EU-enlargement and the Opening of Russia: Lessons from the GTAP Reference Model[1]

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Abstract

This paper examines the economic effects of the opening of the former Soviet Union. The analysis carried out in the paper is two-fold. First we simulate the impact of the eastern enlargement of the EU and, second, we analyse how deeper integration between the EU and FSU contributes to this. The analysis is carried out with FTAP computable general equilibrium model. We find that there is a trade-off between the two roads of European integration arrangements. Eastern enlargement seems, even in its very deep form, be beneficial for all EU regions without causing substantial welfare losses outside the Union. The only regions that seem to lose somewhat are NAFTA and Japan. EU-CIS integration, on the other hand, has different impact. To be beneficial for CIS-countries free trade between the EU and CIS countries requires improved productivity in the latter, which may be due to better institutions or increased FDI, but still the agreement is not beneficial for large parts of the EU and the rest of the world.

1. Preliminaries

EU enlargement will change European trade relations significantly. As the major part of the continent belongs to the EU's trade policy regime the question how enlarged EU organizes its trade relations with the rest of the continent becomes more important. One of the key issues with this respect is the relationship between the EU and Russia. A full-membership is here not an option but to avoid marginalization the EU should adopt an open attitude towards the rest of the continent in its external commercial policy.

With regard to Russia an obvious starting point would be a free trade agreement. This however diverts trade and investments from the rest of the CIS countries. There is a danger that the approach that is too concentrated to Russia will marginalize these countries. Hence the EU should adopt a broader approach, which makes EU-CIS free trade as an obvious candidate for future trade relations.

In this paper, we examine the economic effects of widening and deepening EU-integration from the Russian economy's viewpoint and how deeper EU-RF integration might contribute to these effects. The next stage in EU-integration will be the eastern enlargement, which widens the Internal Market (IM) to an area having a number of consumers almost twice as much as in the United States. The expansion of the IM has an important impact on Russia as it accounts approximately for half of her total exports.

A common fear related to the EU enlargement is that it potentially marginalizes European economies that are left outside. This argument was used before the Helsinki summit where it was decided to extend the membership negotiations from the Luxembourg group (Hungary, Poland, Czech Republic, Estonia and Slovenia) to all CEECs plus Cyprus and Malta. Adoption of a non-discriminating was, correctly, seen as a way of giving equal opportunities for all candidate countries to proceed with necessary economic and institutional reforms with having a more credible promise of entry to the EU within reasonable time.

More generally the problem is related to the hub-and-spokes nature of the Europe Agreements. Hub-and-spoke design of trade agreements[2] tends to marginalize spokes since trade barriers between the spokes tend to remain higher than in trade between the hub and a spoke. This in turn diverts investments and trade from the spokes towards the core of the system. Therefore, trade literature usually suggests organizing different levels of trade agreements like concentric circles[3] (for eastern enlargement see Baldwin 1994).

For European integration this could mean that the EMU forms the core circle, the Single Market the next, then the Customs Union with a possibility for unilateral membership for EU-outsiders and, finally, a free trade area of the EU plus the rest of European countries (see Sapir 1997, 2000). For the time beyond the Eastern enlargement this question remains relevant since it is likely that Russia and other CIS countries become spokes of an enlarged Union.

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[2] Bhagwati et al. (1998) call the system of European trade agreements a European spaghetti bowl.
[3] Or like a wedding cake as Baldwin (1994) puts it.

Eastern enlargement is likely to affect Russian trade at least in three ways. First, lower trade barriers within the IM divert imports from Russia to intra-IM trade. This is because lower trade barriers within the IM favour IM-based exporters in terms of relative prices. This hurts Russian exporters but also from the viewpoint of the EU member states it creates welfare loss. The effect is likely to be rather small, though, since trade between the current incumbent member states and candidate countries is relatively free due to Europe Agreements. Therefore, the impact of expanding EU membership should not contribute significantly to trade diversion. Second, as Russian exporters are hit by the relative price changes and as the IM is an important market area for them, it is likely that without any further liberalisation of trade Russian exporters face a negative terms-of-trade effect. This yields a welfare gain for the IM and a loss for the Russian economy. Third, within the IM, lower trade barriers create trade. This gives an additional welfare gain for the EU countries but might also contribute positively to Russian economy. In fact, there is some evidence that EU-integration has created trade also externally through increased demand. In the case of eastern enlargement this effect is likely to be boosted by the fact that the current EU member states pursue a more liberal trade policy towards Russia than the candidate countries that will adopt the EU norm after the enlargement. The direct total effect on Russian economy is the sum of these three effects.

Lower trade barriers within the IM intensify intra-IM competition and improve EU-based firms' efficiency. As trade barriers between candidate countries and the EU are quite low in the first place this pro-competitive effect is likely have much more substantial role in shaping events than the direct effects that are due to removal of visible trade barriers. For the Russian economy the consequences of more intensified competition within the IM are likely to be more significant as well and the channels are the same as described above. Trade is likely to be diverted if more intensified intra-EU competition improves competitiveness of CEEC exporters compared to Russian exporters in the IM. Note, however, that this effect should work in Russian markets as well. If more intensified intra-IM competition enhances EU-based exporters productivity they should gain market shares in their exports to Russia. This in turn means that intra-IM pro-competitive effect might spill over to Russian economy and have similar positive effects as within the IM.

Eastern enlargement may marginalize Russian economy also via foreign direct investments. Full membership gives the CEECs a more favourable position as host countries for FDIs relative to Russia than today. This may, in turn, divert integration and productivity gains.

In this paper, we investigate the above-described effects quantitatively using a computable general equilibrium model. We analyse two different regime changes, first eastern enlargement (EE) and, second, a free trade area (FTA) between the IM and CIS. The latter is made for pragmatic purposes. The current release of the model that we are using has former Soviet Union as a block. Therefore, we left for future work the interesting question of how this differs from a scenario where CIS countries are like spokes to the EU.

In each scenario, we have three sub scenarios. First, the one where trade is liberalized, i.e. the base enlargement or EU-CIS free trade area. Second, we assume that in addition to the base impact the substitution between foreign and domestic goods becomes more elastic. This can be interpreted arguing that deeper integration decreases market segmentation. Our third scenario adds a productivity growth to this, which may be due to more intensified competition or increased FDI.

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The rest of the paper is organized as follows. The next section describes the current stage of affairs in trade relations between the EU, CEECs and Russia. Section 3 gives the model and describes the level of aggregation and other assumption we have made. Section 4 describes the simulations more carefully. Section 5 gives the results and, finally, section 6 concludes.

2. EU-enlargement: economic structures and trade patterns

2.1 Output

Currently it looks like that ten EU candidate countries will be able to join the Union in 2004. Bulgaria and Romania have been ruled out of any possible adherence plan to the European Union in the first wave in 2004. Bulgaria and Romania have been, however, left with door open for entry at a later date – though not necessarily by their target date of 2007. The ten countries that could enter the Union in 2004 include Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia.

In the latest GTAP database (version 5.0) Poland and Hungary are as separate primary regions while Czech Republic, Slovenia, Bulgaria, Rumania and Slovakia are defined as one region (called Rest of Central European Associates). Baltic States are still part of the Former Soviet Union (FSU) region. Cyprus and Malta are included in a ´residual´ region, that is, the rest of the world. Therefore we used the CEEC7 region to represent the group of joining countries in the EU-enlargement process.

The structure of an average economy in the CEEC7 differs quite significantly from that of the EU15[4]. The CEEC7 has nearly two times higher GDP share of agricultural production than the EU15 average and nearly three times lower per capita GDP than the EU15. Also, as we shall see, the level of trade protection in the CEEC7 is within most sectors much higher than the EU15. The asymmetry of the size of the joining and member country economies is huge; taken together the total CEEC7 economy is roughly 4 % of the EU15[5]. As a result one expects that enlargement process expand consumption opportunities in the CEEC7 region much more than in the EU15. *Ex ante* one would predict that the impact of the enlargement is higher on the CEEC7 than that on the EU15.

We also consider scenario where the enlarged EU forms a free trade area (FTA) with the FSU. A similar asymmetry between the applicant and the union exists as with the EU-enlargement. FSU economy is slightly larger than the CEEC7 one, but still only about 6 % of total EU-CEEC7 GDP.

Differences in the supply side (in terms of producer cost structures) between FSU, CEEC7 and the EU indicate that agricultural products (crops + livestock) are relatively more important in the CEEC7, while natural resources, oil and gas are relatively more significant in the FSU.

2.2 Trade

[4] EU15 stand for total EU, that is in our case it the sum of Finland, Germany, EU-North and EU-South
[5] According to the 1997 GTAP database 5.0

EU absorbs over 60 percent of all CEEC7 exports (see Table 2.1) while CEEC7 account only roughly 5 percent of total EU15 exports. EU15 is also significant export market to the FSU with over 30 % share.

