

**THE EFFECTS OF FOREIGN TRADE LIBERALIZATION  
AND FINANCIAL FLOWS BETWEEN SLOVENIA AND  
EU AFTER THE ACCESSION**

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# THE EFFECTS OF FOREIGN TRADE LIBERALIZATION AND FINANCIAL FLOWS BETWEEN SLOVENIA AND EU AFTER THE ACCESSION

## 1. INTRODUCTION

On 13. of December 2002 Slovenia has, with the other nine candidate countries, successfully concluded accession negotiations with the EU. Results obtained on the financial issues for the period 2004-2006 point out to the following official conclusions: a) stated aims were fulfilled for the agriculture sector (possibility for direct payments from own budget; the same level of direct payments from the year 2007 on; production quotas are not below the level of current production; financial very attractive solution for the rural development, b) for the regional policy and structural funds Slovenia will get 404 millions of EUR; there is also a possibility for the further regionalization on the NUTS-2 level c) EU will partially cover the costs (45% - 107 millions EUR) for the construction and maintenance of the Schengen border, d) regarding the transfers and the net budget position Slovenia succeeded to raise budgetary compensation from 45 millions EUR in the year 2003 to 85 millions of EUR for each year with the 2004-2006 period, e) Slovenian net budgetary position will be a positive one and Slovenia will have also quite favourable position (retain its positive net budgetary position) in the period of the next financial perspective 2007-1013.

These conclusions should in fact demonstrate that for the financial part of negotiations Slovenia succeeded to achieve the best combination in order to fulfill two aims: a) agreement with EU should enable the continuation of the process of real convergence, and b) the agreement should not worsen budgetary position and thus provide difficulties with the fiscal part of Maastricht criteria.

But, are all these very favourable official conclusions reflecting reality? Were all effects of financial package taken into account and all the transfers between both budgets estimated correctly? Are there any other financial flows connected with the accession?

Within the paper we will try to answer to the above questions with the analysis of the continued foreign trade liberalization process, the official transfers between both budgets and some additional financial flows and effects on domestic budget. Namely, one should take into account decreased budget revenues due to the complete liberalisation of trade with the EU and candidate countries as well as the decreased efficiency of value added tax collection. And, on the other hand, there will be additional transfers to the EU institutions and increased costs due to the preparation of Schengen border with Croatia. A partial equilibrium analysis will be then complemented by the general equilibrium simulation results in order to estimate the more complex mutual effects at the aggregate and sectoral levels. The static CGE model used (Majcen and Buehrer, 2001) is broadly based upon the model used in Buehrer (1994) augmented with data from the 1998 SAM and parameters from the GTAP model (Hertel, 1997). The basic structure is similar to that used in many CGE models of developing countries, e.g. Devarajan, Lewis and Robinson (1991), in previous models of Yugoslavia, Labus (1990), and in models of transition economies, Silver and Tesche (1992).<sup>1</sup>

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<sup>1</sup> *Detailed description and complete equation specification of the model is presented in the Appendix.*

The outline of the paper is as follows. In Section 2 the process of further foreign trade liberalization is presented together with the calculation of the average rates of collected import duties in the period 1998-2001 and after the accession into the EU. In Section 3 the Slovenian net budgetary position is analyzed and in section 4 some of the simulation results are presented. Final Section summarizes the basic findings of the study and sets out some implications for further work.

## **2. FOREIGN TRADE LIBERALIZATION IN THE PROCESS OF INCLUSION OF THE R OF SLOVENIA INTO THE EU**

In this section estimation of the levels and changes of the rates of import duties due to continued foreign trade liberalisation process after the year 1998 which in fact cover: a) full implementation of Free Trade Agreements (in the year 2001), b) the process of gradual adjusting of Slovenian Customs Tariff to the EU Common External Tariff for manufacturing products, c) complete liberalization of trade with EU and candidate countries after the accession, and d) adoption of EU Common Customs Tariff and trade regime after the accession into the EU.

The results obtained certainly show quickly continued process of foreign trade liberalisation with the adoption of new customs system, the entrance into the GATT/WTO, signment of several FTAs and particular of the Europe Agreement. High orientation of Slovenian economy towards foreign markets is revealed also in the low paid tariff rates for the imports from the third countries (Table 1). Full implementation of almost all agreements was finished in the year 2001.

Analysis of the average rates of collected import duties in the year 2001 shows very low figures on the aggregate level (1,2%), as well as on the level of imports from the EU-15 (0,7%), candidate countries (1,2%) and third countries (2,5%). Outstanding results were found for the agricultural products - in case of Europe and other FTA agreements they reveal the fact that these products are subject of concessions only to the some extent. And these are products for which we can expect the greatest trade diversion/creation effects after the inclusion of Slovenia into the EU.<sup>2</sup>

Theoretically, Europe and almost all other FTA should be fully implemented with the beginning of the year 2001. Nevertheless, more than 11 bill. SIT were collected on the imports from the EU countries. The main reason can be found in the imports of agricultural products that contribute 8,8 bill. SIT of import duties (see Table 2). Very interesting is also the group of products from other sectors that were imported without the use of preferential treatment within the Europe Agreement – for these products importers paid more than 2 bill. SIT of import duties. Obviously it was simpler (or even cheaper) to pay tariff according to the official Customs tariff than to use preferential treatment.

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<sup>2</sup> *Lower average rates of import duties for the import from the third countries are primarily the outcome of the different structure of imports of agricultural products.*

**Table 1: Average rates of collected import duties on Slovenian imports from different groups of countries for the years 1998 and 2001**

SECTOR	1998				2001				CHANGE (%)			
	Total	EU15	'Laeken' group	The rest of The World	Total	EU15	'Laeken' group	The rest of The World	Total	EU15	'Laeken' group	The rest of The World
A	6,20	10,02	7,80	2,18	3,93	6,52	2,84	2,00	-36,5	-35,0	-63,6	-8,3
B	3,01	2,28	11,85	3,73	2,21	2,16	0,96	2,39	-26,4	-5,2	-91,9	-35,8
CA	0,00	0,00	0,00	0,00	0,24	0,01	0,01	0,26	-	-	-	-
CB	0,34	0,28	0,06	0,44	0,28	0,04	0,05	0,50	-17,5	-86,0	-20,2	12,8
DA	12,61	14,55	13,60	8,97	10,36	11,75	10,56	7,65	-17,9	-19,2	-22,4	-14,7
DB	2,43	1,41	0,83	7,36	1,46	0,07	0,50	6,57	-39,9	-95,0	-39,4	-10,7
DC	5,16	2,73	0,73	12,22	2,35	0,14	0,22	11,10	-54,4	-94,7	-69,4	-9,2
DD	0,77	0,88	0,29	0,69	0,33	0,14	0,16	0,81	-57,0	-83,7	-44,5	16,5
DE	1,80	1,92	0,40	1,96	0,26	0,11	0,03	1,06	-85,5	-94,1	-91,4	-45,7
DF	2,41	2,32	0,11	2,88	0,02	0,01	0,03	0,03	-99,3	-99,8	-71,2	-99,0
DG	1,08	1,13	0,12	1,26	0,30	0,14	0,04	0,91	-72,4	-87,6	-70,1	-27,9
DH	2,60	2,34	0,18	6,08	0,65	0,16	0,15	4,07	-75,0	-93,2	-17,2	-33,2
DI	1,93	2,03	0,30	2,39	0,31	0,08	0,16	1,40	-84,1	-96,2	-46,9	-41,2
DJ	0,99	1,11	0,06	1,40	0,25	0,08	0,05	0,85	-74,8	-92,6	-14,4	-39,0
DK	1,77	1,51	0,28	3,34	0,63	0,16	0,35	3,29	-64,3	-89,2	25,4	-1,7
DL	1,80	1,13	0,55	3,25	0,72	0,20	0,27	1,73	-60,3	-81,9	-49,8	-46,7
DM	3,33	2,56	0,66	7,83	0,64	0,13	0,08	5,71	-80,8	-95,1	-87,1	-27,1
DN	2,95	1,40	0,54	9,76	2,43	0,40	0,42	9,19	-17,8	-71,0	-21,3	-5,9
E	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	-	-	-	-
<b>Total</b>	<b>2,68</b>	<b>2,35</b>	<b>1,79</b>	<b>3,88</b>	<b>1,15</b>	<b>0,68</b>	<b>1,15</b>	<b>2,50</b>	<b>-56,9</b>	<b>-71,1</b>	<b>-35,8</b>	<b>-35,4</b>

