5	Non-ferrous metallurgy	8,560
G6	Chemical and petrochemical industry	7,280
G7	Machine building and metal working	9,190
G8	Light industry	13,760
G9	Food-processing industry	9,220
G10	Other industrial productions	9,780
G11	Agriculture and Forestry	10,480
G12	Construction	0,000
G13	Trade and public catering	0,000
G14	Transport and communication	0,000
G15	Other services	0,000
G16	Finance, crediting, insurance	0,000

Table 7. Production (in mln. EURO).

		Russia	EU-15	7 CEE Countries	Baltics	ROW
G0	Electric power industry	66420,20	251124,00	46120,09	4047,39	1151036,70
G1	Oil	94348,23	226351,49	18394,04	2835,50	1029728,48
G2	Gas	38840,26	22820,01	2299,10	41,50	206039,69
G3	Other fuels	9328,00	13598,85	7728,70	90,23	78262,03
G4	Ferrous metallurgy	51811,88	232835,44	48883,65	1300,21	1061617,62
G5	Non-ferrous metallurgy	90553,46	64192,34	6042,08	329,19	372361,75
G6	Chemical and petrochemical industry	49266,30	426937,00	54671,22	2832,81	714481,49
G7	Machine building and metal working	129532,76	1642861,33	149289,42	6370,24	1034826,83
G8	Light industry	15914,92	137774,80	18345,24	3855,88	1081742,19
G9	Food-processing industry	131851,68	627522,70	129745,03	7309,11	2091683,26
G10	Other industrial productions	79947,39	323965,34	48080,94	3092,25	2567117,55
G11	Agriculture and Forestry	140926,04	583629,33	85279,58	7863,49	1452843,67
G12	Construction	116565,43	581708,00	80095,13	6893,59	1456761,85
G13	Trade and public catering	60708,69	5557802,75	470936,39	34235,88	12748296,26
G14	Transport and communication	122959,95	985278,60	49564,41	11828,93	2355836,35
G15	Other services	182007,02	1919674,00	169908,09	10229,95	4836346,40
G16	Finance, crediting, insurance	121014,84	1029738,00	24892,48	2903,04	2085864,30

Table 8. Consumption (in mln. EURO).

	Goods consumption in Russia	From Russia	From EU-15	From 7 CEE Countries	From Baltics	From ROW
G0	Electric power industry	64807,55	54,69	0,00	10,53	29,29
G1	Oil	44301,76	4658,48	105,81	1659,73	2414,17
G2	Gas	38426,67	3,91	0,00	8,96	2,20
G3	Other fuels	8381,03	173,51	25,23	0,13	294,83
G4	Ferrous metallurgy	24972,43	2161,01	642,27	113,65	6175,65
G5	Non-ferrous metallurgy	36096,67	4980,15	324,12	37,58	3419,94
G6	Chemical and petrochemical industry	27812,56	7661,31	2049,55	257,94	10688,32
G7	Machine building and metal working	87543,97	6382,87	11585,15	2727,48	44467,61
G8	Light industry	11490,57	20948,55	2989,65	1950,76	19474,69
G9	Food-processing industry	123683,64	9150,84	2982,00	230,27	30297,89
G10	Other industrial productions	60841,23	2844,32	1768,68	134,22	7357,51
G11	Agriculture and Forestry	139356,82	4007,23	319,44	103,42	3504,28
G12	Construction	115878,34	18,45	147,98	19,74	1272,97
G13	Trade and public catering	54496,20	630,02	132,78	68,40	985,89
G14	Transport and communication	104102,22	731,12	154,09	79,38	1144,10
G15	Other services	179799,45	1934,37	407,69	210,02	3027,03
G16	Finance, crediting, insurance	119849,22	748,99	157,86	81,32	1172,06
	Goods consumption in EU-15	From Russia	From EU-15	From 7 CEE Countries	From Baltics	From ROW
G0	Electric power industry	40,04	248904,95	150,67	0,00	556,54
G1	Oil	10388,42	206072,66	527,73	410,07	53347,68
G2	Gas	364,30	22608,71	3,87	0,33	3033,39
G3	Other fuels	3,18	13332,01	746,89	55,48	4463,23
G4	Ferrous metallurgy	8240,11	208434,04	3130,76	135,59	15849,91
G5	Non-ferrous metallurgy	17363,61	34001,30	1837,34	228,11	39112,12
G6	Chemical and petrochemical industry	10859,91	353149,05	4707,38	295,48	49225,38
G7	Machine building and metal working	25178,25	1246352,23	34670,74	975,77	311399,38
G8	Light industry	2991,14	72969,55	6928,33	1060,56	63437,15
G9	Food-processing industry	2467,20	580571,03	1370,70	58,22	29126,35
G10	Other industrial productions	11169,94	219041,53	5671,71	258,24	62935,11
G11	Agriculture and Forestry	683,45	552295,11	4271,77	1412,78	42032,34
G12	Construction	285,00	581642,97	2,00	0,06	7,02
G13	Trade and public catering	2270,70	5557172,73	0,00	0,00	0,00
G14	Transport and communication	6892,62	984547,48	0,00	0,00	0,00
G15	Other services	806,88	1905607,69	466,48	26,48	13720,29
G16	Finance, crediting, insurance	426,04	1028855,88	0,21	0,03	39,95
	Goods consumption in 7 CEE Countries	From Russia	From EU-15	From 7 CEE Countries	From Baltics	From ROW
G0	Electric power industry	194,00	6,11	45937,92	0,03	138,43
G1	Oil	1567,93	1635,55	17521,32	84,36	746,51
G2	Gas	7,33	27,81	2294,99	1,01	163,07
G3	Other fuels	7,62	10,19	6830,58	2,10	103,37
G4	Ferrous metallurgy	405,05	2984,21	44758,83	4,47	740,41