Table 2.1. Trade (sum of all goods) - Bilateral Exports shares at World Prices

	NAFTA	China	Japan	Germany	FSU	Finland	EU-N	EU-S	Medit.	CEEC7	India	ROW	EU15
NAFTA	0.386	0.023	0.082	0.044	0.010	0.003	0.017	0.157	0.013	0.007	0.005	0.254	0.221
China	0.277	0.000	0.169	0.059	0.014	0.003	0.014	0.132	0.009	0.008	0.006	0.310	0.208
Japan	0.287	0.087	0.000	0.054	0.006	0.003	0.014	0.119	0.009	0.005	0.005	0.409	0.191
Germany	**0.114**	**0.017**	**0.033**	**0.000**	**0.028**	**0.009**	**0.088**	**0.416**	**0.023**	**0.077**	**0.005**	**0.190**	**0.513**
FSU	0.074	0.037	0.046	0.092	0.248	0.023	0.026	0.189	0.031	0.093	0.006	0.133	0.330
Finland	**0.083**	**0.022**	**0.037**	**0.112**	**0.100**	**0.000**	**0.124**	**0.291**	**0.015**	**0.035**	**0.005**	**0.177**	**0.527**
EU-North	**0.100**	**0.015**	**0.041**	**0.175**	**0.025**	**0.027**	**0.063**	**0.283**	**0.014**	**0.053**	**0.004**	**0.201**	**0.548**
EU-South	**0.113**	**0.013**	**0.036**	**0.146**	**0.017**	**0.007**	**0.043**	**0.380**	**0.025**	**0.030**	**0.007**	**0.184**	**0.576**
Medit.	0.126	0.010	0.044	0.133	0.043	0.003	0.031	0.386	0.041	0.019	0.011	0.154	0.552
CEEC7	**0.064**	**0.006**	**0.023**	**0.288**	**0.070**	**0.005**	**0.075**	**0.256**	**0.018**	**0.091**	**0.003**	**0.100**	**0.624**
India	0.220	0.026	0.064	0.064	0.029	0.002	0.019	0.211	0.017	0.008	0.000	0.340	0.297
ROW	0.216	0.056	0.103	0.059	0.010	0.003	0.020	0.177	0.012	0.010	0.014	0.319	0.260

Source: GTAP database 5.0

A closer look on the CEEC7 ’s export markets reveals that Germany is by far the most important individual EU country with nearly 30 % share of total CEEC7 exports. The EU-South block is close to the Germany with 25.6 % share of total CEEC7 exports.

The main CEEC7 export sectors are: apparel, textiles, fabricated metal products, transport and agricultural products (crop and livestock). Germany as export area accounts nearly 50% of CEEC7’s fabricated metal product and apparel sector exports.

Table 2.2. Bilateral Export shares for CEEC7 exports at World Prices

	NAFTA	China	Japan	Germany	FSU	Finland	EU-N	EU-S	Medit.	CEEC7	India	ROW	total
CROP	0.024	0.003	0.010	0.162	0.181	0.004	0.074	0.152	0.063	0.184	0.001	0.141	1.000
LIVST	0.029	0.003	0.019	0.148	0.242	0.001	0.034	0.214	0.053	0.107	0.000	0.150	1.000
COAL	0.010	0.001	0.014	0.155	0.175	0.095	0.200	0.100	0.008	0.210	0.000	0.031	1.000
OIL	0.053	0.003	0.019	0.015	0.005	0.002	0.199	0.064	0.003	0.504	0.003	0.131	1.000
GAS	0.090	0.000	0.047	0.055	0.023	0.004	0.039	0.090	0.016	0.012	0.000	0.625	1.000
Iron&Steel	0.052	0.016	0.006	0.198	0.022	0.006	0.051	0.200	0.034	0.197	0.005	0.212	1.000
Chem&Plast	0.031	0.006	0.007	0.170	0.165	0.004	0.051	0.193	0.030	0.225	0.004	0.115	1.000
TEXTILE	0.033	0.003	0.009	0.329	0.037	0.007	0.087	0.345	0.014	0.077	0.001	0.060	1.000
APPAREL	0.021	0.000	0.003	0.457	0.018	0.003	0.082	0.393	0.001	0.007	0.000	0.013	1.000
FABMET	0.014	0.005	0.004	0.456	0.056	0.005	0.089	0.157	0.012	0.132	0.001	0.068	1.000
WOOD	0.009	0.002	0.004	0.187	0.145	0.004	0.062	0.189	0.021	0.264	0.003	0.110	1.000
TRANSPORT	0.101	0.007	0.042	0.309	0.035	0.004	0.056	0.300	0.009	0.032	0.005	0.100	1.000
OthPrimary	0.041	0.004	0.021	0.222	0.236	0.007	0.096	0.160	0.009	0.125	0.000	0.080	1.000
MnfcsOther	0.057	0.002	0.011	0.329	0.069	0.004	0.095	0.218	0.020	0.106	0.003	0.087	1.000
SERVICES	0.171	0.022	0.087	0.110	0.025	0.006	0.055	0.257	0.021	0.030	0.006	0.210	1.000

Source: GTAP database 5.0

Table 2.3. Bilateral Exports shares for exports of the FSU at World Prices

	NAFTA	China	Japan	Germany	FSU	Finland	EU-N	EU-S	Medit.	CEEC7	India	ROW	Total
CROP	0.004	0.004	0.001	0.037	0.610	0.004	0.010	0.169	0.064	0.044	0.000	0.053	1.000
LIVST	0.028	0.024	0.124	0.049	0.387	0.004	0.013	0.202	0.062	0.061	0.001	0.047	1.000
COAL	0.004	0.005	0.141	0.005	0.409	0.034	0.012	0.040	0.119	0.179	0.000	0.051	1.000
OIL	0.012	0.003	0.003	0.146	0.218	0.028	0.017	0.170	0.001	0.229	0.001	0.171	1.000
GAS	0.000	0.000	0.000	0.130	0.463	0.016	0.028	0.145	0.017	0.183	0.000	0.017	1.000
Iron&Steel	0.137	0.097	0.022	0.030	0.163	0.016	0.007	0.102	0.133	0.030	0.014	0.248	1.000
Chem&Plast	0.077	0.158	0.009	0.054	0.255	0.033	0.014	0.145	0.033	0.082	0.018	0.122	1.000
TEXTILE	0.066	0.020	0.008	0.088	0.315	0.018	0.064	0.184	0.069	0.053	0.002	0.112	1.000
APPAREL	0.119	0.003	0.010	0.247	0.174	0.070	0.095	0.234	0.003	0.014	0.001	0.032	1.000
FABMET	0.010	0.017	0.002	0.082	0.485	0.021	0.039	0.101	0.023	0.174	0.002	0.043	1.000
WOOD	0.017	0.265	0.006	0.033	0.245	0.016	0.010	0.089	0.069	0.093	0.047	0.110	1.000
TRANSPORT	0.178	0.027	0.110	0.080	0.125	0.006	0.040	0.209	0.013	0.013	0.011	0.189	1.000
OthPrimary	0.052	0.066	0.163	0.050	0.265	0.032	0.037	0.110	0.031	0.090	0.001	0.104	1.000
MnfcsOther	0.073	0.029	0.056	0.103	0.186	0.029	0.026	0.299	0.023	0.050	0.007	0.118	1.000
SERVICES	0.154	0.011	0.058	0.067	0.222	0.020	0.034	0.165	0.011	0.049	0.005	0.203	1.000

The most important export industries for the FSU are gas, other manufactures (includes petroleum products), oil, services and other primary goods. The EU-South[6] has the highest export share of the four EU regions, with roughly 25 % share of the total FSU exports. Germany's share is roughly 7.5 %.

2.3 Protection

Accession of the CEEC7 to the EU involves a movement from a free trade area towards a customs union. Thus all remaining bilateral tariffs will be abolished and that the external tariffs in the CEECs with respect to third countries will be set equal to the common external tariff (CET) of the EU. Table 2.4 indicates bilateral import tariffs between CEEC7 and the four EU regions.

In general, the degree of protection is higher in the CEEC7 than in the EU. Import tariffs for agricultural products from EU is on average about 40 % while import from the CEEC7 to EU is about half of this level. In general import tariffs on manufactured goods are at much lower level than agricultural goods. The levels of export tariffs (or subsidies) between these regions are at much lower level, as indicted by table 2.5.

Tariff rates between FSU and CEEC7 and the EU regions are shown in Table 2.5. For agricultural products CEEC7 is more protectionist that FSU while for other primary, fabricated metals, apparel, and oil sectors FSU has higher tariff rates. In general FSU seems to be more protectionist that the EU.