Source: SORS – import customs declarations for the years 1998 and 2001

**Table 2: The structure of imports from EU15 according to the implementation of Europe Agreement in the year 2001**

SECTOR	TOTAL		Preferential trade agreement		Other preferential quotas		Non-preferential imports	
	Imports (mio SIT)	Import duties %	Share in imports %	Import duties %	Share in imports %	Import duties %	Share in imports %	Import duties %
A	26.034	6,5	36,2	0,0	19,8	4,2	44,0	12,9
B	782	2,2	0,1	0,0	1,7	2,0	98,1	2,2
CA	2.504	0,0	9,5	0,0	71,8	0,0	18,6	0,1
CB	5.446	0,0	41,7	0,0	0,1	0,4	58,2	0,1
DA	63.908	11,8	0,0	0,0	14,3	2,3	85,7	13,3
DB	123.242	0,1	54,6	0,0	24,8	0,0	20,5	0,3
DC	40.175	0,1	47,9	0,0	23,0	0,0	29,1	0,5
DD	18.390	0,1	75,7	0,0	13,7	0,0	10,7	1,3
DE	65.172	0,1	66,4	0,0	7,6	0,0	26,0	0,4
DF	74.176	0,0	79,2	0,0	2,3	0,0	18,6	0,0
DG	206.609	0,1	66,7	0,0	25,1	0,0	8,3	1,7
DH	71.726	0,2	89,5	0,0	6,4	0,1	4,1	3,7
DI	43.815	0,1	91,0	0,0	7,2	0,0	1,8	4,2
DJ	209.676	0,1	75,9	0,0	17,9	0,0	6,2	1,3
DK	203.726	0,2	74,3	0,0	20,0	0,0	5,7	2,8
DL	194.678	0,2	53,2	0,0	14,1	0,1	32,7	0,6
DM	277.140	0,1	64,2	0,0	32,4	0,0	3,4	3,5
DN	34.827	0,4	92,0	0,0	0,9	0,5	7,1	5,7
E	4.010	0,0	0,0	0,0	0,0	0,0	100,0	0,0
<b>Total</b>	<b>1.666.036</b>	<b>0,7</b>	<b>64,8</b>	<b>0,0</b>	<b>19,2</b>	<b>0,2</b>	<b>15,9</b>	<b>4,1</b>
<b>Import duties/structure</b>	<b>11.324</b>	<b>100,0</b>	<b>1</b>	<b>0,0</b>	<b>487</b>	<b>4,3</b>	<b>10.836</b>	<b>95,7</b>

Source: SORS – customs declarations for the 2001, own calculations

For the estimation of import duties after the inclusion of Slovenia into the EU, we used the following assumptions/steps:

- a) We used official tariff rates of the EU Common External Tariff, applicable for the year 2001. Using the values of imports from the third countries in the year 2000 (the last complete year available from the COMEXT data base at the moment of calculations) we calculated the average official tariff rates and average ad-valorem levies. Specific tariffs and levies to be paid on the unit of particular product were transformed into the ad-valorem equivalents with the use of data on the net weight and the value of imports from third countries. The most problematic items have been certainly products with seasonal duties or levies based on the content of starch, milk fat, sugar or alcohol – for these items we used some average values of the content and relevant levies. According to the relevance of these items in the Slovenian imports, the possible mistake made using the above assumptions regarding the content will not be of great importance. Namely, these items represented only 1,2% of the total Slovenian imports from the 'Rest of the World' in the year 2001 and their share in the estimated import duties were less than 2%.
- b) We further assumed that estimated rates would not change in the analyzed period 2001-2006.
- c) In the next step the average share of the collected import duties (source was EU budget for the year 2000) into the estimated official import duties were calculated -

unfortunately, because of the lack of data, only for the two groups of products (agricultural and other industries products). With these two shares we tried to estimate the final outcome of the complicated system of EU foreign trade regime. Results show that EU on average collected only 49% of import duties if the official rates would be applied (68% for the other industries products and only 11% for the agricultural products).

- d) With these two shares estimated official tariff rates and agricultural levies were corrected in the next step. Using this procedure we arrived to the estimated rates of collected import duties for each 8-digit item of EU Common External Tariff.
- e) In the final step data on the values of imports separated from EU15, 'Laeken' Group and 'The rest of the World' were added to the database with the estimated rates of collected import duties and the value of collected import duties estimated for the year 2001 using the above stated assumptions regarding the rates of collected import duties. We thus obtained weighted average rates of collected import duties for imports from other countries (table 3) for which we further assumed that they would remain the same also for the period 2004-2006.<sup>3</sup>

Table 3: Estimation of changes in rates of import duties after the adoption of EU Common External Tariff (2001 prices)

Sector	Situation in 2001			Inclusion into the EU
	EU15	'Laeken' Group	Rest of the World	Rest of the World
A	6,52	2,84	2,00	1,76
B	2,16	0,96	2,39	1,36
C	0,03	0,04	0,29	0,40
DA	11,75	10,56	7,65	1,80
DB	0,07	0,50	6,57	6,95
DD	0,14	0,16	0,81	0,62
DE	0,11	0,03	1,06	0,92
DG	0,14	0,04	0,91	2,87
DH	0,16	0,15	4,07	3,90
DI	0,08	0,16	1,40	2,94
DJ	0,08	0,05	0,85	2,51
DK	0,16	0,35	3,29	1,59
DL	0,20	0,27	1,73	1,00
DM	0,13	0,08	5,71	5,49
DN	0,27	0,38	10,08	3,50
E	0,01	0,03	0,03	2,28
<b>Total</b>	<b>0,68</b>	<b>1,15</b>	<b>2,50</b>	<b>2,37</b>
<b>Import duties (bill. SIT)</b>	<b>11,324</b>	<b>2,402</b>	<b>14,724</b>	<b>13,947</b>

Source: SORS – import customs declarations for the year 2001, EU Common External Tariff , own calculations

<sup>3</sup> Aggregation was based on the sectors in the CGE model. Due to the problems with losses in two sectors they were added to the other sectors (sector DF to sector E, and sector DC to sector DN).

In the year 2001 almost half of total import duties were collected on imports of products from EU15 and candidate countries. With the entrance into the EU Slovenia will lose these import duties. On the other hand Slovenia collected 14,7 bill. SIT on products imported from other countries with the average rate of 2,5%.

The use of the estimated rates of collected import duties on the imports of the EU from the Rest of the World on the Slovenian structure of imports from the Rest of the World did not change the average rate of import duties on the aggregate level by high margin (from 2,50% to 2,37%). Collected import duties would thus amount to 13,9 bill. SIT. Comparison of rates on the sector level reveal the most important changes in the sectors of food, beverages and tobacco industries, furniture and other non-covered products of manufacturing, for which rates will substantially decrease.

These, estimated rates of collected import duties for Slovenian imports from 'the Rest of the World' countries, together with assumption of the null rates for the imports from the EU15 and 'Leaken' group countries, estimated trade creation/diversion effect and growth of imports were than used for the estimation of the values of traditional own resources Slovenia will pay to the EU budget after the inclusion into the EU.<sup>4</sup> Final results are presented in Table 4.

**Table 4: Estimation of TOR to be paid in the period 2004-2006**

SCENARIO	mio SIT 1999			mio EUR 1999		
	2004	2005	2006	2004	2005	2006
1. Inclusion of all 10 candidate countries	10266	11011	11769	52,9	56,7	60,6
2. Inclusion of 4 candidates in the year 2004 and the others in the year 2005	10600	11011	11769	54,6	56,7	60,6

Source: Majcen (2002)

Taking into account that in fact all 10-candidate countries will enter into the EU in the year 2004, it can be concluded that Slovenian traditional own resources payments in the period 2004-2006 will be between 10,3 and 11,8 bill. SIT (1999 prices) or 54,6 and 60,6 mio. EUR (1999 exchange rate).<sup>5</sup>

It can be concluded that continued process of foreign trade liberalization will cause substantial reduction of budget revenues based on import duties. Remained revenues based

<sup>4</sup> For complete presentation of the estimation of traditional own resources Slovenia will have to pay to the EU budget see Majcen (2002).

<sup>5</sup> Assumption that Croatia and FYR of Macedonia completely take the advantages of the signed Stabilization and Association Agreement (SAA) with the EU, would decrease the estimated traditional own resources payments to 8,2 - 9,8 bill. SIT or 44,3- 50,7 mio. EUR. In reality Croatian exporters could take the advantage of preferential treatment for the minor part of their exports to the EU. It can be thus concluded that the estimated value would be closer to the higher numbers in the Table 4 that did not take into account SAA.

on import duties will represent 25% of import duties collected on the imports from ‘The rest of the World’ countries. In the year 1998 budget revenues from import duties amounted to almost 48 bill. SIT (1999 prices), and in the year 2001 represented only a half of the 1998 amount (23,2 bill. SIT). With the entrance into the EU we will loose additional 9,5 bill. SIT because of the complete liberalization of imports from the EU and ‘Laeken’ group countries, and also additional 10,2 bill. SIT transferred into the EU budget. Only 3,4 bill. SIT will be left for covering the costs of collection of import duties.

