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Modelling of small countries in economic integration processes: an extension of the Armington approach

by
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Abstract
The focus of this paper is a process of 'deep' economic integration. Economic integration is not merely a removal of trade barriers but also increased competition because goods become more homogeneous due to, for example, harmonization of standards.

To accommodate this 'deep' integration process we changed the preference structure for consumers in such a way that products from EU regions are considered as closer substitutes. The enlargement of the European Union in Eastern direction has therefore profound implications for Eastern European countries. Next to the reduction in trade barriers their commodities will become closer substitutes in the long run. The empirical analyses shows that the welfare gains for Eastern European countries of increased substitutability of their products with EU products are much larger than the welfare gains from removing the trade barriers.

A second focus of this paper is the magnitude of the terms of trade effects in an Armington world that are often considered as being excessive. An Armington world implies national product differentiation and implicitly monopoly power for all countries. The latter is also true for small countries. Unilateral Trade liberalization experiments in such a world have often a negative welfare impact due to these excessive terms of trade effects. By increasing the degree of competition within the EU Union the new preference structure reduces this problem. The total impact of the new structure is ambiguous

Trade liberalization experiments show that the values of the Armington elasticities in the new preference structure are crucial for production and welfare effects. In case of higher substitutability within the EU and lower between EU and non-EU products on EU markets, multilateral trade liberalization improves terms of trade for EU countries and deteriorates it for other countries. The opposite is true in case of increased competition 'only' within the EU market. In this paper we made some 'simple' assumptions about the values of the Armington parameters. A better estimation of these parameters is crucial if one performs policy analyses with this model.

1 Introduction

The focus of this paper is a process of ‘deep’ economic integration. Economic integration is not merely a removal of trade barriers but also increased competition because goods become more homogeneous.

Including Armington elasticities into a modeling framework implies specific national market power on international markets (BROWN, 1987). One resulting effect is that it coincides with non-zero optimal tariffs, even for small countries. By inducing substitution of consumption towards domestic produce, the tariff leads to a smaller export supply. Since export demand is somewhat inelastic under the Armington assumption, the decrease in supply results in a rise in export prices by the tariff imposing country. As a consequence, unilateral trade liberalization is, as a rule, not welfare improving under the Armington structure, and welfare effects tend to be dominated by terms of trade effects.
In an Armington world there are important differences between large and small countries. If a large country reduces a tariff it will affect its own terms of trade both by increasing world demand for the imported product and by increasing supply of the product to world markets. A small country in contrast, will only be able to increase its own supply to world markets, but it will not significantly affect world demand. As a consequence, under a tariff reduction its import prices will not rise after the tariff reduction, but its export prices will fall.

A reciprocal tariff reduction will always be the preferred option under the Armington structure. Even in the reciprocal case, small countries do not always gain at the expense of large countries. In fact, under the Armington structure, trade creation will reduce the welfare benefits from integration due to a displacement of domestic production and deteriorating terms of trade. (Brown, 1987). The size of the tariff cuts plays a decisive role in the determination of terms of trade effects.

Another aspect of the Armington approach becomes relevant while dealing with strongly integrated regions and their possible enlargements. Introducing equal Armington elasticites worldwide, like done in the GTAP model, assumes that any pair of the same good from two different sources shows the same substitutability. But, as Harrison et al (1996) argue harmonization of standards like in the European Union, and increased intra-EU trade after an accession contribute to increased substitutability. As consumers are more likely to try new varieties they sometimes like. In addition, the integration can be described as ‘deep’: Markets become increasingly integrated, and price differentials become smaller as buyers more easily substitute among the products from different member states. With this form of ‘deep’ integration, trade policy changes can be expected to yield effects that differ from the standard prescriptions derived from commonly used trade models.

With the availability of data for the 15 individual EU member states as well as different accession candidates in the version 5 database single intra-EU analysis and the simulation of Eastern enlargement can be improved. However, the standard two-level nested Armington structure may result in misleading results if applied uncritically.
This paper adresses the modelling of individual EU countries in GTAP. It proposes a revised import demand structure, which distinguishes intra-EU imports from imports sourced from non-EU countries. In so doing, the paper mainly addresses the aspect of deeper integration. The puzzling aspect of small country market power is still persistent in our modified structure, but it is less severe than under the standard approach.

2 Extension of the theoretical framework

2.1 New structure

Figure 1 and Figure 2 highlight the standard and modified import structure. The EU consumer first allocates his expenditures on any traded commodity between a domestic -EU composite good and imports from third countries. The 'domestic-EU' composite commodity consists of a CES aggregation of domestic production and aggregate imports from other EU countries. The aggregate EU imports into any member state are themselves a CES aggregate of imports from all other EU countries. By increasing the elasticity of substitution, ESUBDEU, between domestic goods and the EU aggregate, domestic consumers become more sensitive to price changes of intra-EU imports. Hence, a price decrease by any other EU country, and holding rest of world prices constant, will tend to lead a to larger shift towards intra-EU imports, and to a reduction of supply to EU markets. As a result, the country's terms of trade vis a vis other EU countries will tend to improve. Conversely, as goods from different EU sources become more perfect substitutes, i.e. an increase in the elasticity of substitution between goods from different EU sources, ESUBEU, the ability of the country to exercise market power on EU markets is reduced.

This structure permits modeling of intra-EU trade effects under varying degrees of *intra*-branch substitution in the import demand tree. In the limit, EU products are homogeneous. On the other hand, there is also the competition of EU products with non-EU products, or *inter*-branch substitution. In the new structure, the competition between EU and non-imports is governed by the elasticity ESUBD.