[6] Belgium, France, Greece, Italy, Luxembourg, Netherlands, Ireland, Portugal, Spain, United Kingdom

Table 2.4. Sectoral import tariff rates between CEEC7 and EU

	Import tariffs from EU to CEEC7				Import tariffs from CEEC7 to EU			
	Germany	**Finland**	**EU-North**	**EU-South**	**Germany**	**Finland**	**EU-North**	**EU-South**
CROP	1.344	1.598	1.391	1.267	1.117	1.123	1.210	1.269
LIVST	1.405	1.398	1.468	1.403	1.292	1.193	1.348	1.390
COAL	1.054	1.000	1.000	1.000	1.000	1.000	1.000	1.000
OIL	1.003	1.000	1.000	1.000	1.000	1.000	1.000	1.000
GAS	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Iron&Steel	1.100	1.151	1.093	1.111	1.034	1.035	1.034	1.034
Chem&Plast	1.086	1.096	1.085	1.088	1.064	1.064	1.065	1.065
TEXTILE	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
APPAREL	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
FABMET	1.101	1.116	1.103	1.113	1.037	1.037	1.038	1.037
WOOD	1.087	1.091	1.077	1.083	1.046	1.053	1.049	1.046
TRANSPORT	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
OthPrimary	1.214	1.214	1.166	1.221	1.104	1.079	1.055	1.069
MnfcsOther	1.085	1.098	1.087	1.094	1.035	1.040	1.039	1.042
SERVICES	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000

Source: GTAP database 5.0

Table 2.5. Sectoral import tariff rates between FSU and CEEC7 & EU

	Import tariffs: imports from EU & CEEC7 to FSU					Import tariffs: imports from FSU to EU & CEEC7				
	Germany	**Finland**	**EU-N**	**EU-S**	**CEEC7**	**Germany**	**Finland**	**EU-N**	**EU-S**	**CEEC7**
CROP	1.079	1.039	1.135	1.094	1.122	1.050	1.262	1.231	1.037	1.478
LIVST	1.132	1.136	1.134	1.130	1.166	1.667	1.207	1.179	1.297	1.496
COAL	1.018	1.038	1.000	1.017	1.004	1.000	1.000	1.000	1.000	1.018
OIL	1.015	1.000	1.018	1.002	1.008	1.000	1.000	1.000	1.000	1.000
GAS	1.000	1.000	1.000	1.011	1.000	1.000	1.000	1.000	1.000	1.000
Iron&Steel	1.121	1.039	1.092	1.097	1.081	1.023	1.020	1.020	1.021	1.096
Chem&Plast	1.078	1.056	1.057	1.083	1.088	1.049	1.041	1.050	1.047	1.065
TEXTILE	1.089	1.038	1.083	1.115	1.093	1.092	1.098	1.101	1.090	1.100
APPAREL	1.219	1.114	1.158	1.199	1.202	1.124	1.120	1.126	1.105	1.170
FABMET	1.156	1.131	1.101	1.123	1.127	1.022	1.030	1.030	1.017	1.071
WOOD	1.064	1.047	1.051	1.062	1.047	1.024	1.029	1.033	1.025	1.030
TRANSPORT	1.121	1.080	1.074	1.043	1.127	1.005	1.023	1.002	1.002	1.049
OthPrimary	1.135	1.079	1.106	1.114	1.145	1.152	1.007	1.057	1.076	1.067
MnfcsOther	1.078	1.063	1.064	1.089	1.106	1.024	1.029	1.030	1.025	1.065
SERVICES	1.016	1.016	1.017	1.017	1.015	1.000	1.000	1.000	1.000	1.011

Source: GTAP database 5.0

3. GTAP model

3.1 The Global Trade Analysis Project

The Global Trade Analysis Project (GTAP) modelling framework, developed at the University of Purdue, has become widely applied and well-documented analysis tool in a wide range of topics (there are currently over 400 GTAP applications in the GTAP web

page: http://www.gtap.agecon.purdue.edu). The GTAP model is a multi-region, computable general equilibrium (CGE) model. The inter-regional linkages originate from bilateral trade flows, while intra-industry linkages are captured by the regional input-output structure. The GTAP database represents the state of the world economy[7] in a given year. The data covers bilateral trade patterns, structure of production, consumption and intermediate use of commodities and services. The latest version of the database includes 66 different regions[8] and 57 different sectors of production.

A short review of the main blocks of the GTAP model is given below, for a comprehensive description see Hertel (1997)[9].

3.2 Consumption

One of the distinctive features in the GTAP model is the representation of total regional consumption by an aggregate agent, called regional household. The regional household's utility function (Cobb-Douglas) is defined over three consumption categories: private consumption, public sector consumption and savings (serving proxy for future consumption[10]). In a standard GTAP model closure the claims of each of the consumption categories represent a fixed share of the total income. The regional household receives all the income that is generated within the economy. The aggregation of the consumption different consumption categories enables the possibility of using region-specific welfare measure.

Private consumption is derived from a Constant Difference of Elasticity (CDE) utility function, due to Hanoch (1975). The CDE-function has the desirable property that the resulting preferences are non-homothetic unlike the Cobb-Douglas function and on the other hand the CDE function is more parsimonious in its parameter requirements than a fully flexible functional form utility function.

Government expenditures are specified by Cobb-Douglas preferences. The total government spending (determined by the regional household fixed share spending) is allocated to specific purchases of commodities and services according to the Cobb Douglas, fixed shares of the aggregate government spending. The aggregation of the regional consumption implies that there is no direct link between government expenditures and tax revenues.

3.3 Treatment of investments

Because standard GTAP is comparative static model (see Ianchovichina and McDougall (2000), and Vaittinen (2000)) for dynamic GTAP models), savings behaviour is modelled by including them directly into the regional household's utility function. At global level savings and investment are equal in equilibrium. All world-wide savings are collected by a single agent, called as global bank.

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[7] Latest version representing the world economy in 1997 as a system of flows of goods and services measured in millions of 1997 USD.

[8] Of which 56 are primary regions and 10 composite regions.

[9] Hertel T., ed.,(1997)

[10] GTAP model is static model, but the savings component is included to represent an investment demand in the total consumption. Investment affects 'end of period' capital stocks, the capital stocks change does not affect the equilibrium solution.

The global bank invests the savings by purchase of capital goods[11]. There are basically two different mechanisms that describe how the global bank determines the allocation of the investment demands between the regions. A simpler version involves keeping the regional shares of global investment as fixed. This investment allocation mechanism dampens much of the relative regional differences (say, in terms of trade adjustment) in face of policy shock exercise like trade liberalisation and therefore this closure rule was not adopted in this paper.

The other investment allocation mechanism assumes that the global bank maximises the rate of return on investment. Investment is then allocated between regions according to expected rate of future returns. Although the standard GTAP model does not include any forward-looking elements, it is hypothesised that the expected returns in a given region fall as the current investment rises. In the equilibrium expected rates of returns are equalised between regions.

3.4 Production

The supply side of the model follows fairly standard CGE tradition with perfect competition[12] and constant returns to scale technology assumptions. Each industry is assumed to produce a single homogeneous commodity. Production technology is modelled by a hierarchical Leontief Constant Elasticity of Substitution (CES) production function. The upper nest of the production consists of a Leontief aggregation of composite value-added and composite intermediate inputs. This is analogous to an assumption that primary factors are separable from intermediate inputs, that is, optimal mix of primary factors is assumed to be invariant to the price of intermediates.

There are five factors of production: labour (skilled and non-skilled), capital, natural resources and land. Labour and capital are typically specified as mobile[13] across domestic sectors, while land is used only in agricultural sectors. Labour and land are not mobile across regions in the standard model version.

The GTAP model also includes factor taxes[14], production and consumption taxes, export taxes and import tariffs, which are in turn distinguished by production sector, by agent (regional household, firm, government) and by region. Technological change is represented by output augmenting, primary factor augmenting[15], composite intermediate commodity augmenting and value-added augmented variables.

It is assumed that domestic and imported goods (both intermediate and final goods) are imperfect substitutes. In the case of intermediate goods, firms first decide on sourcing of their imports after which the resulting composite import price determines an optimal mix of domestic and imported goods. The formulation of import demand by asserting exogenous preferences with respect goods from foreign origin is known as the Armington assumption, due to Armington (1969). Although the Armington assumption can be

[11] Capital good sector in GTAP model corresponds to the investment column of input-output tables and is a notional sector (its value added is zero), which does not undertake any real economic activity of its own.
12 For an alternative specification see Hertel & Swaminathan (2000).
13 One can control for sluggishness assumption of some factors, so that it is possible that factor prices are not equalised within a region.
[14] All taxes and subsidies are expressed in Power of intervention format (value at agent prices divided by value at market prices or value of imports at market prices divided by value of imports at world prices)
[15] When , primary factor augmenting variable increases it has three effects>: reduces demand for endowment at constant prices, reduces the effective price of the endowment and thus encouraging factor substitution, lowers cost of value-added thus encouraging expansion

criticised for its *ad hoc* nature[16], its use is often justified by parsimony (to introduce intra-industry trade pattern). Hillberry et. al. (2001) argue that the role of the distinct national preferences, that is the Armington elasticities, is exaggerated in CGE models as these limit modelled responses to trade policy changes. The authors point out that in most CGE models, including the GTAP model, the choice of the Armington elasticity values relies on existing time series econometric literature estimates. There is, however, a growing consensus (see for example Galloway et al. (2000)) that the time series estimates are too low and hence the use of these estimates in CGE models contribute to the fairly small economic responses in face of trade policy simulations. Hillberry et. al. (2001) further argued that doubling the initial values of the GTAP Armington elasticities led to more desirable simulation properties in that the modelled responses to a trade policy shock reflected more of the changes in trade costs (via more responsive buyers) rather than exogenous tastes.

3.5 Welfare

GTAP model computes money metric equivalent of aggregate per capita utility for a region (using the regional household's utility function). The regional household's Equivalent Variation (EV) is equal to the difference between the expenditure required to obtain the new, post-simulation level of utility at initial prices. Huuf and Hertel (2001)[17] show how the overall welfare measure in GTAP model can be decomposed into several sub-components of which the four major elements are:

- *Endowment* contribution to welfare (due to change in the availability of primary factors),
- *Technical efficiency* contribution to welfare (for example due to increased factor productivity) ,
- *Allocative efficiency* contributions to welfare (allocation of resources change),

- *Terms of trade* contributions to welfare (welfare may change as a result of more/less favourable prices of exports/imports)

In a policy shock like trade liberalisation the first two sources of welfare change would typically be zero as the endowment and technical change variables are exogenous. Below, we implement two cases where the technical change component is, however, significant source of welfare change[18]. In all other simulations the prime source of welfare change are from terms of trade and the allocative efficiency effects.