The estimates we arrived to, using as real assumptions and data as possible, are significantly higher from the first and also the last EU estimates where they used revised volume of Slovenian GNP (28-29 mil. EUR per year). Both EU estimates are using some very simplifying assumptions – the same share of import duties in the GNP as is the average share for the EU countries, the same average rate of collected import duties as was the average rate of import duties for the imports from ‘The rest of the World’ countries in the year 2001, further decrease in this average rate because of the future new preferential agreements is fully compensated with the future growth of imports (all candidate countries have the same import structure and the same rate of growth), there is no trade creation/diversion effect.

On the other hand we based our estimations on the 8-digit CN levels taking into the account our import structure from ‘The rest of the World’ countries, using the share of collected/official rates of import duties for two groups of products (agriculture and other products). We further estimated also the possible trade creation/diversion effects using the general equilibrium model of Slovenian economy. The possible mistake because of the assumed unchanged rates of import duties depends on the importance of the future preferential agreements of the EU with third countries for the Slovenian imports. We do believe that, taking all considerations into account, real TOR for the period 2004-2006 will be much closer to our estimates than to the EU ones.

It can be concluded that all direct effects of continued process of foreign trade liberalization have not been taken into account when the net budget position of Slovenian budget has been calculated. On one hand Slovenian budget revenues will decrease for additional 41.5 – 65.7 mil. EUR in 1999 prices and on the other hand we will not pay only 29 mil. EUR of traditional own resources into the EU budget each year, but from 52.9 to 60.9 mil. EUR (see Table 5).

**Table 5: Corrections of the Slovenian net budget position due to the complete liberalization of foreign trade with EU and candidate countries and adoption of EU Common External Tariff (mill. EUR, 1999 prices)**

Correction	2004	2005	2006
1. Budget revenues	-41.5*	-63.6	-65.7
2. Transfers to EU budget	-15.9*	-18.5	-21.3
3. Total	-57.4*	-82.1	-87.0

\* only for the eight months period due to the date of accession of 1.5. 2004

Source: Majcen (2002), own calculations

### 3. TRANSFERS BETWEEN SLOVENIAN AND EU BUDGET

Considering the negotiation process which has been concluded on 13. of December 2002 in Copenhagen, it has to be stated that the real levels of transfers from both sides are not so obvious as it may one believe. Namely, there are many different factors that will influence the final outcome in reality: a) real growth rates of production and imports after the inclusion of Slovenia into the EU, b) inflation rates, c) exchange rate changes, and d) absorption capacity of Slovenian economy.

On the other hand we should take into the account also some additional “costs” – Slovenia will have to pay to different EU institutions and funds and it will loose significant amount of VAT because of decreased efficiency of gathering the tax. One should also take into account additional budget sources that will be used to compensate the difference to complete volume of direct payments, as well as the additional costs of establishing the external Schengen border.

It is obvious that when speaking about the Slovenian net budgetary position after the accession we should distinguish two “positions”. The first one, which is strictly considering only the flows between the two budgets. And the second one, which takes into the account also additional changes in Slovenian budget due to the accession. Considering both figures, we can arrive to the estimate of direct impact of transfers on Slovenian budget. Of course, we should also have in mind that the accession into the EU (with increased market, lowered costs and increased competition) will have also a favourable positive effects on Slovenian economy. Final, direct and indirect, effects will be estimated with the use of the CGE model.

Regarding the flows between two budget it could be concluded that at the end of negotiations Slovenia succeeded to improve its positive net budgetary position from the one in the year 2003 (45 mill. EUR) to the 81 mill. EUR for each year of the period 2004-2006 (see Table 6). With the added lump-sum cash flow and budgetary compensations Slovenian net budgetary position would be positive one arising to 0.32-0.34% of GDP. This outcome has been realized due to the finally accepted corrections of the future GDP growth rates and revised volumes of GDP. Such a result certainly gives us some additional space in the (very possible) situation of lower absorption capacity than assumed of the resources from structural funds and rural development. We should also be aware of the fact that EU did not accept our estimations of traditional own resources Slovenia will have to pay to EU budget. With the revenues lost due to the complete liberalization of foreign trade with the EU and other accession countries (see Table 5), quite favourable positive net budgetary position disappears!

Adding already stated other additional costs and decreased budget revenues, we arrive to the total direct impact of accession on the Slovenian budget position (Table 7). The figures were calculated in current prices using assumed 2% annual increase from the year 1999 on. The final outcome will be probably even less favourable if we take into account the fact that exchange rates are not following completely the inflation rates in Slovenia.

TABLE 6: ESTIMATED NET BUDGETARY POSITION AFTER ENLARGEMENT - SLOVENIA

The calculations are based on revised GDP; 1999 prices, € millions, SIT billions: Planned date of accession: 1 May 2004

	2004				2005				2006			
	EUR	SIT	% GDP	%GNI	EUR	SIT	% GDP	%GNI	EUR	SIT	% GDP	%GNI
<b>Pre-accession aid</b>	51.0	9.9	0.22	0.22	43.0	8.3	0.17	0.17	27.0	5.2	0.10	0.10
<b>1. Agriculture.</b>	43.4	8.4	0.18	0.18	124.6	24.1	0.50	0.51	158.2	30.6	0.61	0.61
<b>1a - Common Agricultural Policy</b>	14.9	2.9	0.06	0.06	65.2	12.6	0.26	0.27	71.6	13.9	0.28	0.28
Market measures	14.9	2.9	0.06	0.06	38.3	7.4	0.15	0.16	38.8	7.5	0.15	0.15
Direct payments	0.0	0.0			26.8	5.2	0.11	0.11	32.8	6.4	0.13	0.13
<b>1b - Rural development</b>	28.5	5.5	0.12	0.12	59.4	11.5	0.24	0.24	86.6	16.8	0.33	0.34
<b>2. Structural actions after capping</b>	27.0	5.2	0.11	0.11	59.2	11.5	0.24	0.24	72.8	14.1	0.28	0.28
Structural Fund	25.9	5.0	0.11	0.11	45.9	8.9	0.19	0.19	48.9	9.5	0.19	0.19
Cohesion Fund	1.2	0.2	0.01	0.01	13.3	2.6	0.05	0.05	23.9	4.6	0.09	0.09
<b>3. Internal Policies</b>	49.7	9.6	0.21	0.21	59	11.4	0.24	0.24	66.3	12.8	0.26	0.26
Existing policies	12.1	2.3	0.05	0.05	20.9	4.0	0.08	0.09	28.2	5.5	0.11	0.11
Institution building	2.0	0.4	0.01	0.01	2.5	0.5	0.01	0.01	2.5	0.5	0.01	0.01
Schengen	35.6	6.9	0.15	0.15	35.6	6.9	0.14	0.14	35.6	6.9	0.14	0.14
<b>Sub-total (1 + 2 + 3)</b>	120.1	23.3	0.51	0.51	242.9	47.0	0.98	0.99	297.3	57.6	1.15	1.15
Cash flow lump-sum	65.0	12.6	0.27	0.28	18.0	3.5			18.0	3.5		
<b>Total allocated expenditure</b>	<b>236.1</b>	<b>45.7</b>	<b>1.00</b>	<b>1.00</b>	<b>303.8</b>	<b>58.8</b>	<b>1.23</b>	<b>1.24</b>	<b>342.3</b>	<b>66.3</b>	<b>1.32</b>	<b>1.33</b>
Traditional own resources	18.0	3.5	0.08	0.08	29.0	5.6	0.12	0.12	29.0	5.6	0.11	0.11
VAT resource	22.0	4.3	0.09	0.09	35.0	6.8	0.14	0.14	36.0	7.0	0.14	0.14
GNP resource	129.0	25.0	0.55	0.55	198.0	38.3	0.80	0.81	203.0	39.3	0.78	0.79
UK rebate	17.0	3.3	0.07	0.07	27.0	5.2	0.11	0.11	28.0	5.4	0.11	0.11
<b>Total own resources</b>	<b>186</b>	<b>36.0</b>	<b>0.79</b>	<b>0.79</b>	<b>289.0</b>	<b>56.0</b>	<b>1.17</b>	<b>1.18</b>	<b>296.0</b>	<b>57.3</b>	<b>1.14</b>	<b>1.15</b>
Net balance before budgetary compensation	50.1	9.7	0.21	0.21	14.8	2.9			46.3	9.0	0.18	0.18
Budgetary compensation	30.0	5.8	0.13	0.13	66.0	12.8	0.27	0.27	36.0	7.0	0.14	0.14
<b>Net balance after budgetary compensation</b>	<b>80.1</b>	<b>15.5</b>	<b>0.34</b>	<b>0.34</b>	<b>80.8</b>	<b>15.6</b>	<b>0.33</b>	<b>0.33</b>	<b>82.3</b>	<b>15.9</b>	<b>0.32</b>	<b>0.32</b>