Figure 1: Standard GTAP structure

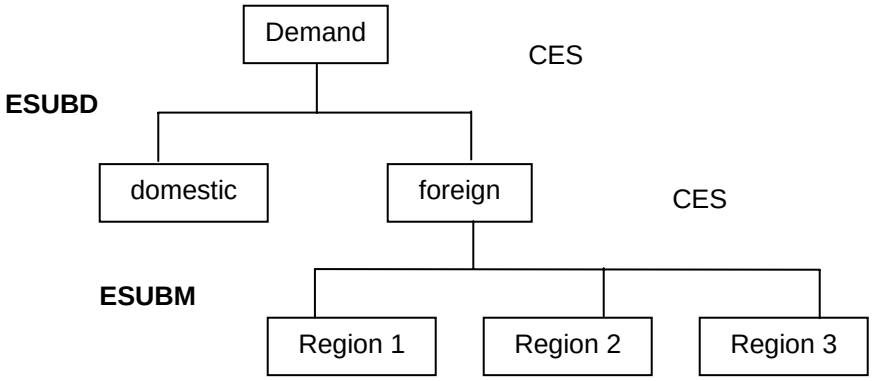
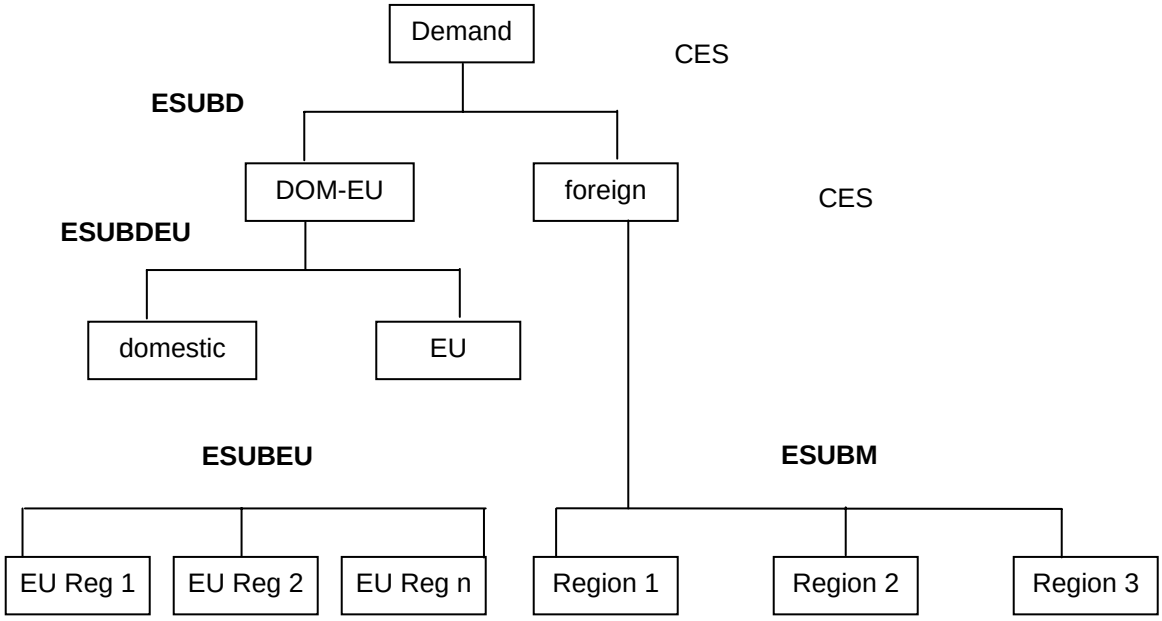


Figure 2: New GTAP structure for EU regions



2.2 Additional Data

Figure 2 introduces a variety of new price and quantity variables as well as two new parameters (ESUBEU and ESUBDEU).

3 Scenarios and results

3.1 Aggregation and Scenarios

a. PLIB scenario:
   import tariffs and export subsidies (tms, txs) for all products worldwide –50%

a. EU Enlargement: no trade barriers between old and new EU members, same border protection for all EU regions, introduction of quotas, no other changes in domestic policies, no transfer of direct payments