3.6 GTAP database and the used level of aggregation

This study utilises the latest GTAP database version 5.0. The original data consisted of 66 separate regions (of which 56 are primary regions and 10 composite regions) with each region including 57 different sectors of production. The base year for the data is 1997. The

16 Most importantly that the product differentiation is *exogeneous* and not resulting from proper modelling of imperfect competition

17 Huff, K. and Hertel, T.W. (2001).

18 The EU3 and FTA3 scenarios where factor augmenting technical changes were increased in CEEC7 and FSU respectively.

GTAP database version 5.0 allows EU to be split into 15 separate countries (EU15). The Former Soviet Union (FSU) still remains one block in the current database.

Table 3.1 Regional aggregation in the GTAP model

New Region	Original GTAP
1. CEEC7	Hungary, Poland, Bulgaria, Czech Republic, Romania, Slovakia, Slovenia
2. FIN	Finland
3. DEU	Germany
4. EUN	Austria, Denmark, Sweden
5. EUS	Belgium, France, Greece, Italy, Luxembourg, Netherlands, Ireland, Portugal, Spain, United Kingdom
6. CHN	China
7. FSU	Former Soviet Union
8. IND	India
9. JPN	Japan
10. MEDITERREAN	Turkey, Morocco, Rest North Africa
11. NAFTA	Canada, United States, Mexico
12. ROW	Rest of the world

Table 3.2 Sectoral aggregation in the GTAP model

	NEW SECTOR	Original GTAP sector
1	Apparell	Leather products, Wearing apparel
2	Coal	Coal
3	Crop	Sugar cane, sugar beet, Cereal grains nec, Crops nec, Oil seeds Processed rice, Paddy rice, Sugar, Vegetables, fruit, nuts, Wheat
4	Chemicals and plastics	Chemical,rubber,plastic prods
5	Metal products	Fabricated metal products
6	GAS	Gas
7	Ferrous metals	Iron and steel
8	livestock sector	cattle, sheep, goats, horse, Fishing, Dairy products, Animal products nec, Meat products nec, Raw milk, Vegetable oils and fats
9	Other manufactures	Electronic equipment, Wood products, Metals nec, Mineral products nec, Machinery and equipment nec, Manufactures nec, Petroleum, coal products
10	OIL	Oil
11	Other primary production	Beverages and tobacco products, Forestry, Food products nec, Minerals nec, Plant-based fibers, Wool, silk-worm cocoons
12	Services	Communication, Construction, Dwellings, Electricity, Gas manufacture, distribution, Insurance, Business services nec, Financial services nec, Pub.Admin/Defence/Health/Educat, Recreation and other services, Trade, Water
13	Textiles	Textiles
14	Transport equipment	Air transport, Motor vehicles and parts, Transport equipment nec, Transport nec, Sea transport
15	Paper products, publishing	Wood and paper products

The EU15 is aggregated into four EU-regions: Finland, Germany and EU-North (EUN) and EU-South (EUS). The EUN area consists of Sweden, Denmark and Austria, which all are important trading partners to the CEEC7 and FSU blocks. The EU-South block consists

of all rest of the EU countries. The practical reason for keeping the EU at the four region aggregation level (rather than say, 15) was to better be able to keep track of economic effects of the enlargement, and also to reduce the computing costs. Below table reports the regional aggregation into 12 different regions.

The sectoral aggregation follows fairly closely to that of Baldwin et.al. (1997). The 57 different sectors in GTAP database were aggregated into 15 sectors of production.

4. Policy scenarios

4.1 The impact of Eastern Enlargement

EU1: EU-enlargement

Three different EU-enlargement simulations were implemented. First is a scenario where all bilateral tariffs and export subsidies between the EU and the CEEC7 regions are abolished, and the EU average common external tariff (CET) applied to the CEEC7. This scenario is labelled as EU1 in the tables reporting the simulation results.

The implied changes in the import tariffs are reported in tables 4.1a and 4.1b.

The changes for the CEEC7 are higher than for EU, which just reflects the above-mentioned higher degree of protection in the CEEC7. Table 4.2 reports the CET changes for the CEEC7 countries implied by the Enlargement. In general the CET rates have to fall, but as in the case of crop imports for Japan the CET has to rise.

Table 4.1a Import tariff rate % changes for commodity i from r to CEEC7

	Germany	Finland	EU-North	EU-South
CROP	-25.57	-37.43	-28.13	-21.05
LIVST	-28.84	-28.49	-31.87	-28.71
COAL	-5.14	0.00	0.00	0.00
OIL	-0.27	0.00	0.00	0.00
GAS	0.00	0.00	0.00	0.00
Iron&Steel	-9.09	-13.12	-8.48	-10.00
Chem&Plast	-7.91	-8.77	-7.80	-8.11
TEXTILE	0.00	0.00	0.00	-0.01
APPAREL	0.00	-0.01	0.00	0.00
FABMET	-9.21	-10.37	-9.33	-10.11
WOOD	-8.02	-8.37	-7.12	-7.71
TRANSPORT	0.00	0.00	0.01	0.00
OthPrimary	-17.61	-17.65	-14.22	-18.10
MnfcsOther	-7.87	-8.94	-8.04	-8.56
SERVICES	0.00	0.00	0.00	0.00

EU2: EU-enlargement and internal market

The above EU-enlargement simulation did not take into account the fact that the enlargement involves the accession of the CEEC7 to the internal market. This will have further effect to the CEEC7 economies via trade, FDI, domestic investment etc. Thus, it is fair to say that he above simulation to some extent underestimates the long run impacts of

the enlargement. Accession to the internal market means that number of administrative barriers to trade, as well as number of technical barriers of trade, i.e. minimum requirements, harmonisation of rules and regulations etc., are abolished. Furthermore, it may be argued that risk and uncertainty will be mitigated by the CEEC7 accession to the EU.

Table 4.1b Import tariff rate % changes for commodity i from CEEC7 to s

	Germany	Finland	EU-North	EU-South
CROP	-10.46	-10.96	-17.33	-21.18
LIVST	-22.59	-16.20	-25.83	-28.07
COAL	0.00	0.00	0.00	0.00
OIL	0.00	0.00	0.00	0.00
GAS	0.00	0.00	0.00	0.00
Iron&Steel	-3.26	-3.35	-3.27	-3.25
Chem&Plast	-5.97	-6.04	-6.07	-6.14
TEXTILE	0.00	0.00	-0.01	0.00
APPAREL	0.00	0.00	0.00	0.00
FABMET	-3.57	-3.53	-3.63	-3.59
WOOD	-4.38	-5.04	-4.69	-4.35
TRANSPORT	0.00	0.00	0.00	0.01
OthPrimary	-9.44	-7.31	-5.26	-6.46
MnfcsOther	-3.41	-3.84	-3.73	-4.06
SERVICES	0.00	0.00	0.00	0.00

Table 4.2 CET tariff rate % changes for the CEEC7

	NAFTA	China	Japan	FSU	Mediterranean	India	ROW
CROP	-14.53	-5.10	0.67	-28.83	-7.91	3.04	-9.76
LIVST	-11.77	-19.21	-3.52	-9.78	1.00	-10.79	-17.74
COAL	0.98	1.00	1.00	-0.82	-11.27	1.00	0.73
OIL	1.00	1.00	1.00	0.97	-0.10	1.00	0.27
GAS	1.00	1.00	1.00	0.98	0.00	1.00	1.00
Iron&Steel	-6.28	-6.86	-3.60	-6.84	-12.70	-1.70	-7.59
Chem&Plast	-3.87	-3.46	-0.31	-0.31	-5.25	-2.65	-7.05
TEXTILE	-4.89	-4.79	-4.83	-0.63	-3.96	-1.79	-2.83
APPAREL	-0.69	-7.68	-3.46	-4.57	-8.03	-6.06	-5.07
FABMET	-6.43	-7.04	-6.57	-4.55	-8.83	-6.59	-8.49
WOOD	-3.54	-2.03	-2.63	-0.79	-9.01	-5.14	-6.80
TRANSPORT	-2.09	-2.69	-4.99	-4.38	-2.61	0.34	-7.82
OthPrimary	-30.52	-16.05	-16.22	1.10	4.12	-12.92	-10.44
MnfcsOther	-4.96	-6.01	-4.69	-1.78	-5.86	-5.88	-6.03
SERVICES	1.00	1.00	1.00	1.00	1.00	1.00	1.00

In order to take into account some of these integration effects we did a second EU-enlargement simulation with higher degree of import demand elasticity within the customs union. This meant increasing the Armington elasticities for a number of key sectors. In the GTAP model, the Armington is applied in international trade. The assumption means that

commodities with the same name, produced by different countries, are imperfect substitutes. The Armington assumption implies that imperfect substitutes can have different prices in different countries and explains two-way trade between regions. By increasing substitutability between domestically produced and imported good within customs union, we hope to capture some of the internal market effects that further encourage trade within the area. In fact, this scenario attempts to capture reduced market segmentation, which is a likely as the IM removes non-visible trade barriers.