Data sources: The final negotiation results - Copenhagen, December 2002; Institute of Macroeconomic Analysis and Development (IMAD) and Statistical Office of the Republic of Slovenia (SORS); calculations by Ministry of Finance, Budget Department, December 2002

It can be concluded that estimated total direct impact of the Slovenian accession on its net budget position will be clearly a negative one. Slovenian budget deficit will increase by 155 millions of EUR in the first year of accession (if we take into account also one month of postponement of VAT payments, the result for the year 2004 would be even less favourable) and will amount to 0.6% of GDP. The greatest increase of deficit is expected in the second year after the accession (0.77%).

Of course we should have in mind that all these estimates are only partial ones, without taking into account also the reactions of economic agents as well as the government. Further trade liberalization, increased domestic market and also competition, lowered collected VAT and also lowered transaction costs, will generate changes in domestic production, trade, employment, investment and consumption. What will be the final outcome is hard to conclude without an appropriate tool. In the next section we will thus try to prepare some simulations of possible complex effects of changes in Slovenian budgetary position after the accession into the EU using a static computable general equilibrium model of Slovenian economy.

#### **4. SIMULATION RESULTS**

Simulations were prepared using the corrected version of computable general equilibrium (CGE) model of Slovenian economy, based on SAM for the year 1998 (Majcen and Buehrer, 2001). Namely, we had to correct the 'Rest of the World' account by splitting it down into two separate accounts: EU15 and 'Laeken' Group and on the other side 'The Rest of the World'. We also added a new institution in order to simulate transfers between the two budgets after the accession of Slovenia into the EU.

The new version of the CGE model was then used for simulation of the consequences of further foreign trade liberalisation in the period after the year 1998 as the outcome of the finished process of implementation of FTAs and Europe Agreement, adaptation of Customs Tariff to EU Common External Tariff for the manufacturing products, adoption of the EU Common External Tariff after the inclusion of Slovenia into the EU and estimated transfers between both budgets.

##### **4.1. Foreign trade liberalization**

With the CGE Model based on the year 1998, we had to prepare data on collected import duties for both groups of countries (EU15+ 'Laeken' Group, 'The rest of the World') for the base year 1998 and the year 2001. Additionally, estimated rates of collected import duties on imports from 'The rest of the World', valid for the period after the accession 2004-2006, were also used. In the Table 3 rates of collected import duties implemented within the CGE model were presented. The main deficiency of the final estimation is certainly the use of only two shares of collected to official import duties. Results on sector level are therefore only rough approximation that should be improved in the future research work.

**Table 7: Estimated budget deficit of the Republic of Slovenia after the accession to EU (% of GDP)**

(mil. Of EUR or bill. Of SIT in current prices)

	2004	2005	2006	2004	2005	2006
	mill. EUR			bill. SIT		
Expected budget revenues	5,634	5,844	6,088	1,500	1,622	1,752
Expected budget expenditures	5,852	6,023	6,199	1,559	1,671	1,784
Expected budget deficit	-219	-178	-112	-58	-49	-32
<i>Expected budget deficit without the EU accession effect (%GDP)</i>	<i>-0.97</i>	<i>-0.75</i>	<i>-0.45</i>	<i>-0.97</i>	<i>-0.75</i>	<i>-0.45</i>
1. Expected transfers from the EU budget	294	417	435	68.4	97.0	101.1
2. Expected transfers from the Slovenian budget	205	324	340	47.8	75.8	79.2
3. Expected additional change of the budgetary position after the accession ( $\Sigma$ (3a...3f))	243	309	303	57	72	71
3a Expected decreased amount of collected VAT 0.5% of GDP)	83	133	142	19.4	31.1	33.2
3b Obligations towards EU institutions	7	12	21	1.5	2.9	4.8
3c Expected decrease of revenues from import duties	46	72	75	10.7	16.7	17.6
3d "Top up" payments of direct payments	23	19	14	5.2	4.3	3.3
3e Schengen border	67	52	26	15.6	12.0	6.0
3f Estimated additional transfers of collected import duties	18	21	24	4.1	4.9	5.7
4. Increase of budget deficit due to EU accession (1-2-3)	-155	-216	-209	-36	-51	-49
<i>Increase of budget deficit due to EU accession (% of GDP)</i>	<i>-0.60</i>	<i>-0.77</i>	<i>-0.68</i>	<i>-0.60</i>	<i>-0.77</i>	<i>-0.68</i>
Total estimated budget deficit	-373	-395	-320	-94	-100	-81
Total estimated budget deficit (% of GDP)	<i>-1.56</i>	<i>-1.52</i>	<i>-1.13</i>	<i>-1.56</i>	<i>-1.52</i>	<i>-1.13</i>

Sources: Final results of negotiations - Copenhagen, December 2002 and Ministry of Finance; calculations made by the budget department and own calculations

If we sum up the assumptions used during the estimation of the levels and changes of rates of import duties applied within the CGE model, they were the following:

- a) Final estimation was based on the estimated collected import duties for the year 2004;
- b) Valid foreign trade regime is reflected with the share of collected import duties compared with the official import duties – in our example in the base year 1998 and in the year 2001;
- c) Official rates of EU Common External Tariff, applicable in the year 2001 and estimated collected rates reflect also the situation in the analysed period 2004-2006.

With the above assumption simulations were done in two steps. Firstly, we estimated the effects of continued foreign trade liberalization due to the implementation of the Europe and other FTAs within the period 1998-2001 taking into consideration rates of collected import duties. New equilibrium solution for the year 2001 was then applied as a basis for comparison with the solution got in the second step where we assumed inclusion of the Slovenia into the EU.

Simulations were performed using the estimated elasticities of substitution and transformation. Additionally, we tested the sensitivity of the model results on the changes of the assumptions regarding the adaptation of wages or employment as well as regarding the possible reaction of the government to the changed collected import duties. Decreased incomes can be compensated with the decreased government consumption, savings or with the introduction of the new tax or increased some already existing one. We assumed that government compensates lost revenues with the increased value added tax – the CGE model was therefore adapted to find new equilibrium solution with the unchanged government consumption and savings, compensating the loss with an increase of the value added tax. All simulations were performed using the assumption of fixed aggregated balance of payments (and variable balances for both foreign accounts), with the exchange rate with EU being the numeraire and all other assumptions used in the base solution of the CGE model.

The effects of the foreign trade liberalization due to the accession into the EU on the aggregate level are presented in Table 8. We used only the results with the assumed possibility of change in the employment. Simulations 1, 3 and 5 represent the outcome of the further foreign trade liberalisation and adoption of EU Common Customs Tariff as well as their trade regime after the accession regarding the different possible reactions of the government to decreased revenues. Government was assumed to compensate decreased revenues either by decreasing consumption (Scenario 1), increasing VAT (Scenario 2), or by decreasing savings (Scenario 3).

Revenues from the import duties were estimated to fall for 59% if we compare results with the situation in the year 2001. Using this figure in order to compare the estimates of collected import duties after the accession (Majcen, 2002), we arrive to the estimate about 1.5 billion SIT lower (12 bill. SIT in 1999 prices).