G5	Non-ferrous metallurgy	1084,86	1346,45	3602,53	2,39	455,38
G6	Chemical and petrochemical industry	548,98	8699,07	47068,77	14,94	2714,30
G7	Machine building and metal working	912,96	43859,00	95374,14	48,84	14642,09
G8	Light industry	35,18	6897,34	4000,77	23,76	2473,23
G9	Food-processing industry	145,22	3278,75	125085,96	8,62	1525,98
G10	Other industrial productions	1478,39	9588,75	39560,82	21,68	2160,86
G11	Agriculture and Forestry	40,48	2688,34	79950,65	45,44	2103,88
G12	Construction	2,47	11,42	79944,69	0,00	2,85
G13	Trade and public catering	380,71	0,00	470803,61	0,00	0,00
G14	Transport and communication	1155,64	0,00	49410,32	0,00	0,00
G15	Other services	135,28	237,05	169025,93	0,00	0,45
G16	Finance, crediting, insurance	71,43	0,11	24733,89	0,00	0,00
	<i>Goods consumption in the Baltics</i>	From Russia	From EU-15	From 7 CEE Countries	From Baltics	From ROW
G0	Electric power industry	775,99	0,00	0,00	4011,49	0,00
G1	Oil	399,61	186,05	0,90	134,37	70,12
G2	Gas	0,94	0,73	0,20	30,65	0,11
G3	Other fuels	3,86	0,19	0,34	21,73	0,18
G4	Ferrous metallurgy	364,57	151,18	16,44	861,97	89,21
G5	Non-ferrous metallurgy	257,80	75,61	9,57	52,81	12,96
G6	Chemical and petrochemical industry	553,08	564,85	112,19	2091,52	127,02
G7	Machine building and metal working	1128,39	2747,47	192,02	2605,75	771,31
G8	Light industry	72,09	744,38	18,08	717,09	145,93
G9	Food-processing industry	344,87	528,11	157,90	6986,26	192,33
G10	Other industrial productions	1102,54	725,83	162,04	2676,85	180,69
G11	Agriculture and Forestry	44,85	318,23	57,65	6106,06	278,32
G12	Construction	21,18	0,32	0,04	6873,79	0,61
G13	Trade and public catering	196,13	0,00	0,00	34167,48	0,00
G14	Transport and communication	595,33	0,00	0,00	11749,55	0,00
G15	Other services	69,69	25,47	0,00	9993,09	0,06
G16	Finance, crediting, insurance	36,80	0,23	0,01	2821,53	0,00
	<i>Goods consumption in ROW</i>	From Russia	From EU-15	From 7 CEE Countries	From Baltics	From ROW
G0	Electric power industry	602,62	2158,25	31,50	25,34	1150312,44
G1	Oil	37690,51	13798,75	238,29	546,98	973150,00
G2	Gas	41,03	178,84	0,04	0,55	202840,93
G3	Other fuels	932,30	82,95	125,66	10,78	73400,42
G4	Ferrous metallurgy	17829,72	19105,01	335,36	184,53	1038762,44
G5	Non-ferrous metallurgy	35750,53	23788,84	268,52	8,30	329361,35
G6	Chemical and petrochemical industry	9491,78	56862,72	733,32	172,95	651726,47
G7	Machine building and metal working	14769,18	343519,76	7467,38	12,40	663546,43
G8	Light industry	1325,93	36214,98	4408,42	103,72	996211,19
G9	Food-processing industry	5210,76	33993,97	148,47	25,74	2030540,71
G10	Other industrial productions	5355,29	91764,91	917,68	1,25	2494483,38
G11	Agriculture and Forestry	800,44	24320,42	680,07	195,78	1404924,85

G12	Construction	378,43	34,84	0,43	0,00	1455478,40
G13	Trade and public catering	3364,94	0,00	0,00	0,00	12747310,37
G14	Transport and communication	10214,14	0,00	0,00	0,00	2354692,25
G15	Other services	1195,71	11869,42	7,99	0,35	4819598,57
G16	Finance, crediting, insurance	631,35	132,79	0,51	0,15	2084652,29

Table 9. Taxes (in %).