The simulation with increased Armington elasticity values involved re-specifying the old commodity specific elasticity value vector into region-commodity matrix of values. It was assumed that the existing estimates for the elasticity values (ranging from 1.8 to 4.4) were as before except for the chosen sectors within the CU. For the simulation it was assumed that the Armington elasticities were 30 in agricultural, manufacturing, iron and steel and textile industries within the EU-CEEC7 customs union. The relatively high Armington elasticity values were chosen in order to bring out the effects of the internal market effects more clearly. The model stability with respect tot he elasticity values was checked by doing series of simulations with less dramatic increases in the elasticity values. Results showed that qualitatively the smaller increases were consistent with the reported case.

EU1EA: EU-enlargement and internal market post Europe Agreements
By 1997 the EU had eliminated practically all tariffs on manufactured goods on imports from the CEEC countries in accordance with the Europe Agreements (EA). The CEEC countries will complete the EA agreement by end of 2002. In order to evaluate the effects of the EA-agreements to the economic effects of EU-enlargement the EU1 scenario was implemented after the EA agreements had taken place. This implies implementing the EU average CET rates to the CEEC7 and abolishing all the remaining tariffs (mainly agricultural products) between the EU and CEEC7.

EU3: EU-enlargement and factor productivity increase within CEEC7
The third EU-enlargement scenario involved implementing the EU1 scenario with additional increase in total factor productivity in the CEEC7 region. Labour as well as capital productivity is bound to rise in CEEC7 region due to increased foreign investment, labour migration, increased competition etc. This simulation involved imposing a 6 % increase in CEEC7 factor productivity parameter. It must be emphasised that the 6 % does not correspond to yearly change – rather it is some kind of approximation for a one-shot increased productivity change in the new, post accession, equilibrium.

4.2 FSU-EU free trade area

The free trade area (FTA) scenario between Former Soviet Union (FSU) and the enlarged EU (EU15 + CEEC7) involved basically the same policy shock simulations as in the above EU enlargement case (removal of tariffs, Armington elasticity value and factor productivity increase in the FSU). The main difference here is of course that there is no CET constraint on the FSU. These simulations are labelled as FTA1, FTA2 (Armington) and FTA3 (factor productivity) in. In FTA2 scenario we doubled Armington elasticities in agricultural, manufacturing, iron and steel and textile industries within the EU-FSU free trade area and kept the EU2 scenario values within an enlarged EU as above. In addition to these, we implemented a scenario where the FSU abolishes its trade barriers vis-a-vis the EU25 region unilaterally (this is called FTA0 below). The motivation for this simulation

was to investigate applicability of a small country assumption on FSU with respect to the EU25.

When interpreting the results in the FTA scenarios one should bear in mind that now the point of reference is the equilibrium database that corresponds to the post EU-CEEC7 enlargement simulation. In the EU enlargement case the point of reference was the base year equilibrium of the GTAP database 5.0, that is year 1997.

5. Simulation results from the EU-enlargement and FTA scenarios.

Abolishing formal trade barriers affects directly to the relative prices of intermediate inputs and final goods. Changes in demand for goods from different regions leads to trade creation and trade diversion. Free trade means that prices reflect relative scarcities so that countries can better exploit the gains from trade. Trade creation involves reallocation of production between different regions creating efficiency improvement in overall production. Furthermore, elimination of trade barriers affects terms of trade, that is, the price of exports relative to imports. Abolishing import tariffs will improve terms of trade for countries that export their goods to that market. While such trade of terms improvement may harm domestic production it can welfare improve welfare due to rise of value of its produced goods relative to imported goods.

All results are reported in terms of percentage changes compared to the relevant reference. In case on EU-enlargement this reference is the GTAP base year (1997) equilibrium. In case of the FTA simulation the point of comparison is the post EU-CEEC7 enlargement equilibrium data. It is also worth mentioning that one should read the results more in qualitative terms than attach weight on specific numerical values, which in any case depend on the model's parameter values and the chosen 'business as usual' reference scenario.

Table 5.1 gives the simulation results concerning total output. With regard to the enlargement scenarios we find the most significant effects on CEEC7 row. On the other hand the impact for the incumbent EU countries is very small. This confirms the standard result that the new entrants are likely gain from eastern enlargement whereas the incumbents face only negligible effects. In EU1 scenario, which corresponds with the basic simulation of Baldwin et al. (1997), the impact for CEECs is smaller. The reason is that we use more recent GTAP database.[19]

The additional effects on CEEC7 of scenarios EU2 and EU3 are bigger. The gain for CEECs becomes three-fold in the E3 scenario. In scenario EU2, where the Armington elasticites were doubled, the real output increases by 0.7 percent. When the EA agreements are taken into account the EU1 scenario (labelled as EU1EA) produces somewhat smaller output increase (0.36%) than in the EU1 scenario, which is what one would expect. For the current EU member states improved productivity in the CEECs does not yield additional gain but reduced market segmentation implies further gains. The overall effects remain, however, very small.

[19] Baldwin et al. estimated that the effect of the eastern enlargement on CEECs is 1.5 per cent. Also Havlik (2002) argue that this overestimates the impact since Europe Agreements gradually diminish trade barriers.

Table 5.1 The effects of eastern enlargement and EU-CIS free trade area on GDP volumes, percentage change in the long-run equilibrium compared to the baseline

	EU1	EU1EA	EU2	EU3	FTA1	FTA2	FTA3
NAFTA	-0.000	0.000	-0.000	-0.000	0.000	0.000	-0.001
China	0.003	0.002	0.001	0.003	-0.005	-0.007	-0.004
Japan	-0.001	0.000	-0.000	-0.001	-0.001	-0.001	-0.001
Germany	**0.009**	**-0.004**	**0.012**	**0.009**	**-0.016**	**-0.028**	**-0.016**
FSU	-0.007	0.003	0.001	-0.006	0.038	0.087	1.093
Finland	**0.008**	**-0.002**	**0.010**	**0.008**	**0.034**	**0.033**	**0.034**
EU-North	**0.004**	**-0.008**	**0.005**	**0.004**	**-0.067**	**-0.092**	**-0.068**
EU-South	**0.006**	**0.002**	**0.008**	**0.006**	**-0.030**	**-0.040**	**-0.031**
Mediterranean	0.000	0.004	0.001	0.000	-0.015	-0.013	-0.014
CEEC7	**0.539**	**0.366**	**0.706**	**1.645**	**-0.846**	**-1.218**	**-0.846**
India	0.001	0.000	-0.000	0.001	0.001	0.000	0.001
ROW	-0.001	0.003	0.001	-0.001	-0.009	-0.007	-0.009

The simulation results suggest that the impact of eastern enlargement on FSU and the rest of the world are negligible. This suggests that the fear of Russia's marginalization due to eastern enlargement does not get support from the results. Even the sign of the impact on FSU economy is unclear since reduced market segmentation within the IM seems to yield gains for Russia.[20]

With regard to the EUCIS FTA the impact for CIS countries positive The impact of abolishing trade barriers is very modest, though. To obtain more considerable output effects a boost in productivity in CIS countries is needed (FTA3). This emphasizes the role of FDI in CIS countries integration process.

For the current EU member states the effects of the EUCIS FTA agreement are negative with an exception of Finland. Both EU-South and EU-North and also Germany lose. It is worth noting that, in absolute terms, the losses are in these cases bigger than the gains following from the eastern enlargement with one exception. As the former scenario is built upon the latter this means that the impact of all FTA scenarios compared to the 1997 baseline to EU-South, EU-North and Germany is negative. For the current EU member states the effects are small but for the CEECs the negative impact of EUCIS FTA is considerable. The exception is, however, the case where we add more elastic substitution between domestic and foreign goods within EUCIS free trade area and productivity growth in CEECs and FSU. Then the net effect for CEECs remains positive. This suggests that the whole integration process covering eastern enlargement and EUCIS free trade area has a positive output effect for Finland, the CEECs and CIS countries and negative output effect for the rest of the EU. For CEECs the positive output effect due to accession is approximately 4.5 per cent and the negative effect of EU-CIS free trade area more than 5.5 per cent if we add up all possible effects.

[20] Note that according to the simulations in Baldwin et al. (1997) Russia gains. One reason behind that is the fact that EU membership liberalizes CEECs trade policy regime towards Russia. Much of this effect has, however, already taken place. For a more recent situation, see discussion in Hamilton (2002).

Tables 5.2a and 5.2b give the trade effects in seven simulations (imports 5.2a and exports 5.2b). Eastern enlargement has significant impact on CEECs trade as their imports increase by more than 10 per cent in all scenarios. Increase in exports is not as big with an exception of the scenario where more elasticity in substitution between domestic and foreign goods was assumed. Under reduced market segmentation CEECs' exports increase by 38 per cent and imports by 29.5 per cent. The overall trade effect (scenarios EU1-3) is roughly a 50 per cent increase in CEECs trade, which demonstrates, indeed, a significant trade creation effect. For the current EU members the relative effects are naturally more modest, but still significant, simply due to the size difference of EU15 and CEEC7.