**Table 8: Some macroeconomic effects of foreign trade liberalization process in the period 2001-2004 (changes in %)\***

AGGREGATE	SCENARIO 1	SCENARIO 2	SCENARIO 3	SCENARIO 4	SCENARIO 5	SCENARIO 6
	Trade liberalization	+ decreased VAT	Trade liberalization	+ decreased VAT	Trade liberalization	+ decreased VAT
<b>1. Labor</b>	-0.34	0.55	-2.48	-2.07	0.05	1.05
<b>2. Capital</b>	0.00	0.00	0.00	0.00	0.00	0.00
<b>3. Import duties</b>	-59.03	-58.41	-60.43	-60.13	-59.11	-58.54
<b>4. Government consumption</b>	-2.30	-2.95	0.00	0.00	0.00	0.00
<b>5. Government savings</b>	0.00	0.00	0.00	0.00	-30.89	-39.66
<b>5. Investment</b>	-0.38	0.33	-2.19	-1.92	-2.05	-1.79
<b>5. GDP</b>	-0.11	0.50	-1.59	-1.32	0.10	0.76
<b>6. Exports (total)</b>	1.10	2.56	-1.96	-1.19	0.92	2.33
- EU25	1.28	2.99	-2.22	-1.32	1.08	2.72
- others	0.65	1.53	-1.32	-0.87	0.53	1.37
<b>7. Imports (total)</b>	1.14	2.47	-1.63	-0.94	0.96	2.23
- EU25	1.17	2.53	-1.60	-0.88	0.96	2.25
- others	1.11	2.35	-1.66	-1.07	1.00	2.21
<b>8. GDP deflator</b>	-0.73	-0.88	-0.05	-0.03	-0.65	-0.77
<b>9. VAT+</b>	0.00	0.00	10.25	13.35	0.00	0.00

Elasticities of substitution/transformation from (Buehrer, 1994) and GTAP data base

- \* SCENARIO 1 – quantity of labor is variable (fixed wages), decrease of government consumption is equal to the decreased revenues from import duties;
- SCENARIO 2 – Scenario 1 + assumed decrease in collected VAT equal to 0.5% of GDP;
- SCENARIO 3 - quantity of labor is variable (fixed wages), government consumption unchanged, decreased revenues compensated with the increased VAT;
- SCENARIO 4 - Scenario 3 + assumed decrease in collected VAT equal to 0.5% of GDP;
- SCENARIO 5 - quantity of labor is variable (fixed wages), government consumption unchanged, decreased revenues compensated with the decreased gov. savings;
- SCENARIO 6 – Scenario 5 + assumed decrease in collected VAT equal to 0.5% of GDP;

+ Unchanged government consumption is obtained with the increase of VAT (Scenarios 3 in 4)

Source: simulation results with the CGE model

But we should have in mind that as we used the static model this outcome took into account only the trade creation/diversion effect due to the changes in import duties and not real increase of imports in the period 2001-2004.

Complete liberalisation of imports from EU and candidate countries will decrease import prices and thus increase imports from these countries – to preserve unchanged balance of payments exports should also rise through decreased prices (partially as the outcome of decreased import prices of intermediate goods). Final outcome for the level of GDP and employment is slightly negative one (-0.1 and -0.34 respectively) also because of the assumed compensating decreased government consumption (-2.3%) and thus decreased production of non-market services (Scenario 1).

Another possible government reaction to decreased revenues is appropriate increase of one of taxes – here we assumed that VAT should change to the extent that government consumption and savings remain unchanged. The outcome of such a policy is clearly a negative one for the economy – final necessary increase of VAT was estimated to be 10% - with the employment decreased by -2.5%, GDP by -1.6%, investment by -2.2%, exports by 2% and imports by 1.6%.

Compensation with the government savings (-30.9%) does not have a negative effect on aggregate employment and GDP with the positive effects of liberalization on trade, but again with decreased investment activity.

With the Scenarios 2, 4 and 6 we added also the estimated decrease of the VAT collection (0.5% of GDP) in order to see the reaction of the economy.<sup>6</sup> It can be concluded that, as expected, assumed decreased rates indeed have a favourable positive impact on the economy.

If we sum up the results obtained regarding the (isolated) effects of foreign trade liberalization, it has to be concluded that the effects are indeed very sensitive to the assumed reaction of the government. Insisting on unchanged government consumption through the adequate rise in the VAT rate will have a clearly negative effects on the Slovenian economy. On the other hand compensation with the decreased government savings will have a negative impact on the investment activity and thus on the lower growth rate of the economy. In case we have used dynamic CGE model for the simulation of changes of particular aggregates compared with the steady growth of the economy, these negative effects on investment activity would come out. It is therefore obvious that a static CGE model can not provide the final answer about the effects of changes in Slovenian budget. Namely, a great share of transfers are connected with the changes in the structure and the levels of investment activities or can have indirect effect on investment activity.

#### **4.2. Financial flows between Slovenia and EU after the accession**

In this section we tried to get some estimates of the complex effects of accession into the EU. Due to the static nature of the model the results obtained did not show complete, short

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<sup>6</sup> *We assumed that the decrease of VAT collection will be the outcome only because of the decreased collection on imports of goods – the basic sector rates were then decreased accordingly and than applied in the simulations.*

and long run effects, but are mainly focused on the short run outcome – short enough that changes in the investment activity can not affect the levels of capital. Nevertheless, we tried to capture also some, at least medium run, effects through the assumed decrease of transaction costs.

During the preparation of particular scenarios we tried to get as close as possible to the reality. We assumed that quantity of labor is variable, that government will try to preserve unchanged level of its consumption and savings, compensating the changes with the changes in the VAT rate. We did not make any changes in the structure of government consumption and in the structure of investment. Finally, eight scenarios have been prepared, starting with the foreign trade liberalization and ending with complex set of transfers between both budgets, decreased collection of VAT, changes in government savings, consumption and subsidies:

- a) Scenario 1: further foreign trade liberalization due to the accession into the EU;
- b) Scenario 2: + decreased VAT rate (0.5% of GDP);
- c) Scenario 3: + decreased transaction costs (2% decrease of world import prices);
- d) Scenario 4: + net transfers from the EU budget (0.33% GDP; 0.26% going to agriculture);
- e) Scenario 5: + corrected payments of import duties, additional payments to EU institutions, additional government investments due to the Schengen border, additional direct payments to farmers;
- f) Scenario 6: + lower absorption capacity (only 50% use of the estimated use of sources for rural development and sources from structural and cohesion funds);
- g) Scenario 7: + no changes in transaction costs;
- h) Scenario 8: + decrease of government consumption by 5%.

With the assumptions within the Scenarios 1 to 5 we tried to capture the changes in the protection, transfers between budgets and some additional costs Slovenia will have after the accession. We added also an estimate of decreased transaction costs using the estimates prepared for the EU countries (European economy, 1988: p18). We continued with the assumed lower absorption capacity in order to get some notion of the possible effects of not so unrealistic outcome, no changes in transaction costs (to capture only the very short run effects) and the possibility of decreased government consumption. The results on the aggregate level are presented in Table 9.

The results of first two scenarios were already presented in the previous subsection – possible positive effects of foreign trade liberalization disappear if the government tries to preserve its unchanged consumption and savings with increased VAT rates. Estimated loss in collected VAT on the other hand does have a positive impact on the macro aggregates despite the necessary additional increase in the VAT rates.

**Table 9: Some macroeconomic effects of the accession into the EU (changes in %)**

AGGREGATE	SCENARIO 1	SCENARIO 2	SCENARIO 3	SCENARIO 4	SCENARIO 5	SCENARIO 6	SCENARIO 7	SCENARIO 8
<b>1. Labor</b>	-2.475	-2.071	3.157	5.091	1.996	-0.449	-5.699	-0.928
<b>2. Capital</b>	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
<b>3. Import duties</b>	-60.43	-60.13	-58.48	-57.54	-59.08	-60.32	-61.97	-59.15
<b>4. Government consumption</b>	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-5.000
<b>5. Government savings</b>	0.000	0.000	0.000	13.88	13.88	13.88	13.88	13.88
<b>6. Investment</b>	-2.193	-1.915	2.166	4.230	3.025	1.018	-3.099	0.989
<b>7. GDP</b>	-1.587	-1.322	2.192	3.485	1.443	1.018	-3.781	-0.440
<b>8. Exports (total)</b>	-1.960	-1.190	5.451	6.951	3.467	1.007	-5.557	1.179
- EU25	-2.225	-1.321	6.357	8.054	4.009	1.181	-6.336	1.347
- others	-1.321	-0.874	3.264	4.285	2.158	0.588	-3.677	0.775
<b>9. Imports (total)</b>	-1.628	-0.936	6.631	8.838	5.343	2.464	-4.972	1.138
- EU25	-1.603	-0.879	7.871	10.092	6.589	3.693	-4.876	1.231
- others	-1.660	-1.067	2.999	5.165	1.691	-1.140	-5.222	0.898
<b>10. GDP deflator</b>	-0.050	-0.030	-0.285	-0.589	0.050	0.499	0.866	-0.723
<b>11. VAT+</b>	10.245	13.347	-0.541	-6.489	5.741	15.157	30.618	5.760

Elasticities of substitution/transformation from (Buehrer,1994) and GTAP data base

SCENARIO 1 – further foreign trade liberalization and adoption of EU Common Customs Tariff;