		Russia	EU-15	7 CEE Countries	Baltics	ROW
G0	Electric power industry	-0,3	5,0	5,0	5,0	3,7
G1	Oil	12,0	5,0	5,0	5,0	6,8
G2	Gas	12,0	15,0	15,0	15,0	14,3
G3	Other fuels	3,4	15,0	15,0	15,0	12,1
G4	Ferrous metallurgy	3,5	15,0	15,0	15,0	12,1
G5	Non-ferrous metallurgy	2,3	15,0	15,0	15,0	11,8
G6	Chemical and petrochemical industry	12,8	15,0	15,0	15,0	14,5
G7	Machine building and metal working	12,0	15,0	15,0	15,0	14,3
G8	Light industry	11,0	15,0	15,0	15,0	14,0
G9	Food-processing industry	20,0	5,0	5,0	5,0	8,8
G10	Other industrial productions	7,8	15,0	15,0	15,0	13,2
G11	Agriculture and Forestry	3,2	15,0	15,0	15,0	12,1
G12	Construction	9,2	15,0	15,0	15,0	13,6
G13	Trade and public catering	0,9	15,0	15,0	15,0	11,5
G14	Transport and communication	1,0	15,0	15,0	15,0	11,5
G15	Other services	-3,9	5,0	5,0	5,0	2,8
G16	Finance, crediting, insurance	0,1	20,0	5,0	5,0	7,5

Table 10. Substitution Elasticities for Russian-Made Goods.

G0	Electric power industry	0,75
G1	Oil	0,75
G2	Gas	0,75
G3	Other fuels	0,75
G4	Ferrous metallurgy	0,806
G5	Non-ferrous metallurgy	0,806
G6	Chemical and petrochemical industry	0,827
G7	Machine building and metal working	0,587
G8	Light industry	0,94
G9	Food-processing industry	0,789
G10	Other industrial productions	0,8
G11	Agriculture and Forestry	0,607
G12	Construction	0,6
G13	Trade and public catering	0,6
G14	Transport and communication	0,6
G15	Other services	0,6
G16	Finance, crediting, insurance	0,59

Diagram 1. Changes in Russian trade in scenario 1 as compared to the base scenario.

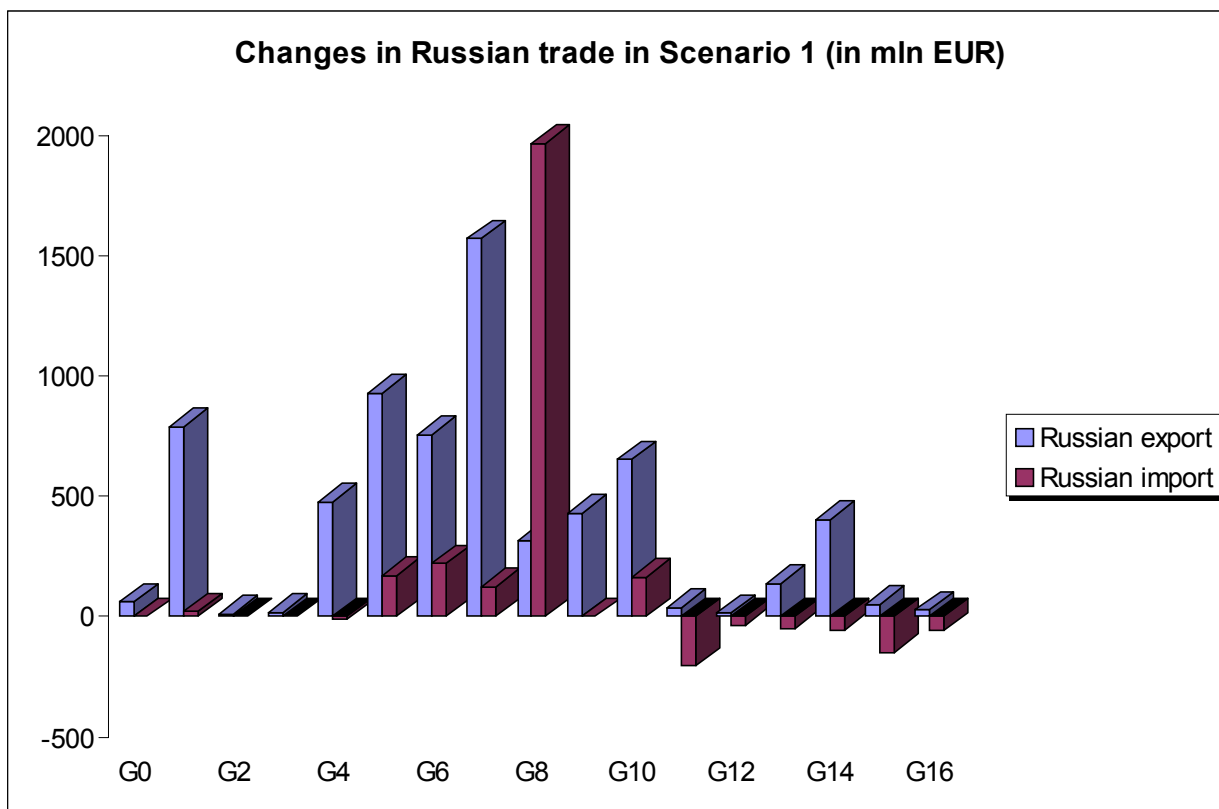


Diagram 2 Changes in Russian trade in scenario 2 as compared to scenario 1.