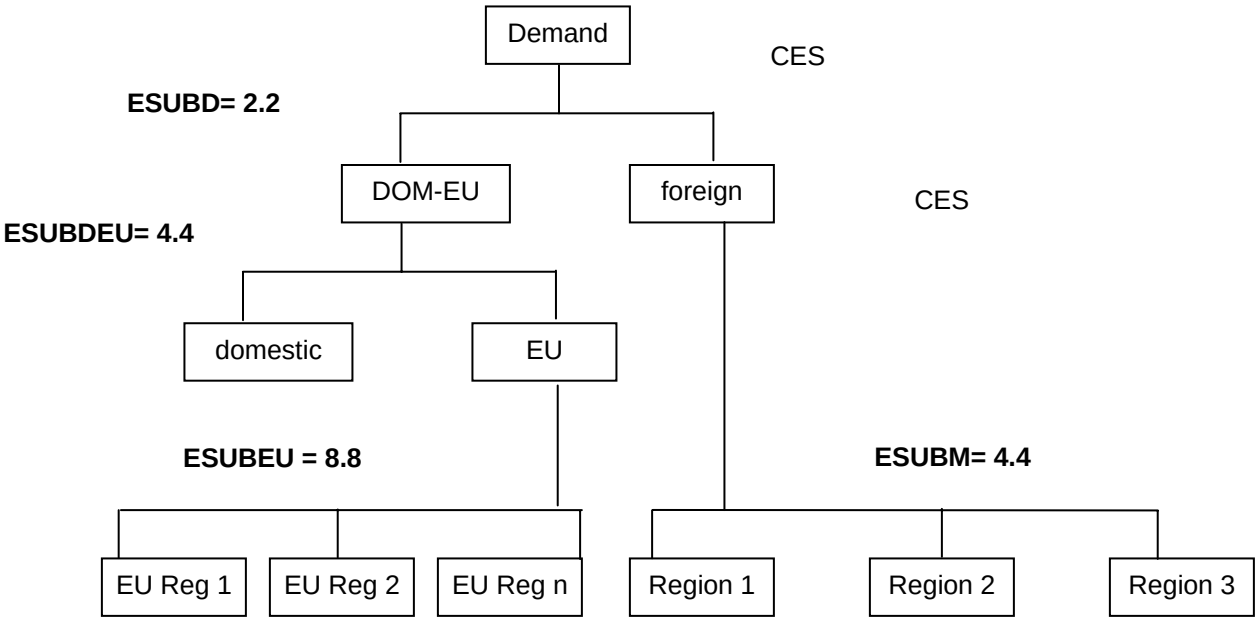
Table 1: Aggregation of GTAP Version 5

Products		**Regions**	
WHEAT	Wheat	NL	Netherlands
GRAINS	other grains	DEU	Germany
SUG	sugar plants	REU	Rest of the EU
OCR	other crops	RCEEC	Central and Eastern Europe Associates
RMK	raw milk	NAFTA	NAFTA
CATTLE	Cattle	ASIA	Asia
ANIM	Other animal products	ANZ	Australia, New Zealand
MEAT	Meat	ROW	Rest of the World
DAIRY	Dairy		
FOOD	other food products		
OTHIND	other industries		
SVCES	services		

3.2 Partial Liberalization

3.2.1 EU products become closer substitutes, while substitution with other regions declines.

Figure 3: New GTAP structure for EU regions*



* elasticities of substitution are commodity specific. As an example, the elasticities for wheat are given.

Figure 3 depicts the new demand tree that is used in this partial liberalization scenario. It also provides the values for the various elasticities of substitution, taking the example of wheat. For each lower nest we increased the elasticity of substitution with a factor two to avoid complementarity problems. The ESUBD and ESUBM values are equal to the standard GTAP values in all regions. To show that goods within the EU become more homogenous we increased the elasticity of substitution between products from the domestic country and other EU regions (ESUBDEU) and among non-domestic EU countries (ESUBEU).

Table 2: Partial liberalization: Output effects (in %)

Qo	NL		DEU		REU		RCEEC		NAFTA		ASIA		ANZ		ROW	
	Stand.	New	Stand.	New	Stand.	New	Stand.	New	Stand.	New	Stand.	New	Stand.	New	Stand.	New
WHEAT	-3.1	0	-3.9	-1.5	-3.4	-1.6	-3.4	-3.8	14.2	13.2	-7.2	-7.4	-1.3	-1.7	-4.3	-4.5
GRAINS	-10.2	-5.4	-4.2	-2.9	-5.7	-3.5	-0.9	-1.3	2.1	1.9	-2.9	-3	11.6	11.4	-0.3	-0.6
SUG	0	0	0	0	0	0	-2.5	-2.7	0.7	0.6	0	0	2.9	2.9	-0.1	-0.3
OCR	-1.5	-1.4	-0.7	-0.4	-0.6	-0.2	-2.8	-2.6	0	0	-1.9	-2	1.4	1.5	1	0.9
CATTLE	-8.4	-3.3	-1.5	-0.3	-1.8	-0.5	3.9	2	1.6	1.4	-2.2	-2.2	9.6	7.1	-1.8	-2.1
RMK	0	0	0	0	0	0	1.4	1.2	-0.3	-0.1	-1.1	-1.1	18.4	18.2	-1.3	-1.3
ANIM	-5.7	-2	-1.3	-0.1	-0.9	-0.1	-1.3	-1.9	0.6	0.6	0.1	0.1	4.2	2.7	-1.1	-1.3
MEAT	-10.1	-4.2	-3.8	-2.5	-1.7	-0.5	0.2	-1.4	1.1	1	-2.6	-2.7	14.2	9.9	-0.9	-1.6
DAIRY	0.3	0.1	0	0	0.2	0.1	3.7	3.3	-0.3	-0.2	-6.7	-6.6	20.3	20.3	-3.5	-3.3
FOOD	-0.1	2.4	-0.8	-0.5	-0.9	-0.1	-2.9	-3.2	0.7	0.6	-0.6	-0.7	3	2.9	0.2	-0.2
OTHIND	-1	-0.9	0.2	0.2	0	0	-0.7	-0.4	-0.1	-0.2	0.7	0.6	-2.4	-2.2	-0.6	-0.5
SVCES	0.4	0.2	0	0	0.1	0	0.7	0.7	0	0	0	0	0	0	0.3	0.3

The multilateral trade liberalization experiment shows the impact of this new demand structure. Tables 2 to 5 show the output, price and terms of trade impact of a multilateral 50% cut in import tariffs and export subsidies for all products with the standard GTAP model and the new model.

In the standard model production decreases for agricultural commodities for all EU regions (see table 2).[1] The decrease is highest for the Netherlands, a small open economy. Agricultural production decreases in all EU regions because the initial protection levels are relatively high in the EU. The decrease in the Netherlands is bigger for two reasons: First, the Netherlands is a very open economy with large exports and imports volumes relative to domestic absorption. Thus changes in exports and imports have a substantial impact on demand for domestic products. Second, it is also a small country in terms of its contribution to world trade. This implies relatively less market power. Because export demand is more elastic, the quantity adjustments in exports are relatively large, and confounded with rising imports this has an immediate downward impact on domestic production.
Table 3 shows that in the EU countries prices decline. This is due to cheaper imports and the decrease in production.