SCENARIO 2 – Scenario 1 + assumed decrease in collected VAT equal to 0.5% of GDP;

SCENARIO 3 – Scenario 2 + decreased transaction costs by 2%;

SCENARIO 4 – Scenario 3 + net transfers from the EU budget (0.33% GDP; 0.26% going to agriculture);

SCENARIO 5 – Scenario 4 + corrected payments of import duties, additional payments to EU institutions, additional government investments due to the Schengen border, additional direct payments to farmers

SCENARIO 6 – Scenario 5 + lower absorption capacity (only 50% use of the estimated use of sources for rural development and sources from structural and cohesion funds);

SCENARIO 7 – Scenario 6 + no changes in transaction costs;

SCENARIO 8 – Scenario 7 + decrease of government consumption by 5%;

Source: simulation results with the CGE model

With the accession and the abolishment of borders in the next few years we can expect decrease of transaction costs – we assumed that this decrease will be equal to 2% of the value of trade with the EU countries.<sup>7</sup> As the transaction costs are not explicitly modeled in the model, we corrected only import prices by 2%. The results obtained with the Scenario 3 clearly point out the very positive impact: real GDP would rise by 2.2%, employment by 3.2%, exports by 5.5% and imports by 6.7% with trade diversion towards EU countries. Despite unchanged government consumption and savings, abolished import duties and decreased effective VAT rates, new equilibrium VAT rate remained almost unchanged (-0.5% compared with the base solution in the year 2001).

We then proceeded with the introduction of the officially estimated net outcome of the assumed transfers between two budget (0.33% GDP) and with the increased subsidies for agriculture sectors in the amount of 0.26% of GDP. We did not make any corrections in the structure of government consumption or investments. Results are, compared to the ones obtained in Scenario 3), as expected, even more favourable. Additional inflow of money (at the unchanged government consumption and savings) resulted in the even lower VAT rates (-6.5%) resulting in higher competitiveness of the economy.

More realistic situation is certainly Scenario 5 with all additional transfers and payments from the Slovenian budget included. Results obtained are still positive ones with increased GDP, employment, investment and trade, despite the necessary increase of VAT tax to compensate all additional transfers and payments. But what could happen if the absorption capacity will be lower than assumed (50% of assumed one)? The fact is that EU assumed much higher absorption capacity for the new member countries for the use of Structural funds than it was obtained for the existing EU countries – with the assumption of compensation of lower transfers through the VAT tax which has to rise by 15% and thus decrease the competitiveness of the economy, the final outcome show considerable decrease in almost all macro aggregates (with still positive changes) with the exemption of decreased employment.

All former results could be regarded as the effects in at least medium or long run. Given the assumptions and the model used, they show positive net outcome of the Slovenian accession into the EU. But they are indeed quite sensible to the assumption of decreased transaction costs which will not be realised in a very short period. This was the reason why we tried to see the effects without the decreased transaction costs (Scenario 7). Results obtained point to the fact that in the very short run a negative outcome of the accession should be expected – of course if the government still wants to have unchanged its consumption and increased investment activities. In case that the government tries to

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<sup>7</sup> *The direct costs of frontier formalities and associated administrative costs for the private and public sector were estimated to be of the order of 1.8% of the value of goods traded within the Community (European economy, 1988: p. 18). With the abolishment of technical regulations and other non-border barriers added this figure was estimated to be, on average, around 2% of firms' total costs or 3.5% of industrial value-added. Of course there are great differences between sectors with some industrial and service sector branches subject to market entry restrictions which could experience considerably higher potential costs and price reductions (energy generating, transport, office and defence equipment, financial services, and road and air transport) of the order of 10 to 20%, and even more in some cases. It is obvious that in the paper some very important effects of abolishment of non-tariff barriers have not been taken into account. One possible way to capture them would be to incorporate estimated ad-valorem equivalents for non-tariff barriers into the existing CGE model.*

behave more rational and finds the possibility to decrease its own consumption (5% decrease assumed in Scenario 8), this would greatly diminish negative short run effects.

Results obtained show how important is the behaviour of the government already in the short run after the accession into the EU – rational behaviour will certainly moderate possible short run negative effects of the accession and improve already favourable long run effects.

#### **4. FINAL CONCLUSIONS**

The main aim of the paper has been the estimation of the effects of continued process of foreign trade liberalization and Slovenian net budgetary position after the accession into the EU taking into account also some additional important changes in Slovenian budget. For the simulations an adapted CGE model of Slovenian economy has been used.

It can be concluded that continued process of foreign trade liberalization will cause substantial reduction of budget revenues based on import duties. Remained revenues based on import duties will represent 25% of import duties collected on the imports from ‘The rest of the World’ countries. In the year 1998 budget revenues from import duties amounted to almost 48 bill. SIT (1999 prices), and in the year 2001 represented only a half of the 1998 amount (23,2 bill. SIT). With the entrance into the EU we will loose additional 9,5 bill. SIT because of the complete liberalization of imports from the EU and ‘Laeken’ group countries, and also additional 10,2 bill. SIT transferred into the EU budget. Only 3,4 bill. SIT will be left for covering the costs of collection of import duties. Important is also conclusion that these estimates are higher than the estimates prepared by the EU. Because of the use of several more realistic assumptions it should be pointed out that the study represents professional basis for the argumented discussion regarding the realistic value of the traditional own resources that Slovenia will be paying into the EU budget.

Regarding the Slovenian net budgetary position after the accession we should distinguish two “positions”. The first one, which is strictly considering only the flows between the two budgets. And the second one, which takes into the account also additional changes in Slovenian budget due to the accession. Regarding the flows between two budget it could be concluded that at the end of negotiations Slovenia succeeded to improve its positive net budgetary position from the one in the year 2003 (45 mill. EUR) to the 81 mill. EUR for each year of the period 2004-2006. With the added lump-sum cash flow and budgetary compensations Slovenian net budgetary position would be positive one arising to 0.32-0.34% of GDP. This outcome has been realized due to the finally accepted corrections of the future GDP growth rates and revised volumes of GDP. Such a result certainly gives us some additional space in the (very possible) situation of lower absorption capacity than assumed of the resources from structural funds and rural development.

On the other hand we should take into account decreased budget revenues due to the complete liberalisation of trade with the EU and candidate countries as well as the decreased efficiency of value added tax collection. And, there will be additional transfers to the EU institutions and increased costs due to the preparation of Schengen border with Croatia and “top up” direct payments to farmers. Taking into account also these figures we arrive to the total direct impact of accession on the Slovenian budget position, which will

be clearly a negative one. Slovenian budget deficit will increase by 155 millions of EUR in the first year of accession and will amount to 0.6% of GDP. The greatest increase of deficit is expected in the second year after the accession (0.77%). Of course we should have in mind that all these estimates are only partial ones, without taking into account also the reactions of economic agents as well as the government. Further trade liberalization, increased domestic market and also competition, lowered collected VAT and also lowered transaction costs, will generate changes in domestic production, trade, employment, investment and consumption.

The new version of the CGE model was used for simulation of the consequences of further foreign trade liberalisation in the period after the year 1998 as the outcome of the finished process of implementation of FTAs and Europe Agreement, adaptation of Customs Tariff to EU Common External Tariff for the manufacturing products, adoption of the EU Common External Tariff after the inclusion of Slovenia into the EU and estimated transfers between both budgets.

During the preparation of particular scenarios we tried to get as close as possible to the reality. We assumed that quantity of labor is variable, that government will try to preserve unchanged level of its consumption and savings, compensating the changes with the changes in the VAT rate. We did not make any changes in the structure of government consumption and in the structure of investment. Finally, eight scenarios have been prepared, starting with the foreign trade liberalization and ending with complex set of transfers between both budgets, decreased collection of VAT, changes in government savings, consumption and subsidies.

The results of first scenario show that possible positive effects of foreign trade liberalization disappear if the government tries to preserve its unchanged consumption and savings with increased VAT rates. Estimated loss in collected VAT on the other hand does have a positive impact on the macro aggregates despite the necessary additional increase in the VAT rates.

With the accession and the abolishment of borders in the next few years we can expect decrease of transaction costs – the results obtained with the Scenario 3 clearly point out the very positive impact: real GDP would rise by 2.2%, employment by 3.2%, exports by 5.5% and imports by 6.7% with trade diversion towards EU countries. Despite unchanged government consumption and savings, abolished import duties and decreased effective VAT rates, new equilibrium VAT rate remained almost unchanged (-0.5% compared with the base solution in the year 2001).

Results were even more favourable with the officially estimated net outcome of the assumed transfers between two budget and with the increased subsidies for agriculture sectors added (Scenario 4). Additional inflow of money (at the unchanged government consumption and savings) resulted in the even lower VAT rates (-6.5%) resulting in higher competitiveness of the economy.