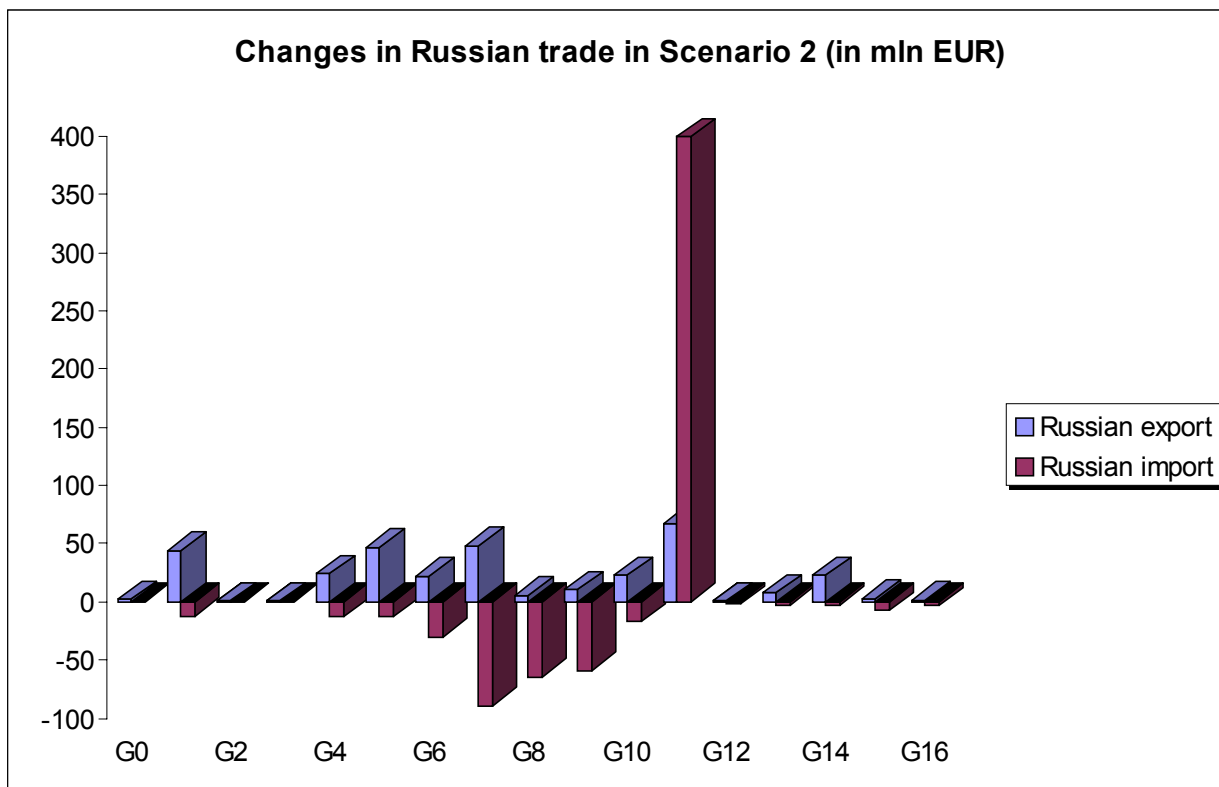


Diagram 3. Changes in Russian trade in scenario 4 as compared to scenario 3.