[1] For raw milk and sugar plants we included a production quota.

Table 3: Partial liberalization: Price effects (in %)

	NL		DEU		REU		RCEEC		NAFTA		ASIA		ANZ		ROW	
	Stand.	new	stand.	New	stand.	new	stand.	new	stand.	new	stand.	new	stand.	new	stand.	new
Land	-11.6	-5.8	-13.2	-7.2	-12.1	-6.2	-5.3	-7.7	16.2	14.5	-9	-9.4	24.6	21.1	-1.2	-2.2
UnSkLab	-0.3	0.6	-0.6	-0.2	-0.5	-0.1	3.4	2.7	-0.9	-1	1.6	1.5	0.9	0.6	0.2	-0.1
SkLab	-0.1	0.7	-0.6	-0.2	-0.4	-0.1	3.9	3.2	-0.9	-1	1.8	1.7	0.7	0.4	0.3	0
Capital	-0.1	0.7	-0.7	-0.2	-0.5	-0.1	3.7	3	-0.8	-1	1.8	1.6	0.7	0.4	0.2	-0.1
NatRes	-1.1	-0.2	-0.4	-0.1	-0.5	-0.1	3	2.5	-1	-1.1	2.3	2.1	-1.5	-1.5	-0.5	-0.6
WHEAT	-1.4	-0.3	-1.8	-1	-1.7	-0.9	-0.6	-1.5	3	2.6	-3	-3.2	2.7	2.1	-1	-1.4
GRAINS	-2.1	-1.2	-1.9	-1.1	-1.9	-1	-0.1	-1	1.5	1.2	-2.2	-2.4	4	3.4	-0.5	-0.9
SUG	-1.2	-0.3	-1.9	-1.1	-1.4	-0.7	-0.4	-1.3	2.3	1.9	-1.9	-2.2	4	3.4	-0.5	-0.8
OCR	-1.2	-0.3	-1.8	-1	-1.4	-0.7	-0.6	-1.4	1.5	1.2	-1.7	-1.9	3.2	2.6	-0.4	-0.7
CATTLE	-1.9	-0.4	-2.8	-1.1	-2	-0.7	0	-1	0.9	0.6	-4.1	-4.3	3.4	2.7	-0.8	-1.2
RMK	-1.4	-0.3	-2.2	-1	-1.7	-0.8	-0.6	-1.3	0.7	0.4	-2.5	-2.7	3.9	3.3	-0.8	-1.1
ANIM	-1.8	-0.8	-2.1	-1.2	-1.9	-1	-1	-1.8	0.4	0.1	-1.9	-2.1	2.7	2.1	-0.9	-1.2
MEAT	-1.6	-0.6	-1.9	-1	-1.6	-0.8	-0.5	-1.1	0	-0.2	-1.5	-1.6	1.9	1.4	-1.4	-1.7
DAIRY	-2.4	0.3	-3.8	-0.4	-2.5	0.2	0	-0.5	-0.3	-0.5	-2.6	-2.7	2.3	1.9	-1	-1.2
FOOD	-2.4	-1.3	-1.8	-0.9	-1.7	-1	-1	-1.4	-0.8	-1	-1.7	-1.8	0.8	0.5	-1.5	-1.8
OTHIND	-0.9	-0.5	-0.9	-0.5	-0.8	-0.5	-0.1	-0.4	-1	-1.1	0.3	0.2	0	-0.2	-1	-1.2
SVCES	-0.5	0.2	-0.7	-0.3	-0.6	-0.2	1.8	1.3	-0.9	-1	1.2	1	0.5	0.3	-0.3	-0.6

Table 4: Difference between 'new' and 'stand' versions, output and prices (percentage points)

	Change in output			Change in price		
	NL	DEU	REU	NL	DEU	REU
WHEAT	3.1	2.4	1.8	1.1	0.8	0.8
GRAINS	4.8	1.3	2.2	0.9	0.8	0.9
SUG	0	0	0	0.9	0.8	0.7
OCR	0.1	0.3	0.4	0.9	0.8	0.7
CATTLE	5.1	1.2	1.3	1.5	1.7	1.3
RMK	0	0	0	1.1	1.2	0.9
ANIM	3.7	1.2	0.8	1	0.9	0.9
MEAT	5.9	1.3	1.2	1	0.9	0.8
DAIRY	-0.2	0	-0.1	2.7	3.4	2.7
FOOD	2.5	0.3	0.8	1.1	0.9	0.7
OTHIND	0.1	0	0	0.4	0.4	0.3
SVCES	-0.2	0	-0.1	0.7	0.4	0.4

A comparison of results of the new model with those of the standard GTAP model gives the following observations:

- The agricultural output and prices decline less in all EU countries (see also table 4)

- The decline in output in the Netherlands is bigger than for the larger EU countries, while this is not the case for the price impact (see table 4).
- Output effects in all other countries are negative!
- Welfare impact is higher in EU countries and lower in non-EU countries: this is largely driven by terms of trade effects (see table 6).

These observations give rise to at least two puzzles:
PUZZLE 1: Why does output increase in all EU countries and decrease for all other countries?

PUZZLE 2: Quantity (exports/production) effects are smaller and terms of trade effects are larger: Normally, this is a result if one moves to a more imperfect market (substitutability decreases). However, in our case we increased the substitution within the EU market.