More realistic situation was captured in Scenario 5 with all additional transfers and payments from the Slovenian budget included. Results obtained were still positive ones with increased GDP, employment, investment and trade, despite the necessary increase of

VAT tax to compensate all additional transfers and payments. But what could happen if the absorption capacity will be lower than assumed (50% of assumed one)? With the assumption of compensation of lower transfers through the VAT tax which has to rise by 15% and thus decrease the competitiveness of the economy, the final outcome show considerable decrease in almost all macro aggregates (with still positive changes) with the exemption of decreased employment.

All former results could be regarded as the effects in at least medium or long run. Given the assumptions and the model used, they show positive net outcome of the Slovenian accession into the EU. But they are indeed quite sensible to the assumption of decreased transaction costs which will not be realised in a very short period. This was the reason why we tried to see the effects without the decreased transaction costs (Scenario 7). Results obtained point to the fact that in the very short run a negative outcome of the accession should be expected – of course if the government still wants to have unchanged its consumption and increased investment activities. In case that the government tries to behave more rational and finds the possibility to decrease its own consumption (5% decrease assumed in Scenario 8), this would greatly diminish negative short run effects.

Results obtained show how important is the behaviour of the government already in the short run after the accession into the EU – rational behaviour will certainly moderate possible short run negative effects of the accession and improve already favourable long run effects.

At the end we would like to point out some limitations and deficiencies of the research activities done. Firstly, with the assumed perfect competition and constant economies of scale, it was not able to come closer to reality at least for some sectors. Secondly, we did not modeled any changes in the structure of government consumption and in the structure of investment. Thirdly, due to the static nature of the model the results obtained did not show complete, short and long run effects, but are mainly focused on the short run outcomes – short enough that changes in the investment activity can not affect the levels of capital. Nevertheless, we tried to capture also some, at least medium run, effects through the assumed decrease of transaction costs. In case we have used dynamic CGE model for the simulation of changes of particular aggregates compared with the steady growth of the economy, changes of investment activity would come out. It is therefore obvious that a static CGE model can not provide the final answer about the effects of changes in Slovenian budget. Namely, a great share of transfers are connected with the changes in the structure and the levels of investment activities or can have indirect effect on investment activities. We will certainly try to overcome all these deficiencies in our future research work with development and use of dynamic general equilibrium model of Slovenian economy.

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## APPENDIX

### SHORT DESCRIPTION OF THE SINGLE COUNTRY CGE MODEL <sup>8</sup>

In the CGE model used Slovenia is treated as a small country for the purposes of both imports and exports. Given the focus of the paper, trade with the EU is separated from trade with the rest of the world. Output is created from a combination of capital, labor and intermediate goods by profit-maximizing firms. Labor markets are assumed either to be subject to a fixed wage or a fixed supply of labor, depending on the simulation. Firms either sell their output domestically or into the international market. The transformation of output into either domestically consumed or aggregate export goods is imperfect. Transforming aggregate exports into specific exports for the two regions is imperfect, though less so than the transformation from domestic output into domestic and aggregate export goods.

Domestic consumption is met from a cost-minimizing mix of domestic and imported goods from the two regions. Domestically produced and aggregate imported goods are assumed to be imperfect substitutes in consumption. Imports from different regions are assumed to be imperfectly substitutable with each other, though more substitutable with each other than with domestic goods. Final domestic demand can take the form of intermediate goods, goods for household or government consumption, or goods for investment in physical capital or inventories.

The distribution of income and savings closes the model. The 1998 SAM contains a relatively rich specification of income flows in Slovenia. Income for labor services is mostly paid to households, while a small portion of labor income is paid directly abroad.<sup>9</sup> All income for capital services is paid to enterprises that use that income, along with payments from foreign countries, to pay taxes, interest, transfers, payments to foreigners, and dividends to households. The government receives tax revenues while paying for interest, transfers, subsidies, and government services. Households, firms, and the government also save a portion of their income and investment is assumed to be equal to saving less private payments of interest abroad.

#### 1. Production of Output and the Employment of Labor

Since this is a short run model, firms are assumed to have a fixed stock of capital. If the sector is tradable, there are three potential markets (domestic, EU, and rest of the world) into which producers can sell their output. Prices of domestic goods are endogenously determined while exports are exogenously priced in foreign currency. Profit maximization requires that producers select the appropriate level of labor given the value of output. The solution to this producer problem is set out in the model in equations 27 - 29.

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<sup>8</sup> See Majcen and Buehrer (2001) for broader presentation of the model.

<sup>9</sup> There is also a small amount of income received by labor from foreign sources.

For the purpose of explanation, assume that producers in each sector,  $i$ , take their sale price,  $PX_i$ , as given. Since value added is combined in fixed proportions with intermediate inputs to form final output, the price of value added,  $PV_i$ , can be determined from the price of final output,  $PX_i$ , adjusted for any production subsidy,  $indtax^i$ , the prices of intermediate goods,  $P_i$ , and the input/output coefficients,  $aa_j^i$ .<sup>10</sup> (Eq. 24.) Labor,  $L_i$ , and capital,  $K_i$ , are combined in a Cobb-Douglas production function to generate the value-added portion of output,  $XD_i$ . (Eq. 27.) With capital fixed, there are decreasing returns to labor. The total labor supply,  $LS_i$ , is fixed in the simulations with a variable wage and endogenous in the simulations using a fixed wage.

The production function implies Eq. 28 as the first order condition with respect to the only variable input, labor. In this equation, observed sector-specific wage differentials can be incorporated through the  $wdist_i$  coefficient. Due to a lack of sector specific wage information,  $wdist_i$  is assumed to be one in all sectors at this time. The labor supply constraint (Eq. 29), in combination with the labor demand equation establishes the market clearing wage,  $W$ , in the simulations that have a variable wage, or the labor supply,  $LS$ , in the simulations that have a fixed wage.

## 2. The Allocation of Output between Domestic and Export Markets

The previous discussion has assumed that the price of final output is fixed. In the model, that price is endogenously determined through a series of constant elasticity of transformation functions and the assumptions that export demand is perfectly elastic.<sup>11</sup>

Since there are two export accounts in this model, one for the EU and one for the rest of the world, a method of allocating exports between regions must be used. In some multi-country trade models, this is done by assuming that there is a single transformation function that includes exports to all markets. See e.g. Hinojosa-Ojeda, Robinson and Tesche (1992). This is simple, but it generally results in elasticities of transformation that are the same between sales to all markets. Alternatively, a multi-tiered transformation system can be used. See e.g. Buehrer and di Mauro (1993). This is somewhat more flexible in that it allows the elasticity of transformation between the two export markets to differ from the elasticity of transformation between domestic uses and exports. In this model, the second approach is used.

Formally, domestic output,  $XD_i$ , is first transformed either into domestically used goods,  $XXD_i$ , or aggregate exports,  $AE_i$ , using a constant elasticity of transformation function and the first order condition of the profit maximization of the transformation function (Eqs. 10-11). Aggregate exports are then transformed into different goods for the two foreign markets,  $E_i^{reg}$ , through another constant elasticity of transformation function and its first

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<sup>10</sup> To make the equations easier to follow, parameters are in lower case while variables are in upper case. Variables that are fixed in the model have lines over them.

<sup>11</sup> This is inconsistent with the findings in Buehrer (1994) that Slovenia generally does not face perfectly elastic demand for its exports. To partially address this issue, a separate two-country model has been developed that explicitly models EU demand for Slovenia exports.

order condition (Eqs. 12-13). Prices for all exports are fixed in foreign exchange and export demand is assumed to be perfectly elastic.

### 3. Determination of Demand for Consumption, Investment and Intermediate Use and Its Allocation between Domestic and Imported Goods

This section describes the disposition of domestic sales and imports. For the sector without imports, domestic sales equal domestic output sold domestically. (Eq. 14) For sectors with imports, domestic sales are combined with aggregate imports to meet domestic demand. (Eq. 5) Aggregate imports are a cost minimizing combination of imperfectly substitutable imports from the rest of the world and from the EU. The substitution between imports from the EU and the rest of the world is modeled using constant elasticity of substitution functions, what are known in the literature as Armington functions (Eqs. 3-4).

It is assumed that domestic output and aggregate imports are imperfect substitutes in consumption. Domestic sales are assumed to be a cost minimizing combination of domestic output and foreign imports. In the model this is represented by Eqs. 6-8, which are based on the Almost Ideal Demand System (AIDS; Deaton and Muelbauer, 1980).<sup>12</sup> Thus, if the world price of imports is unchanged, buyers will purchase a differing mix of imports and domestic output as the price of domestic output rises and falls.