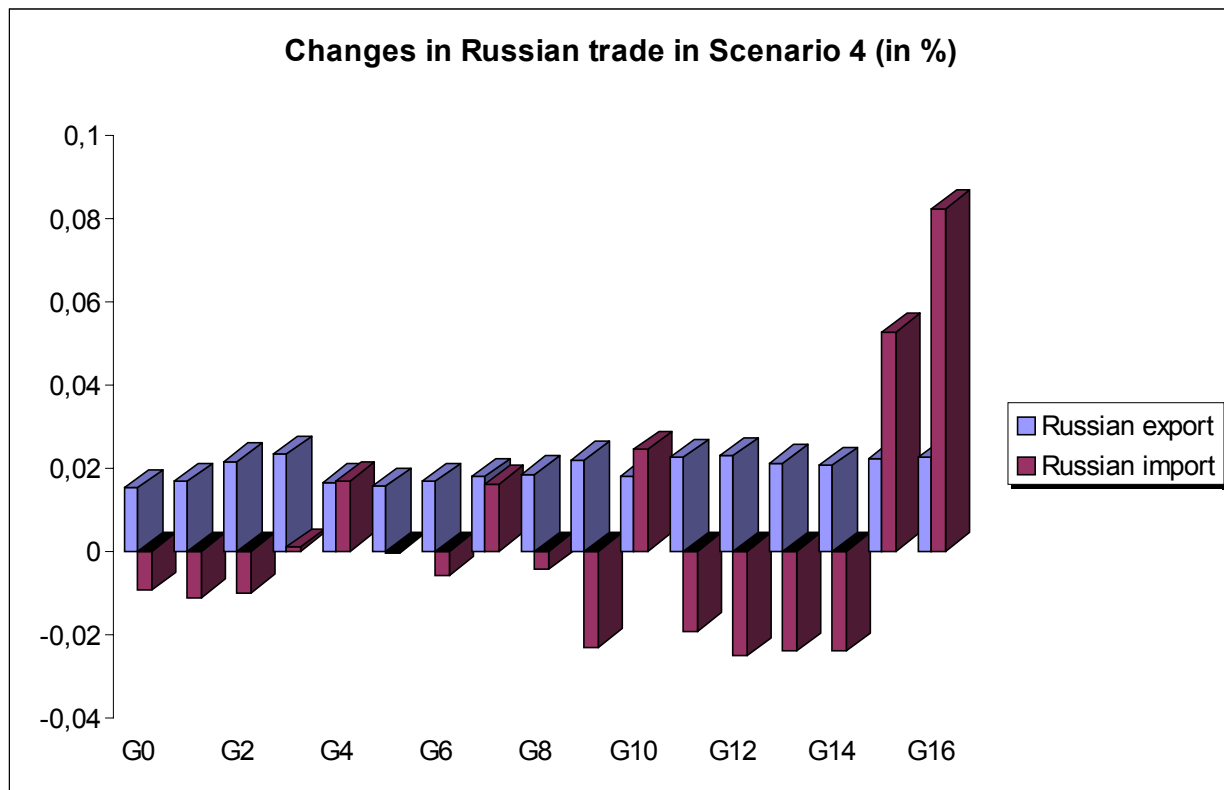


Diagram 4. Changes in Russian production in scenario 1 as compared to the base scenario.

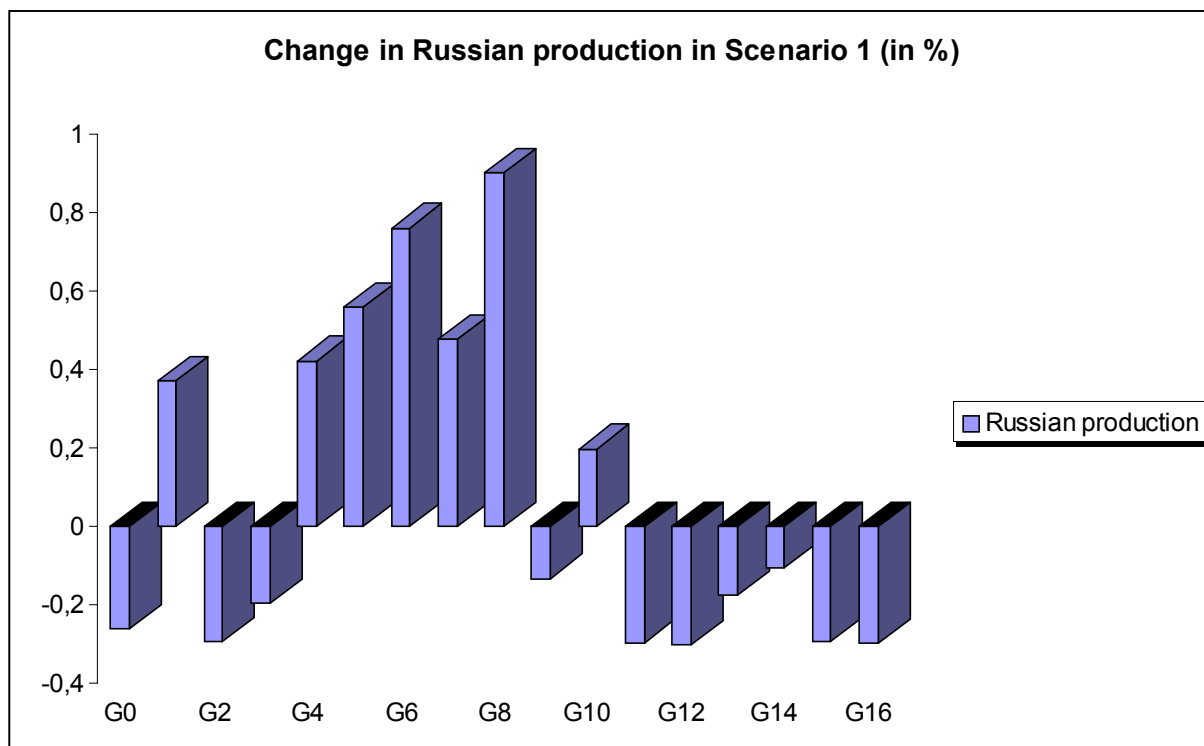
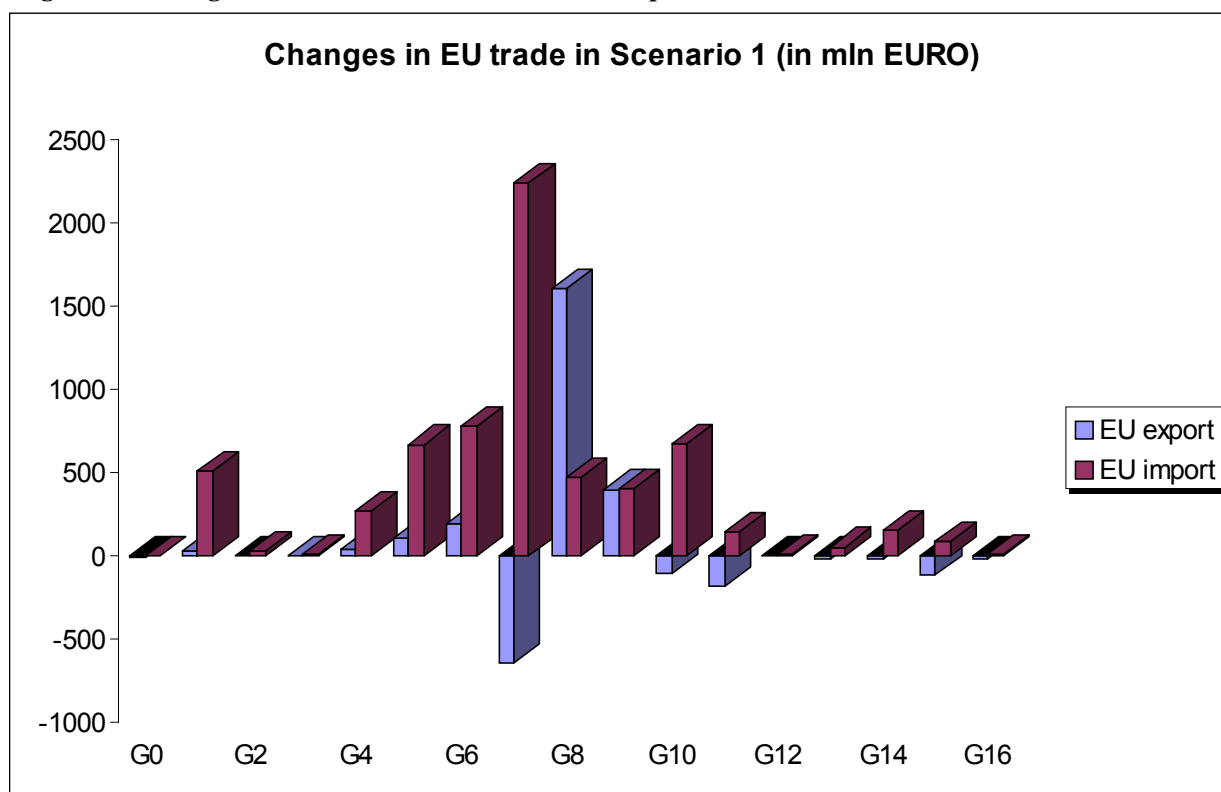