Tabel 5: Change welfare (equivalent variation, 1997 million USD)

	Terms of trade		Welfare	
	Standard model	New model	Standard model	New model
NL	-72	948	757	1677
DEU	-659	882	1077	2210
REU	1098	5017	7141	8683
RCEEC	1332	635	3735	2706
NAFTA	-1663	-2734	-122	-1291
ASIA	6007	4445	25451	23952
ANZ	559	312	601	362
ROW	-6658	-9571	8766	4843
Total	-55	-66	47406	43142

A combination of the changes in the nested demand structure and some specific features of the experiment can explain both puzzles. Figure 3 shows that we increase the substitution parameters within the EU nest. However, by keeping ESUBD at the same level (2.2) the elasticity of substitution that non-EU countries face in competition with other (i.e. non domestic) EU regions in any EU region becomes smaller than in the standard model. In the standard model the other regions compete with EU regions (other than the home country) at ESUBM of 4.4. Now they compete with these countries at a substitution parameter of 2.2 (ESUBD). In the case of a trade liberalisation experiment where import prices decrease due to lower tariffs, the market share gain of non-EU countries is reduced due to the lower substitutability. On the other side EU countries loose less market share, because EU buyers are less price sensitive to non-EU varieties. This explains the first puzzle. All non-EU countries therefore gain less

additional trade with the EU from their lower tariffs. As a consequence, the output drop in all EU countries is dampened in comparison with the standard structure.

So the new demand structure implies that within EU substitution increases (first characteristic) and EU-non EU substitution decreases on the EU market (second characteristic). The second puzzle indicates that the first characteristic dominates the second one. The impact due to the second characteristic is low due to our specific experiment: prices changes within the EU move in the same direction because tariffs within the EU are zero and there is a common import tariff on the borders (price changes are given in table 3). Therefore, changes in import prices are quite similar in all EU countries and substitution effects are very small despite of the increase in the degree of competition. On the other side the first characteristic has larger effects because prices between EU countries and non–EU countries are large due to the large decrease in tariffs on the EU market. If one adds up both effects we can explain the second puzzle.

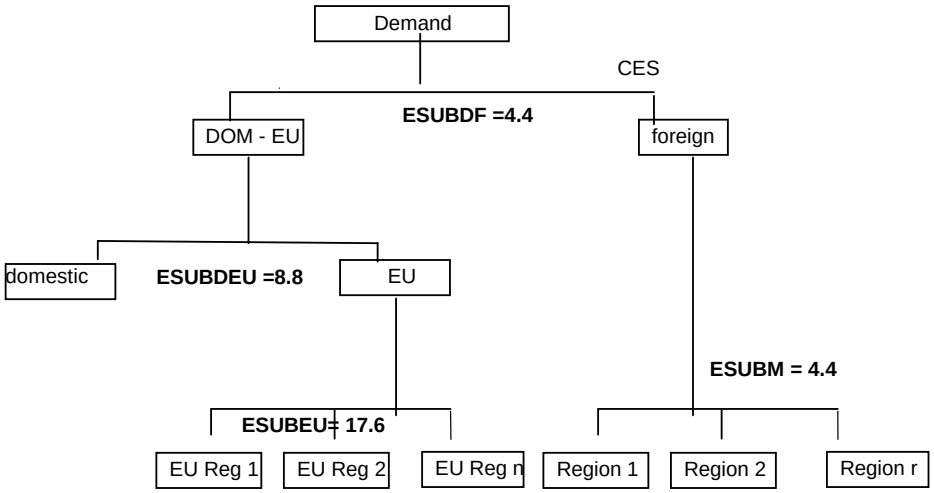
The second observation - that the decline in output in the Netherlands is bigger than for the larger EU countries, while this is not the case for the price impact (see table 4) - can be explained by the small open economy characteristic in combination with the more imperfect non-EU goods. The latter implies that all non-EU countries gain less in terms of exports to the EU due to lower tariffs. A country that is very open (i.e. large export and import shares) gains most from this change.

3.2.2 EU products become closer substitutes

In this section like in the last we assume that due to economic integration EU products on EU markets become more homogenous, but now the degree of product differentiation between EU and non-EU products on EU markets is more or less as in the standard model. The latter can only be achieved by making ESUBD EU specific within the new nested EU demand structure. The changed demand structure is given in figure 4. We replaced ESUBD by ESUBDF and give it the same value as ESUBM. Such that imports compete with EU non domestic commodities still at an elasticity of substitution on 4.4.[2] To avoid complementarity problems we increased the value of the Armington elasticities with a factor two at each lower nest. This implies that relative to the demand structure in section 3.2.1 we increased the degree of substitution within the EU.

[2] However, this implies that the elasticity of substitution between non EU goods and the domestic good increases from 2.2 (ESUBD) to 4.4.

Figure 4: New GTAP structure for EU regions*



* *elasticities of substitution are commodity specific. As an example, the elasticities for wheat are given to show the ratio's between the various elasticities.*

We analyzed the same multilateral trade liberalization experiment, as in section 3.2.1, to study the impact of the change in Armington elastcities. Table 6 to 8 show the output, price and welfare impact of a multilateral 50% cut in import tariffs and export subsidies for all products. Again we compare the results with the standard GTAP model. The results with the standard GTAP model are explained in section 3.2.1.