Table 5.2a Volume of merchandise imports by region

	EU1	EU1EA	EU2	EU3	FTA1	FTA2	FTA3
NAFTA	-0.075	0.0062	-0.054	-0.090	-0.169	-0.142	-0.190
China	0.032	0.0885	0.034	0.027	-0.242	-0.223	-0.264
Japan	-0.150	0.0031	-0.118	-0.179	-0.244	-0.211	-0.293
Germany	**0.529**	**0.0035**	**1.191**	**0.546**	**1.347**	**2.213**	**1.344**
FSU	-0.254	0.1286	-0.044	-0.252	8.539	10.942	10.232
Finland	**0.245**	**-0.0349**	**0.463**	**0.255**	**1.350**	**1.772**	**1.391**
EU-North	**0.338**	**0.0495**	**0.809**	**0.348**	**0.817**	**1.510**	**0.815**
EU-South	**0.123**	**0.0196**	**0.369**	**0.125**	**0.534**	**0.970**	**0.528**
Mediterranean	-0.016	0.0798	0.010	-0.023	-0.519	-0.431	-0.535
CEEC7	**10.634**	**3.0178**	**14.864**	**11.966**	**14.156**	**19.022**	**14.188**
India	-0.086	-0.0060	-0.086	-0.105	-0.305	-0.268	-0.330
ROW	-0.028	0.0736	0.009	-0.034	-0.219	-0.181	-0.233

Table 5.2b Volume of merchandise exports by region

Volume of merchandise exports by region

	EU1	EU1EA	EU2	EU3	FTA1	FTA2	FTA3
NAFTA	0.160	0.0358	0.153	0.199	0.242	0.235	0.298
China	0.123	0.0543	0.115	0.146	0.054	0.054	0.083
Japan	0.335	0.0634	0.310	0.413	0.525	0.500	0.639
Germany	**0.386**	**0.1078**	**0.913**	**0.423**	**0.883**	**1.590**	**0.926**
FSU	0.138	0.0708	0.151	0.171	6.086	8.817	5.218
Finland	**0.145**	**0.0240**	**0.284**	**0.171**	**0.444**	**0.754**	**0.481**
EU-North	**0.178**	**0.0507**	**0.472**	**0.199**	**0.467**	**0.837**	**0.491**
EU-South	**0.199**	**0.0864**	**0.390**	**0.224**	**0.606**	**0.971**	**0.638**
Mediterranean	0.121	0.0503	0.114	0.148	0.048	0.055	0.088
CEEC7	**6.628**	**2.6456**	**14.452**	**6.517**	**10.191**	**18.682**	**10.218**
India	0.186	0.0364	0.176	0.234	0.287	0.281	0.352
ROW	0.089	0.0390	0.093	0.109	0.102	0.104	0.134

In EU-CIS FTA scenarios, the effects are qualitatively similar with a natural exception that CIS trade obtains a positive impact. Note, however, that the magnitude of trade effects due to EUCIS free trade area for CEECs are almost of the same magnitude as the accession alone. On one side this suggests that trade creation effects are considerable but as there is almost no change in the rest of the world's trade, trade diversion seems evident as well.

Table 5.2c Volume of merchandise exports by region under different Armington elasticity values

	1X	2X	3X	4X	5X	6X	7X	8X
NAFTA	0.160	0.152	0.145	0.147	0.150	0.154	0.158	0.162
China	0.123	0.115	0.115	0.121	0.130	0.139	0.148	0.157
Japan	0.335	0.309	0.286	0.281	0.279	0.279	0.280	0.282
Germany	0.386	0.913	1.725	2.378	2.985	3.547	4.068	4.555
FSU	0.138	0.150	0.171	0.194	0.217	0.239	0.261	0.282
Finland	0.145	0.283	0.598	0.884	1.181	1.479	1.773	2.061
EU-North	0.178	0.472	1.127	1.707	2.295	2.875	3.442	3.994
EU-South	0.199	0.390	0.729	1.068	1.417	1.764	2.104	2.437
Mediterranean	0.121	0.113	0.118	0.128	0.141	0.154	0.166	0.177
CEEC7	6.628	14.452	22.459	27.192	30.976	34.142	36.875	39.293
India	0.186	0.175	0.164	0.165	0.168	0.172	0.177	0.181
ROW	0.089	0.093	0.096	0.104	0.112	0.121	0.129	0.136

Table 5.2c indicates how increase of the Armington elasticity value affects to the results. The reported elasticity values are for EU-CEEC enlargement scenario. Columns labels refer to the multiplication of the initial Armington elasticity values (for example 2X refers to two times the initial value, 3X three times the initial value etc.). The effect of increasing the price responsiveness of import demand displays decreasing returns of the multiplication factor, that is, increasing the elasticity results in export growth at falling rate of increase.

Table 5.3 Terms of trade

	EU1	**EU1EA**	**EU2**	**EU3**	**FTA1**	**FTA2**	**FTA3**
NAFTA	-0.028	0.0017	-0.019	-0.034	-0.071	0.044	-0.078
China	0.020	0.0413	0.021	0.018	-0.116	0.003	-0.125
Japan	-0.072	-0.0011	-0.055	-0.088	-0.118	-0.026	-0.141
Germany	**0.072**	**-0.0513**	**0.129**	**0.082**	**0.242**	**0.041**	**0.245**
FSU	-0.096	0.0541	0.009	-0.079	-0.378	-1.709	-0.186
Finland	**0.085**	**-0.0274**	**0.108**	**0.088**	**0.480**	**0.859**	**0.503**
EU-North	**0.080**	**-0.0037**	**0.162**	**0.088**	**0.169**	**0.698**	**0.171**
EU-South	**-0.006**	**-0.0361**	**0.022**	**-0.005**	**-0.003**	**0.031**	**-0.003**
Mediterranean	0.004	0.0401	0.019	0.008	-0.227	0.207	-0.235
CEEC7	**0.259**	**0.0840**	**-0.940**	**0.288**	**1.576**	**-2.498**	**1.596**
India	-0.039	-0.0112	-0.042	-0.050	-0.182	0.171	-0.189
ROW	-0.005	0.0352	0.014	-0.005	-0.104	0.213	-0.110

Table 5.3 gives the terms of trade effects. For the enlargement scenarios we expect that EU member states face an improvement whereas Russia's terms of trade is likely to deteriorate. The results confirm this with exception of EU2 and EU1EA scenarios, where the CEECs face a terms of trade deterioration. In these scenarios, somewhat surprisingly, FSU terms of trade improves. Deterioration of new entrants' terms of trade is due to better

substitutability and reduced market segmentation within the IM. As this effect does not take place between the EU and CIS countries and since trade between CIS countries and the EU is not highly built on close substitutes, Russia faces a terms of trade improvement mainly because CEECs' relative export prices fall.

Regarding EUCIS free trade area the current EU countries and the CEECs face qualitatively similar term of trade effects. The positive effects of FTA1 and FTA3 scenarios are, however, bigger than the corresponding accession effects.

Table 5.4 shows the regional economic welfare effects of different arrangements in Europe. Welfare is measured by equivalent variation relative to total output. Figure 5.1 summarizes the welfare effects at regional level. The figure gives the welfare effects for an enlarged EU, EU-CIS free trade area and the rest of the World. From Table 5.4 it can be seen that only one scenario increases welfare of all regions in our aggregation. That is scenario EU2, i.e. EU enlargement plus increased substitution between import goods and domestic goods within the IM.

The overall welfare effects of eastern enlargement are, as expected, small for the incumbent countries but quite significant for the new entrants.

Table 5.4 Economic welfare effects of EU enlargement and the formation of EU-CIS FTA

	EU1	EU1EA	EU2	EU3	FTA1	FTA2	FTA3
NAFTA	-346	18	-146	-429	-955	314	-1052
China	85	107	100	82	-288	-275	-303
Japan	-264	-7	-108	-336	-515	-213	-613
Germany	**570**	**-369**	**980**	**619**	**943**	**-2823**	**945**
FSU	-157	95	27	-131	-268	1157	6146
Finland	**41**	**-13**	**54**	**41**	**218**	**215**	**226**
EU-North	**194**	**-56**	**396**	**208**	**-56**	**-575**	**-56**
EU-South	**257**	**-454**	**824**	**265**	**-1652**	**-4252**	**-1679**
Mediterranean	7	58	29	10	-298	165	-305
CEEC7	**1769**	**1242**	**297**	**5171**	**-252**	**-17487**	**-221**
India	-11	-4	-10	-16.07	-82	-3	-85
ROW	-69	724	400	-77.79	-2061	3632	-2177