Diagram 5. Changes in EU trade in scenario 1 as compared to the base scenario.



Appendix 2

Model Description

In our model we are considering 5 regions (Russia, EU, 7 countries of Central and Eastern Europe, Baltic states, ROW) and 17 industries. The model structure and the process of model calibration in relation to the data of 1999 base year are presented and described below.

Production.

In each of the regions, the producer observes the production possibility frontier with constant elasticity of transformation:

$$PPF_r = \left[\sum_{j=1}^{17} \beta_{rj} * (S_{rj})^{\tau-1/\tau} \right]^{\tau/\tau-1},$$

where $r=1, \dots, 5$ (region), $j=1, \dots, 17$ (industry), τ - elasticity of transformation.

S_{rj} - production of good j in region r ; β_{rj} - share of good j in region r ($\sum_{j=1}^{17} \beta_{rj} = 1$).

The producer's problem is put down as follows:

$$\begin{aligned} PP_{rg} * S_{rg} &\rightarrow \max \\ s.t. \quad PPF_r &= \left[\sum_{j=1}^{17} \beta_{rj} * (S_{rj})^{\tau-1/\tau} \right]^{\tau/\tau-1} \end{aligned} \quad (1)$$

Here PP_{rg} - the price of manufactured product g in region r . A brief solution of this problem can be presented like this:

$$\begin{aligned} L &= PP_{rg} * S_{rg} + \lambda_r * \left(PPF_r - \left[\sum_{j=1}^{17} \beta_{rj} * (S_{rj})^{\tau-1/\tau} \right]^{\tau/\tau-1} \right) \\ FOC: \quad \frac{\partial L}{\partial S_{rg}} &= PP_{rg} - \lambda_r * \left[\sum_{j=1}^{17} \beta_{rj} * (S_{rj})^{\tau-1/\tau} \right]^{\tau/\tau-1} * \beta_{rg} * (S_{rg})^{-1/\tau} = 0 \end{aligned} \quad (2)$$

$$\text{From (1) and (2), we receive: } S_{rg} = \frac{(\beta_{rg})^\tau * PPF_r}{(PP_{rg})^\tau * \left[\sum_{j=1}^{17} (\beta_{rj})^\tau * (PP_{rj})^{1-\tau} \right]^{\tau/\tau-1}} \quad (3)$$

Consumer.