Table 6: Partial liberalization: Output effects (in %)

	NL		DEU		REU		RCEEC		NAFTA		ASIA		ANZ		ROW	
	Stand	New	Stand	New	Stand	New	Stand	New	Stand	New	Stand	New	Stand	New	Stand	New
WHEAT	-3.1	-3.1	-3.9	-4.1	-3.4	-4.6	-3.4	-3.3	14.2	14.0	-7.2	-7.4	-1.3	-1.2	-4.3	-4.3
GRAINS	-10.2	-10.1	-4.2	-6.2	-5.7	-6.9	-0.9	-0.7	2.1	2.2	-2.9	-2.8	11.6	11.3	-0.3	-0.1
SUG	0	0.0	0	0.0	0	0.0	-2.5	-2.3	0.7	0.7	0	0.0	2.9	3.0	-0.1	0.1
OCR	-1.5	-2.9	-0.7	-0.1	-0.6	-0.8	-2.8	-2.8	0	0.0	-1.9	-1.9	1.4	1.4	1	1.0
CATTLE	-8.4	-8.0	-1.5	-2.7	-1.8	-2.5	3.9	4.5	1.6	1.6	-2.2	-2.2	9.6	10.5	-1.8	-1.6
RMK	0	0.0	0	0.0	0	0.0	1.4	1.5	-0.3	-0.3	-1.1	-1.1	18.4	17.2	-1.3	-1.2
ANIM	-5.7	-5.5	-1.3	-2.7	-0.9	-1.2	-1.3	-1.0	0.6	0.7	0.1	0.1	4.2	4.8	-1.1	-1.1
MEAT	-10.1	-8.8	-3.8	-6.0	-1.7	-2.4	0.2	0.9	1.1	1.2	-2.6	-2.6	14.2	15.3	-0.9	-0.6
DAIRY	0.3	0.3	0	0.0	0.2	0.3	3.7	3.7	-0.3	-0.4	-6.7	-6.9	20.3	18.9	-3.5	-3.7
FOOD	-0.1	3.8	-0.8	-2.1	-0.9	-1.7	-2.9	-2.7	0.7	0.8	-0.6	-0.6	3	3.1	0.2	0.5
OTHIND	-1	-1.1	0.2	0.2	0	0.0	-0.7	-0.8	-0.1	-0.1	0.7	0.7	-2.4	-2.5	-0.6	-0.7
SVCES	0.4	0.3	0	0.1	0.1	0.2	0.7	0.7	0	0.0	0	0.0	0	0.0	0.3	0.3

The new demand structure, as described in figure 4, implies that the level of substitution between EU products increases even more, but that the degree of substitution between EU and non-EU products stays more or less as in the standard model. The impact of these changes can be obtained by a comparison of the results in tables 2 to 5 with the results in tables 6-8. A general conclusion of this comparison is that the results are very different and that the results from this section are much closer to the results of the GTAP standard model. This result is in line with a common finding that elasticities of substitution matter a lot in trade analyses. Other, more specific, observations are:

In general agricultural output (grains, cattle, other animal products and meat) declines less in the Netherlands, a small open EU country, and declines more in the bigger EU countries (compare results in table 6-8 of standard with new model). As a result the impact on output is more equal within the EU region.

Terms of trade effects decrease for all EU countries in this section (table 8) while they improve for all EU countries in table 5. The opposite is true for all non-EU countries.

Table 7: Partial liberalization: Price effects (in %)

	NL		DEU		REU		RCEEC		NAFTA		ASIA		ANZ		ROW	
	Stand.	New	stand.	new	Stand.	new	Stand.	new	Stand.	new	Stand.	new	Stand.	new	Stand.	new
Land	-11.6	-14.8	-13	-16.9	-12	-15.8	-5.3	-4.3	16.2	16.1	-9	-9.1	24.6	24.2	-1.2	-0.6
UnSkLab	-0.3	-0.3	-0.6	-0.7	-0.5	-0.7	3.4	3.6	-0.9	-0.8	1.6	1.7	0.9	1.0	0.2	0.3
SkLab	-0.1	-0.1	-0.6	-0.7	-0.4	-0.6	3.9	4.1	-0.9	-0.9	1.8	1.8	0.7	0.7	0.3	0.4
Capital	-0.1	-0.1	-0.7	-0.8	-0.5	-0.6	3.7	3.9	-0.8	-0.8	1.8	1.8	0.7	0.7	0.2	0.3
NatRes	-1.1	-1.2	-0.4	-0.6	-0.5	-0.7	3	3.1	-1	-0.9	2.3	2.4	-1.5	-1.5	-0.5	-0.4
WHEAT	-1.4	-1.5	-1.8	-2.1	-1.7	-2.1	-0.6	-0.3	3	3.2	-3	-3.0	2.7	2.9	-1	-0.9
GRAINS	-2.1	-2.2	-1.9	-2.2	-1.9	-2.3	-0.1	0.3	1.5	1.6	-2.2	-2.1	4	4.2	-0.5	-0.4
SUG	-1.2	-1.3	-1.9	-2.2	-1.4	-1.7	-0.4	-0.1	2.3	2.5	-1.9	-1.9	4	4.3	-0.5	-0.3
OCR	-1.2	-1.4	-1.8	-2.0	-1.4	-1.8	-0.6	-0.2	1.5	1.7	-1.7	-1.6	3.2	3.4	-0.4	-0.2
CATTLE	-1.9	-2.1	-2.8	-3.1	-2	-2.5	0	0.3	0.9	1.0	-4.1	-4.0	3.4	3.7	-0.8	-0.6
RMK	-1.4	-1.6	-2.2	-2.5	-1.7	-2.1	-0.6	-0.3	0.7	0.8	-2.5	-2.4	3.9	4.0	-0.8	-0.6
ANIM	-1.8	-1.9	-2.1	-2.4	-1.9	-2.3	-1	-0.6	0.4	0.4	-1.9	-1.8	2.7	2.9	-0.9	-0.7
MEAT	-1.6	-1.7	-1.9	-2.1	-1.6	-1.9	-0.5	-0.2	0	0.1	-1.5	-1.4	1.9	2.1	-1.4	-1.3
DAIRY	-2.4	-3.0	-3.8	-3.5	-2.5	-3.1	0	0.3	-0.3	-0.3	-2.6	-2.6	2.3	2.4	-1	-0.9
FOOD	-2.4	-2.6	-1.8	-1.9	-1.7	-2.0	-1	-0.8	-0.8	-0.8	-1.7	-1.6	0.8	0.9	-1.5	-1.5
OTHIND	-0.9	-0.9	-0.9	-1.0	-0.8	-0.9	-0.1	0.0	-1	-1.0	0.3	0.3	0	0.1	-1	-0.9
SVCES	-0.5	-0.5	-0.7	-0.8	-0.6	-0.7	1.8	2.0	-0.9	-0.9	1.2	1.2	0.5	0.6	-0.3	-0.2