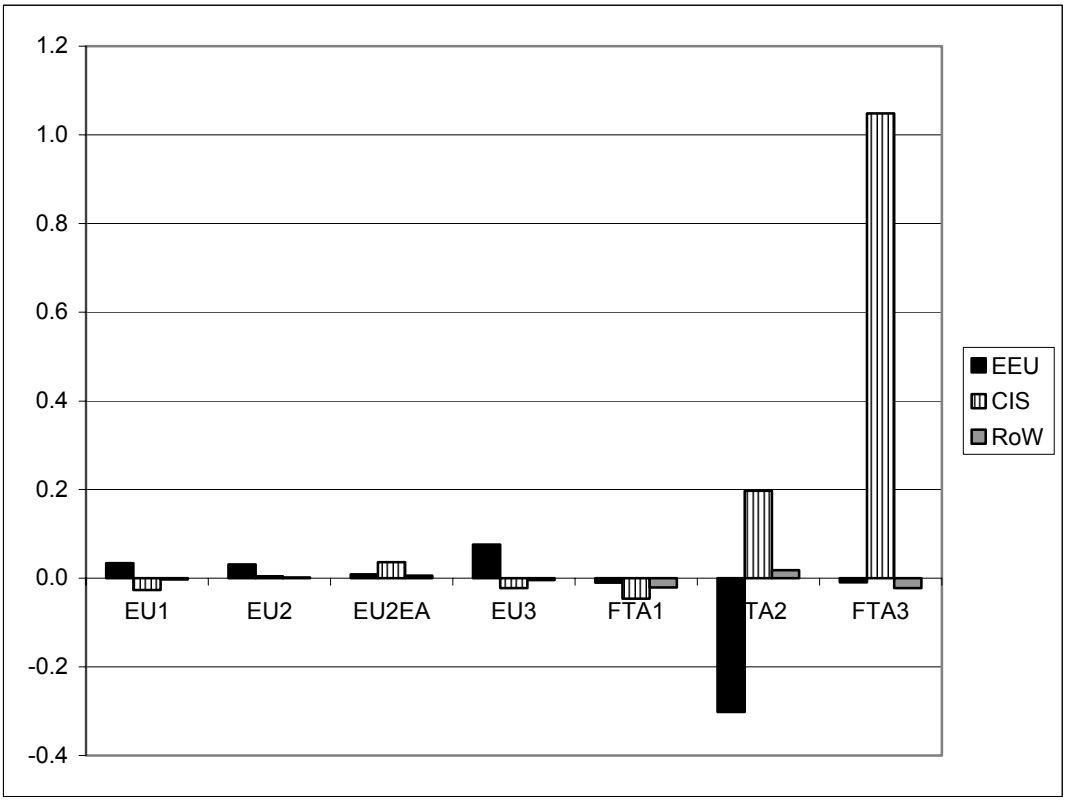
The simulation results regarding the EU-CIS free trade area suggest that there are winners and losers within the area. Among the current EU countries, EU-South and surprisingly also EU-North (Sweden, Denmark and Austria) lose in all variants of FTA scenarios. This holds for CEECs too. Finland on the other hand, seems to gain from EU-CIS free trade area regardless of the scenario and Germany as well except in FTA2 scenario. For the CIS countries EU-CIS free trade area does yield welfare gains unless there is a productivity growth (FTA3). In other words, it seems that CIS-countries do not gain from the agreement per se but they start to gain when substitutability and productivity in FSU improves. There is need for better institutions or more FDI in CIS countries. These do not follow automatically from the agreement but it is likely that the agreement improves conditions for FDI and more functioning institutions. From the point of view of the rest of the world

EU-CIS free trade area seems to have a larger negative impact than the eastern enlargement.

Figure 5.1 groups the welfare effects into intra-EU, intra CIS and the rest of the world effects. The idea is assess whether the arrangements increase internal welfare without decreasing the rest of the world's welfare. If the former part does not hold this suggests substantial trade diversion effects and a failure in the latter part might signal of significant terms-of-trade effects.

Figure 5.1 shows that there is only one scenario under which all three regions gain is EU2, i.e. eastern enlargement with increased substitution between imports and domestic goods within the IM. For the other scenarios concerning eastern enlargement the external welfare effects are negative but very small.[21]

Figure 5.1 Welfare effects of different trade agreements on the enlarged EU (EEU), CIS countries and countries outside the arrangement (RoW), % relative to baseline total output



The effects of EU-CIS free trade area behave somewhat differently. The baseline scenario FTA1 gives economic welfare losses for the EU, CIS countries and the rest of the world. The effects are small though. By increasing substitution between imports and domestic goods we obtain a welfare gain for CIS-countries but a considerable welfare loss for the EU, especially for the EU-South and new entrants. Improved productivity in CIS-countries

[21] In a recent paper, Liapis & Tsigas (1998) find the EU enlargement yields a small welfare loss for the rest of the world but a small welfare gain if CAP is reformed.

yield a welfare gain for them but gives a small welfare loss for the EU. Noteworthy in FTA-scenarios is that Finland and Germany gain from all of them but otherwise the EU regions lose. From the viewpoint of the rest of the world EU-CIS free trade area yields a welfare loss.

Figures 5.2 and 5.3 show the contributions of allocative efficiency and terms of trade effects on welfare. The figures add up all three accession scenarios and EU-CIS free trade area scenarios respectively. The figures demonstrate that allocation effects have a more significant contribution than the terms of trade effect. Both effects work into the same direction.

Since figures 5.2 and 5.3 add up all integration effects that we have considered in this paper in EU enlargement and EU-CIS free trade area they can be interpreted as summarized impact resulting from the regional integration arrangements.

Figures 5.2 and 5.3 demonstrate EU enlargement and its impact in its deep form is mainly positive. It causes small losses for NAFTA and Japan but otherwise the effects are positive. If we aggregate the rest of the world to one block all three regions the EU, FSU and the rest of the world gain. This result does not hold in all three scenarios separately as FSU loses in scenarios EU1 and EU3.

Figure 5.2 Overall economic welfare effect of EU enlargement and the contributions of allocative efficiency and terms of trade effect to that, mill. USD

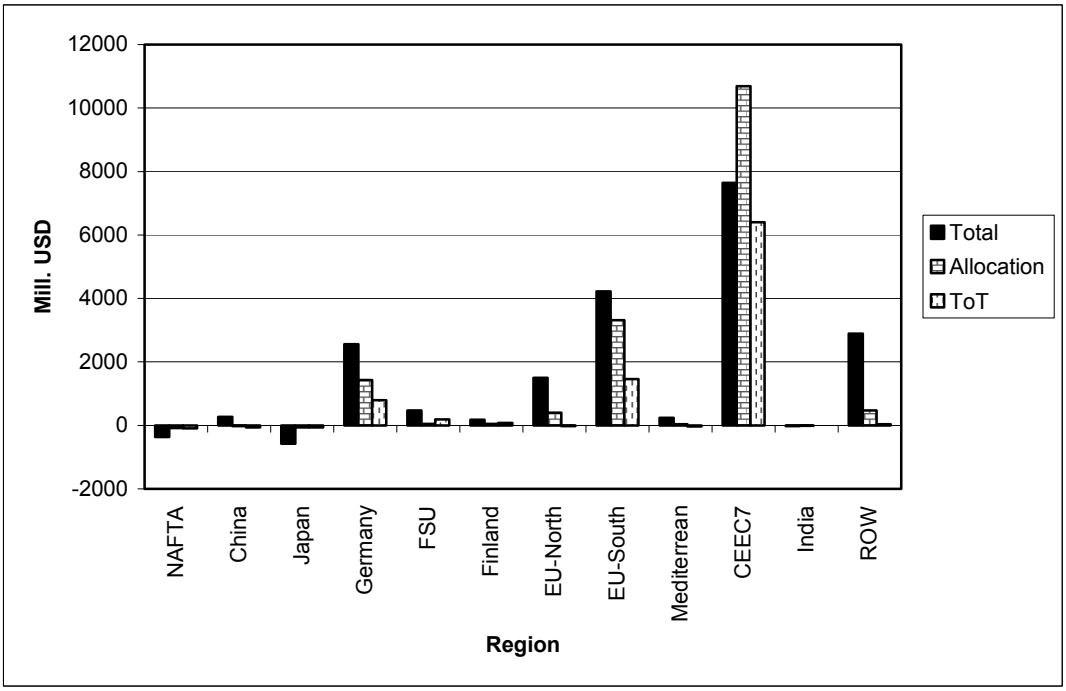
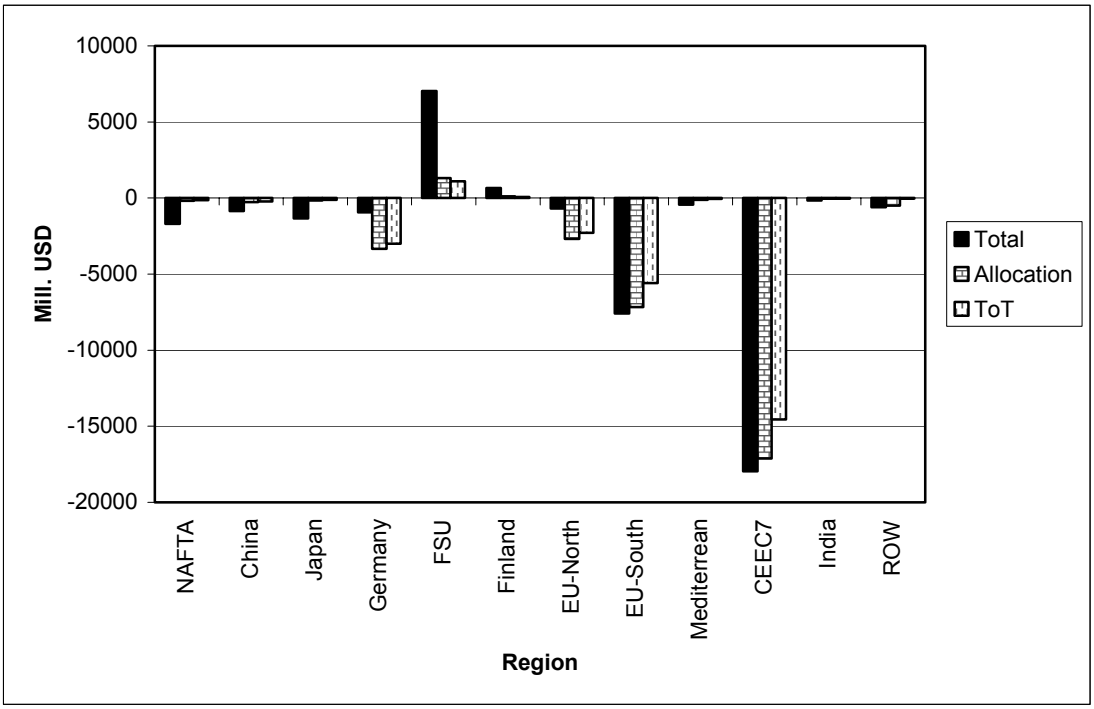