We assume a unique representative consumer in each region. Consumer's preferences are defined by the

utility function with constant elasticity of substitution: $U_r = \left[\sum_{j=1}^{17} \gamma_{rj} * (C_{rj})^{\sigma-1/\sigma} \right]^{\sigma/\sigma-1}$, $r=1, \dots, 5$,

where γ_{rj} - share of good j in the common product structure in region r ($\sum_{j=1}^{17} \gamma_{rj} = 1$) ;

C_{rj} - consumption of composite good j in region r; σ – elasticity of substitution between composite goods in region r.

The customer solves the following problem in the following way:

$$\begin{aligned} U_r &\rightarrow \max \\ s.t. \quad I_r &= \sum_j P_{rj} * C_{rj} \end{aligned} \quad (4)$$

Here P_{rj} - the price of composite good j in region r; I_r - consumer income.

A brief solution of this problem can be presented like this:

$$\begin{aligned} L &= \left[\sum_{j=1}^{17} \gamma_{rj} * (C_{rj})^{\sigma-1/\sigma} \right]^{\sigma/\sigma-1} + \lambda_r * \left(I_r - \sum_j P_{rj} * C_{rj} \right) \\ FOC: \quad \frac{\partial L}{\partial C_{rg}} &= \left[\sum_{j=1}^{17} \gamma_{rj} * (C_{rj})^{\sigma-1/\sigma} \right]^{\sigma/\sigma-1} * \gamma_{rg} * (C_{rg})^{-1/\sigma} - \lambda_r * P_{rg} = 0 \end{aligned} \quad (5)$$

From (4) and (5), we receive the demand for composite good g in region r:

$$C_{rg} = \frac{(\gamma_{rg})^\sigma * I_r}{(P_{rg})^\sigma * \left(\sum_j (\gamma_{rj})^\sigma * (P_{rj})^{1-\sigma} \right)} \quad (6)$$

In its turn, consumption of composite good in our model is assumed in the following form:

$$C_{rg} = \left[\sum_{k=1}^5 \alpha_{rgk} * (C_{rgk})^{\sigma-1/\sigma} \right]^{\sigma/\sigma-1}, \text{ where}$$

C_{rgk} - consumption in region r of good g shipped from region k;

α_{rgk} - good's g consumption share in region r, shipped from region k, in the common structure of good's g consumption in region r; $\sum_k \alpha_{rgk} = 1$.

To find the demand on consumption in region r for good g shipped from region k, the following problem of a customer is solved like this:

$$C_{rg} = \left[\sum_{k=1}^5 \alpha_{rgk} * (C_{rgk})^{\sigma-1/\sigma} \right]^{\sigma/\sigma-1} \rightarrow \max$$

$$s.t. P_{rg} * C_{rg} = \sum_{k=1}^5 PC_{rgk} * C_{rgk} = \left(I_r - \sum_{j \neq g} P_{rj} * C_{rj} \right)$$
(7)

Here PC_{rgk} - the price of the good g in region r, shipped from region k. The solution of this problem is consumption demand in region r of product g, shipped from region k:

$$C_{rgk} = \frac{(\alpha_{rgk})^\sigma * \left(I_r - \sum_{j \neq g} P_{rj} * C_{rj} \right)}{(PC_{rgk})^\sigma * \sum_k (\alpha_{rgk})^\sigma * (PC_{rgk})^{1-\sigma}}$$
(8)

Taxes and tariffs.

In view of a tax on good's g production in the region r t_{rg} and tariff tar_{rgk} on product g, imported by region r from region k, the price of the product g in region r shipped from region k, has the following description:

$$PC_{rgk} = PP_{kg} * (1 + tar_{rgk}) * (1 + t_{rg})$$

In this way, we receive income from taxes and tariffs collection in region r:

$$REV_r = \sum_{j=1}^{17} \sum_{k=1}^5 (tar_{rjk} + t_{rg} + tar_{rjk} * t_{rg}) * PP_{kj} * C_{rjk}$$

This income is redistributed to the consumer as a lump-sum transfer. Thus, consumer income is represented in the following way:

$$I_r = \sum_{j=1}^{17} PP_{rj} * S_{rj} + REV_r + AID_r * PCINDEX_r, \text{ where}$$

$$AID_r = (\sum_j \sum_k C_{rjk}^B - \sum_j S_{rj}^B) - \text{trade disbalance in region r in the base year,}^{23}$$

$$PCINDEX_r = \frac{\sum_j \sum_k PC_{rjk} * C_{rjk}^B}{\sum_j \sum_k PC_{rjk}^B * C_{rjk}^B} - \text{price index in region r.}$$

Equilibrium.

²³ Index B here and after means that the variable corresponds to the base year.