Table 8: Change welfare (equivalent variation, 1997 million USD)

	Terms of trade		Welfare	
	Standard model	New model	Standard model	New model
NL	-72	-89	757	1016
DEU	-659	-953	1077	1085
REU	1098	-521	7141	5990
RCEEC	1332	1556	3735	4065
NAFTA	-1663	-1407	-122	141
ASIA	6007	6404	25451	25855
ANZ	559	645	601	683
ROW	-6658	-5692	8766	10094
Total	-55	-89	47406	1016

3.3 Eastern Enlargement of the European Union

In this section we analyze a process of 'deep' economic integration following an accession to the EU. Next to a removal of trade barriers goods become more homogeneous between member countries. Whereas the standard GTAP model is capable to analyze the impact of removing trade barriers the new preference structure is suited to also accommodate the increased homogeneity impact. Economic integration means that a country moves from being a non-member state to a member state. In terms of figure 4 it moves from the foreign branch in the demand tree (right hand side) to the domestic EU branch (left hand side).

In our EU enlargement scenario the CEEC countries move from the foreign nest to the EU nest, because due to harmonization and standardization products of old and new member states become more homogeneous. In tables 9-11 we show the impact of a simple enlargement scenario with the standard model (where only trade barriers are removed), and, the new model (where in addition CEEC goods become closer substitutes with EU goods).

The results with the standard model show the expected result that due to the removal of trade barriers the CEEC countries increase their welfare.

The new model shows that welfare gains for CEECs are much higher if the increased homogeneity is taken into account. It is shown that welfare gains for CEECs due to increased substitutability of their products with EU products are much larger (19688 million USD) than the welfare gains from removing the trade barriers (6185 million USD).

Table 9: Enlargement: Output effects (in %)

qo	NL		DEU		REU		CEEC		NAFTA		ASIA		ANZ		ROW	
	Stand.	DF	stand.	DF	stand.	DF	stand.	DF	stand.	DF	stand.	DF	stand.	DF	stand.	DF
WHEAT	-1	-15.7	0.9	0.7	-0.2	-9.6	0.5	31.4	-0.2	-0.6	0	-0.1	-0.2	0	-0.1	-0.2
GRAINS	-1.9	-13.7	-0.7	-6	-0.5	-6.1	7.2	33.9	-0.1	-0.3	0	0	-0.1	-0.1	-0.2	-0.2
SUG	0	0	0	0	0	0	0	0	0	0	0	0.2	0	0	0	0.2
OCR	0.7	1.9	0.3	-0.6	0.5	3.3	-4.5	-22.5	0	-0.1	0	-0.1	0	-0.1	0	-0.2
CATTLE	-2.3	-16.2	-0.5	24.2	-1.4	-13	12.7	25.1	-0.1	-0.2	0	-0.2	-0.2	-0.8	-0.1	-0.3
RMK	0	0	0	0	0	0	0	0	-0.1	-0.5	0	-0.2	-0.7	-4.6	-0.1	-0.8
ANIM	-0.3	0.1	0.9	4.2	0.1	-3.1	0	12.2	-0.1	-0.1	0	-0.1	-0.1	-1	-0.1	-0.4
MEAT	-1.8	-20.6	-0.7	-11	-0.3	-10	6.1	105	0	-0.1	0	-0.2	-0.4	-0.9	-0.1	-0.3
DAIRY	0.1	0.5	-0.1	-5	0.1	-0.2	2	16.2	-0.1	-0.6	-0.1	-0.8	-0.8	-5.2	-0.3	-2.2
FOOD	0.6	0.2	0.1	-4.4	0.2	-4.2	-1.7	26.9	0	0	0	0	0	0	-0.1	-0.1
OTHIND	-0.1	-0.9	0.1	0.5	0.1	0.5	-1	-7.3	0	0	0	0	0.1	0.2	0	0
SVCES	0	0.3	0	0.1	0	0.2	0.6	-0.3	0	0	0	0	0	0	0	0.1

Table 10: Enlargement: Price effects (in %)