Figure 5.3 Overall economic welfare effect of EU-CIS free trade area and the contributions of allocative efficiency and terms of trade effect to that,

mill. USD



Deep integration between the EU and FSU, on the other hand does not seem to be, in general, welfare enhancing. In fact dividing the globe into three regions as above, the EU as a block loses in all scenarios separately. Within the EU, Finland and Germany gain. From the point of view of CIS-countries there are gains available but not directly from the agreement. Welfare gains require improved substitutability or productivity growth or both. For the rest of the world EU-CIS free trade area is welfare diminishing.

Figure 5.4 summarizes the trade-off in European integration. The figure shows two alternative long-run scenarios. First, it gives (EU+FTA1) regional welfare effects of the alternative where we add up all EU-scenarios above plus FTA1. This can be interpreted as a scenario where the enlarged IM proceeds to deep integration path and there is a free trade area with CIS-countries. The other scenario consists of EU enlargement and deep integration between the EU and CIS-countries. The striking feature is that the former seems to be welfare improving for nearly all regions whereas the latter profits mainly CIS countries and Finland. The trade off is that to gain FSU needs deep integration with the EU but this seems to have a negative impact on most EU regions and the rest of the world. Keeping integration loose can eliminate this effect but this does not enhance CIS-countries welfare.

Figure 5.4 The overall impact of deep integration in an enlarged EU plus EU-CIS free trade area with CIS-countries and deep integration in EU-CIS area on welfare, mill. USD

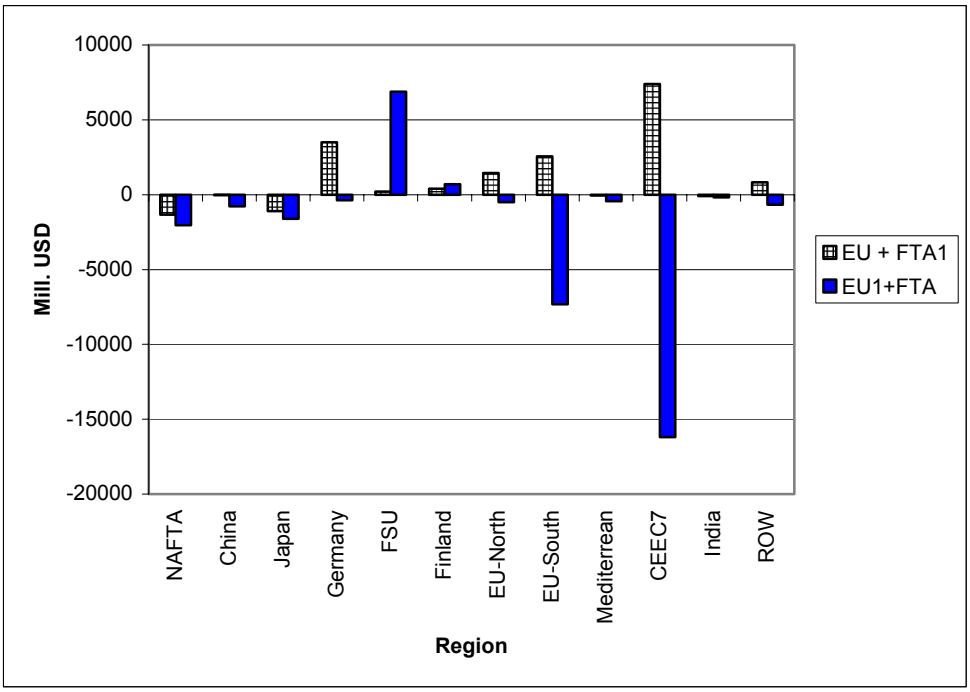


Figure 5.2 Welfare effects of different trade agreements on the enlarged EU (EEU), CIS countries and countries outside the arrangement (RoW), % relative to baseline total output

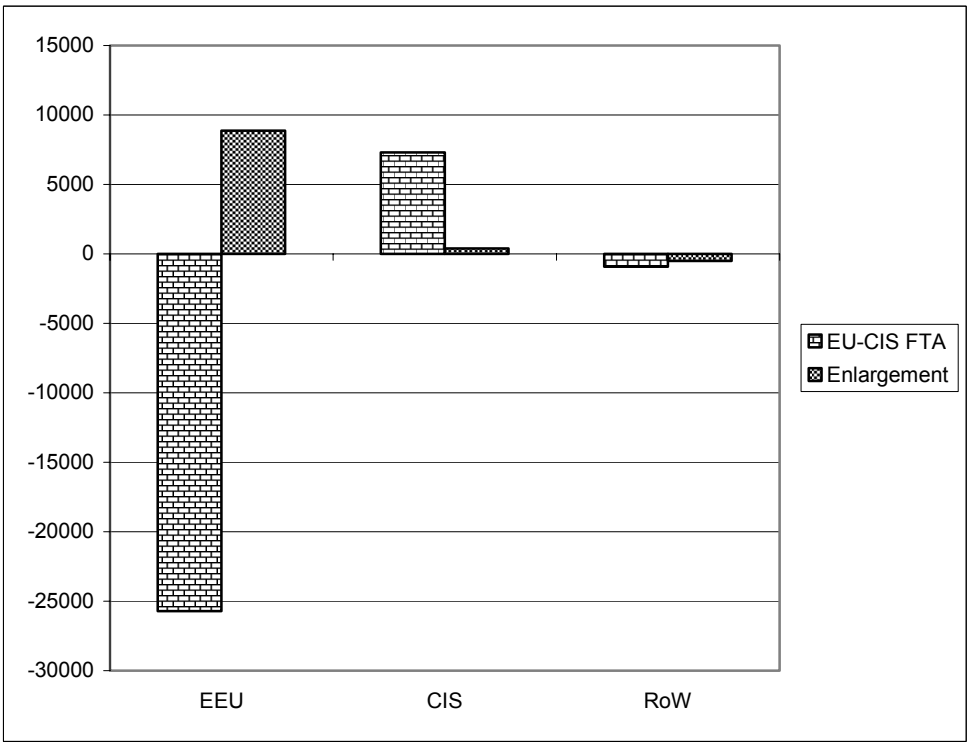


Figure 5.5 summarizes the aggregate effects of all three enlargement and FTA scenarios in millions of USD. Eastern enlargement yields gains for the enlarged Union, mainly for the new entrants. The welfare losses for CIS countries and the rest of the world remain negligible. The figure also shows that while beneficial for the CIS countries EU-CIS free

trade agreement does not seem to be beneficial neither for the EU nor for the rest of the world. The gains for CIS countries stem mainly not from the agreement itself but from increased substitution effect and especially from improved productivity.

6. Conclusions

In this paper, we have simulated the economic effects of eastern enlargement and EU-CIS free trade area. The main emphasis of the paper is in effects to CIS-countries. The simulations were carried out with GTAP computable general equilibrium model.

We distinguished between three variants of dealing with integration effects. The baseline integration scenarios (eastern enlargement or EU-CIS free trade area) cover only reductions in trade barriers. Then, as second stage, we assumed increased substitution between import goods and their domestic counterparts. The third pair of simulations assumed improved productivity in either new entrants (eastern enlargement) or new entrants and CIS-countries (EU-CIS free trade area).

The eastern enlargement scenarios confirmed the usual result that the incumbent EU countries gain very little but new entrants benefit substantially especially if we assume all the above mentioned integration effects. This would give some 4-5 per cent gain for the new entrants in terms of their GDP. It is worth noting, however, that part of this gain has already been materialized as a result of Europe Agreements. For CIS-countries we obtained both positive and negative effects but by adding them up the overall effect is positive. The same holds for the rest of the world.

The same cannot be concluded from the impact of EU-CIS free trade area. The baseline agreement decreases world welfare Finland and Germany being the only countries obtaining benefits. The additional elements, like enhanced substitution and improved productivity, of EU-CIS free trade area do not succeed in turning the agreement beneficial. If we do not consider enhanced substitution (or decreased market segmentation) EU-CIS free trade area is beneficial for CIS-countries, Finland and Germany but decreases economic welfare in most of the EU and the rest of the world. In sum, to be beneficial free trade between the EU and CIS countries requires improved productivity in the latter, which may be due to better institutions or increased FDI, but still the agreement is not beneficial for large parts of the EU. This makes its feasibility questionable.

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