In terms of equilibrium, we receive a set of equilibrium prices. Thanks to these prices, equilibrium in all the markets is achieved. So, all the manufactured product in each of the regions has to be consumed by the aggregate of all the regions:

$$\sum_{r=1}^5 C_{rjk} = S_{jk}$$

The trade balance equation has the following description:

$$-AID_r * PCINDEX_r = \sum_{j=1}^{17} [PP_{rj} * (S_{rj} - C_{rjr})] - \sum_{j=1}^{17} \sum_{k \neq r} (PP_{kj} * C_{rjk}) \quad (9)$$

In the right part (8), there is difference between export and import in region r.

Model calibration

First of all, definition has to be given to weighing factors $\beta_{rg}, \gamma_{rg}, \alpha_{rgk}$, which would correspond to the equilibrium in the base year.

From (3), we receive the expression for β_{rg} :

$$\beta_{rg} = \frac{PP_{rg} * (S_{rg})^{1/\tau}}{\left[\frac{PPF_r}{\left(\sum_j \beta_{rj}^\tau * PP_{rj}^{1-\tau} \right)^{\tau/\tau-1}} \right]^{1/\tau}}$$

Using that $\sum_{j=1}^{17} \beta_{rj} = 1$, we receive²⁴:

$$\beta_{rg} = \frac{PP_{rg}^B * (S_{rg}^B)^{1/\tau}}{\sum_{j=1}^{17} [PP_{rj}^B * (S_{rj}^B)^{1/\tau}]} \quad (10)$$

From (6), the following expression is received γ_{rg} :

$$\gamma_{rg} = \frac{P_{rg} * (C_{rg})^{1/\sigma}}{\left[\frac{I_r}{\sum_j \gamma_{rj}^\sigma * P_{rj}^{1-\sigma}} \right]^{1/\sigma}}$$

Using that $\sum_{j=1}^{17} \gamma_{rj} = 1$, we receive:

²⁴ Due to the fact that denominator in the expression above does not depend on the summation index.

$$\left[\frac{I_r}{\sum_j \gamma_{rj}^\sigma * P_{rj}^{1-\sigma}} \right]^{1/\sigma} = \sum_j P_{rj}^B * (C_{rj}^B)^{1/\sigma} \quad ; \quad \gamma_{rg} = \frac{P_{rg}^B * (C_{rg}^B)^{1/\sigma}}{\sum_j P_{rj}^B * (C_{rj}^B)^{1/\sigma}} \quad (11)$$

From (6), we receive the expression for α_{rgk} :
$$\alpha_{rgk} = \frac{PC_{rgk} * (C_{rgk})^{1/\sigma}}{\left[\frac{I_r - \sum_{j \neq g} P_{rj} * C_{rj}}{\sum_k \alpha_{rgk}^\sigma * PC_{rgk}^{1-\sigma}} \right]^{1/\sigma}}$$

Using that $\sum_{j=1}^{17} \alpha_{rjk} = 1$, we receive:
$$\alpha_{rgf} = \frac{PC_{rgf}^B * (C_{rgf}^B)^{1/\sigma}}{\sum_k PC_{rgk}^B * (C_{rgk}^B)^{1/\sigma}} \quad (12)$$

Substituting formulas (6) и (8) in constraint of the problem (7), we receive the following:

$$P_{rg}^{1-\sigma} * \gamma_{rg}^\sigma = \sum_k PC_{rgk}^{1-\sigma} * \alpha_{rgk}^\sigma * \left(\frac{\sum_l PC_{rgl} * (C_{rgl})^{1/\sigma}}{\sum_j P_{rj} * (C_{rj})^{1/\sigma}} \right)^\sigma$$

The expression in brackets is γ_{rg} according to (11). Hence, this is the price formula of composite product j

in region r:
$$P_{rg} = \left[\sum_k PC_{rgk}^{1-\sigma} * \alpha_{rgk}^\sigma \right]^{1/(1-\sigma)} \quad (13)$$

Formula (13) is included into the system of model's equations. The same formula is used for model calibration.

The last parameter, which has to be defined for the base year, represents consumption of composite product

g in region r:
$$C_{rg}^B = \left[\sum_{k=1}^5 \alpha_{rgk} * (C_{rgk}^B)^{\sigma-1/\sigma} \right]^{\sigma/\sigma-1}$$

Elasticities in the model.

Elasticity of transformation is assumed negative in the model, so that the production possibility frontier was convex ($\tau = -0,9$).

Elasticity of substitution in formulas for utility function and consumption of composite product is assumed at the level 0,9 ($\sigma = 0,9$).

For Russia, the evaluations of substitution elasticity presented in **Table 10**, have been obtained, using the results of the paper by A. Zemnitsky, “Assessment of consequences for foreign companies in the result of tariff barriers removal in Russian economy’s services sector: structural approach”.

Prices.

Due to the fact that the data on production and consumption in our model are presented in mln. EURO, i.e. they are nominal values, the prices for production have been reduced to common standard. The price for the electric power in Russia is taken as one unit in the model. ($PP_{RUS0}=1$) With the help of this parameter, the model was tested on zero order homogeneity.²⁵

Model realization.

The model has been realized with the help of programming language GAMS (Generalized Algebraic Modeling System), which is used for solution of linear and nonlinear optimization problems.

²⁵ PP_{RUS0} parameter was given values 1,5; 2 and so on.