ps	NL		DEU		REU		CEEC		NAFTA		ASIA		ANZ		ROW	
	Stand.	DF	stand.	DF	stand.	DF	stand.	DF	stand.	DF	stand.	DF	stand.	DF	stand.	DF
Land	0.1	-10.6	0.7	-2.6	-0.3	-16	7.2	19.7	-0.6	-1.5	-0.3	-0.5	-0.8	-3.2	-0.5	-1.6
UnSkLab	0.2	0.1	0.4	0.3	0.1	0	8.6	11.3	-0.2	-0.1	-0.2	-0.1	-0.2	-0.3	-0.3	-0.2
SkLab	0.2	0.2	0.4	0.3	0.1	0.2	9	11	-0.2	-0.1	-0.2	-0.1	-0.2	-0.3	-0.3	-0.1
Capital	0.2	0.2	0.4	0.1	0.1	0	8.8	11.5	-0.2	-0.1	-0.2	-0.1	-0.2	-0.3	-0.3	-0.2
NatRes	0.1	-0.6	0.5	0.7	0.2	0.5	7.7	3.9	-0.2	-0.1	-0.2	-0.2	-0.1	-0.1	-0.2	-0.2
WHEAT	0.1	-1.4	0.3	0	0	-1.6	6	15.3	-0.2	-0.4	-0.2	-0.2	-0.3	-0.6	-0.3	-0.3
GRAINS	0	-1	0.2	-0.4	0	-1.3	6.8	15.2	-0.2	-0.3	-0.2	-0.2	-0.3	-0.6	-0.3	-0.4
SUG	0.1	-0.5	0.3	-0.1	0.1	-0.9	5.7	19.2	-0.2	-0.4	-0.2	-0.2	-0.3	-0.7	-0.3	-0.3
OCR	0.2	-0.4	0.3	-0.1	0.1	-0.8	4.5	3.4	-0.2	-0.3	-0.2	-0.2	-0.3	-0.6	-0.3	-0.4
CATTLE	-0.1	-2.1	-0.3	-1.1	-0.4	-3.6	8.1	13	-0.2	-0.3	-0.2	-0.3	-0.3	-0.6	-0.3	-0.4
RMK	0.1	-0.9	0.2	-0.8	-0.1	-1.7	5.6	8.1	-0.2	-0.3	-0.2	-0.3	-0.3	-0.8	-0.3	-0.5
ANIM	0.1	-0.6	0.2	-0.6	-0.1	-1.4	5.5	9.3	-0.2	-0.3	-0.2	-0.2	-0.2	-0.6	-0.3	-0.4
MEAT	0.1	-0.8	0	-0.8	-0.2	-1.6	4.4	4	-0.2	-0.2	-0.2	-0.2	-0.2	-0.4	-0.3	-0.3
DAIRY	-1.6	-9	-1.2	-7.3	-1.4	-8.6	18.8	29.4	-0.2	-0.2	-0.2	-0.4	-0.2	-0.6	-0.3	-0.4
FOOD	0.1	-0.8	0.4	0.1	0	0	1.9	3.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.3	-0.2	-0.2
OTHIND	0.1	0	0.2	0.1	0.1	0	1.9	2.2	-0.1	-0.1	-0.2	-0.1	-0.2	-0.2	-0.2	-0.1
SVCES	0.2	0.1	0.3	0.1	0.1	0	5.6	6.9	-0.2	-0.1	-0.2	-0.1	-0.2	-0.3	-0.2	-0.1

Tabel 11: Change welfare (equivalent variation, 1997 million USD)

	Terms of trade		Welfare	
	Standard model	New model	Standard model	New model
NL	99	-640	223	126
DEU	803	-618	1311	2389
REU	216	-2531	947	5043
CEEC	2946	6050	6185	19688
NAFTA	-793	-583	-1077	-781
ASIA	-1373	-695	-1612	-976
ANZ	-110	-197	-129	-208
ROW	-1833	-879	-2514	-830
Total	99	-640	223	126

4 Conclusions

The focus of this paper is a process of 'deep' economic integration. Economic integration is not merely a removal of trade barriers but also increased competition because goods become more homogeneous due to, for example, harmonization of standards.

To accommodate this 'deep' integration process we changed the preference structure for consumers in such a way that products from EU regions are considered as closer substitutes. The enlargement of the European Union in Eastern direction has therefore profound implications for Eastern European countries. Next to the reduction in trade barriers their commodities will become closer substitutes in the long run. The empirical analyses in section 3.3 shows that the welfare gains for Eastern European countries of increased substitutability of their products with EU products are much larger than the welfare gains from removing the trade barriers.

A second focus of this paper is the magnitude of the terms of trade effects in an Armington world that are often considered as being excessive (see, Hertel, et al. 1997). An Armington world implies national product differentiation and implicitly monopoly power for all countries. The latter is also true for small countries. Unilateral Trade liberalization experiments in such a world have often a negative welfare impact due to these excessive terms of trade effects. By increasing the degree of competition within the EU Union the new preference structure reduces this problem. The total impact of the new structure is ambiguous

Trade liberalization experiments in section 3.2 show that the values of the Armington elasticities in the new preference structure are crucial for production and welfare effects.

In case of higher substitutability within the EU and lower between EU and non-EU products on EU markets, multilateral trade liberalization improves terms of trade for EU countries and deteriorates it for other countries. The opposite is true in case of increased competition 'only' within the EU market. In this paper we made some 'simple' assumptions about the values of the Armington parameters. A better estimation of these parameters is crucial if one performs policy analyses with this model.

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6 APPENDIX

Regions	
NL	nld
DEU	deu
REU	aut bel dnk fin fra gbr grc irl ita lux prt esp swe
RCEEC	hun pol xce
NAFTA	can usa mex
ASIA	chn hkg jpn kor twn idn mys phl sgp tha vnm bgd ind lka xsa
ANZ	aus nzl
ROW	xcm col per ven xap arg bra chl ury xsm che xef xsu tur xme mar xnf bwa xsc mwi moz tza zmb zwe xsf uga xss xrw

Products	
WHEAT	wht
GRAINS	pdr gro

SUG	c_b
OCR	v_f osd ocr
CATTLE	ctl
RMK	rmk
ANIM	oap
MEAT	cmt omt
DAIRY	mil
FOOD	vol pcr sgr ofd b_t
OTHIND	pfb wol for fsh col oil gas omn tex wap lea lum ppp p_c crp nmm i_s nfm fmp mvh otn ele ome omf
SVCES	ely gdt wtr cns trd otp wtp atp cmn ofi isr obs ros osg dwe