Once the allocation of demand between domestic output and imports in tradable sectors is determined, the price of composite domestic sales,  $P_i$ , can be calculated (Eqs. 8, 16 and 17). Given this price, the demands of the various actors in the economy for final output can be established. Households are assumed to spend fixed value shares,  $calph_i$ , of their disposable income to purchase goods from each sector  $i$  (Eq. 31). Disposable income is total household income,  $YH$ , less taxes at a tax rate  $taxh$ , interest payments  $HOUINT$ , transfers  $HTRANF$ , and household savings at an assumed fixed savings rate,  $savh_{hh}$  (Eq. 48-53).

Government demand is derived from an exogenously fixed level of real demand allocated in fixed shares among a small number of sectors (Eq. 32). Investment demand by sector is based on fixed shares,  $zz_i$ , of total investment after inventories (Eq. 33).<sup>13</sup> The last two components of final demand are increases in inventories and intermediate demand. Both of these demands are proportional to the level of output. (Eqs. 30 and 34.)

### 4. The Balance of Income and Expenditure

The description of the demand systems used above has ignored the origin of income for each agent. Households are assumed to receive all of the income from labor not sent abroad or paid to the government as taxes (Eqs. 51-52). Households also receive income

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<sup>12</sup> *An AIDS function was chosen rather than an Armington function in order to allow for non-unitary income elasticities.*

<sup>13</sup> *This is a simplified approach. Many models use a sources/destination table to determine investment demand. Unfortunately, such a table was not available for Slovenia for 1998 at this time.*

from remittances from the rest of the world and certain transfers. Transfers are assumed to be fixed in real terms. Since government consumption is fixed, government savings is assumed to be the difference between government revenue and consumption, taking into account interest payments, subsidies, and payments into the transfer account (Eq. 61). Government revenue is the sum of the various tax sources and transfers to the government (Eqs. 54-59). The balance of savings and investment is discussed in the section on closure below.

## 5. Model Closure and Numeraire

Several issues with respect to the macroeconomic closure of various markets in this model have already been discussed. For instance, labor markets will be closed either by assuming a fixed wage or a fixed labor supply. In both cases, since capital is fixed gross returns to capital will vary between sectors.

Closure between savings and investment is reached in this model by defining investment as equal to savings. Thus there is no independent investment function. Total savings is determined as a fixed share of household after-tax income combined with government and enterprise savings. Enterprise savings are defined as a fixed fraction of, after tax and interest, enterprise income. Government savings is defined as the difference between the fixed real level of government expenditure and government revenues from all taxes.

In the foreign exchange market, the exchange rate between the rest of the world and the EU is assumed fixed. Thus the exchange rates between Slovenia and the EU and the rest of the world move proportionately. Foreign exchange market closure is obtained by assuming that the exchange rate with the European Union is fixed. All inbound foreign transfers are assumed to be fixed in foreign currency. Outbound transfers are generally functions of income, though this varies from item to item. The two separate foreign exchange markets clear through changes in domestic prices and changing hard currency transfers from the rest of the world account to the EU account.

The numeraire for the model is the exchange rate with the EU.

## 6. Calibration of the Model

Many of the parameters in the model come directly from the 1998 SAM. The consumption shares,  $calph_i$ , are the shares of sector consumption in total household consumption. The intermediate uses coefficients,  $aa_j^i$ , also are derived directly from the SAM, as are the parameters for allocating investment expenditures among goods,  $zz_i$ .

While these and other parameters come from the SAM, certain behavioral parameters must be obtained from other sources. These are primarily the various elasticities of substitution and transformation used in the import and export functions. The parameters for price elasticities on the import side of the model are drawn from the GTAP model (Hertel, 1997). This was done by creating an aggregation of the GTAP model using sectors as similar as possible to those used in our version of the 1998 SAM and separating out the EU countries from the rest of the world. We then used the derived import demand elasticities

from the GTAP model for our simulations. Since the AIDS function also requires income elasticities, we drew those from Buehrer (1994)

The calculation of parameters for the export supply functions is more difficult. The GTAP model does not have similar parameters and, as noted in Buehrer (1994) and in Burkett (1983), estimation of these parameters is often problematic. For the purposes of the simulations in this model, we used a value of 2.0 for the elasticity of transformation between domestic and aggregate export goods. The elasticities of transformation between exports to the EU and to the rest of world were assumed to be higher.

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## Equations of the CGE model

### \* FOREIGN TRADE

$$\text{Eq. (1)} \quad ER^{ROW} = \left( \frac{\overline{ER}_0^{ROW}}{\overline{ER}_0^{EU}} \right) * \overline{ER}^{EU}$$

$$\text{Eq. (2)} \quad PM_i^{reg} = \overline{PWM}_i^{reg} * \overline{ER}^{reg} * (1 + tm_i^{reg})$$

$$\text{Eq. (3)} \quad AM_{itm} = a_{itm} * \left( \delta_{itm} * M_{itm}^{EU^{-\rho_{itm}}} + (1 - \delta_{itm}) * M_{itm}^{ROW^{-\rho_{itm}}} \right)^{-1/\rho_{itm}}$$

$$\text{Eq. (4)} \quad \frac{M_{itm}^{EU}}{M_{itm}^{ROW}} = \left( \frac{PM_{itm}^{ROW}}{PM_{itm}^{EU}} \frac{\delta_{itm}}{(1 - \delta_{itm})} \right)^{1/(1 + \rho_{itm})}$$

$$\text{Eq. (5)} \quad PZ_{itm} * X_{itm} = PD_{itm} * XXD_{itm} + PAM_{itm} * AM_{itm}$$

$$\text{Eq. (6)} \quad PAM_{itm} * AM_{itm} = \sum_{reg} PM_{itm}^{reg} * M_{itm}^{reg}$$

$$\text{Eq. (7)} \quad \frac{PAM_{itm} * AM_{itm}}{(PAM_{itm} * AM_{itm} + PD_{itm} * XXD_{itm})} = a_{l_{itm}} + g_{l_{itm}} * \log \left( \frac{PAM_{itm}}{PD_{itm}} \right) \\ + b_{itm} * \log \left( \frac{PAM_{itm} * AM_{itm} + PD_{itm} * XXD_{itm}}{PZ_{itm}} \right)$$

$$\text{Eq. (8)} \quad \log(PZ_{itm}) = a_{0_{itm}} + sm_{itm} * \log(PAM_{itm}) + (1 - sm_{itm}) * \log(PD_{itm})$$

$$\text{Eq. (9)} \quad PE_i^{reg} = \overline{PWE}_i^{reg} * \overline{ER}^{reg}$$

$$\text{Eq. (10)} \quad XD_{ite} = at_{ite} * \left( \gamma_{ite} * AE_{ite}^{\rho_{ITM}^T} + (1 - \gamma_{ite}) * XXD_{ite}^{\rho_{ITM}^T} \right)^{1/\rho_{ITM}^T}$$

$$\text{Eq. (11)} \quad \frac{AE_{ite}}{XXD_{ite}} = \left( \frac{PAE_{ite}}{PSD_{ite}} \right) * \left( \frac{(1 - \gamma_{ite})}{\gamma_{ite}} \right)^{1/(\rho_{ite}^T - 1)}$$

$$\text{Eq. (12)} \quad AE_{ite} = at_{ite} * \left( \chi_{ite} * E_{ite}^{EU^{\phi_{ite}}} + (1 - \chi_{ite}) * E_{ite}^{ROW^{\phi_{ite}}} \right)^{1/\phi_{ite}}$$

$$\text{Eq. (13)} \quad \frac{E_{ite}^{EU}}{E_{ite}^{ROW}} = \left( \frac{PE_{ite}^{EU}}{PE_{ite}^{ROW}} \right) * \left( \frac{(1 - \chi_{ite})}{\chi_{ite}} \right)^{1/(\phi_{ite} - 1)}$$

$$\text{Eq. (14)} \quad PZ_{inm} * X_{inm} = PD_{inm} * XXD_{inm}$$

$$\text{Eq. (15)} \quad XD_{ine} = XXD_{ine}$$

**\* PRICES**

$$\text{Eq. (16)} \quad PZ_{\text{inm}} * (1 + \text{stax}I_{\text{inm}}) = PD_{\text{inm}}$$

$$\text{Eq. (17)} \quad P_i = (1 + \text{stax}I_i) * PZ_i$$

$$\text{Eq. (18)} \quad \text{stax}I_{\text{ser}} = \text{stax}_{\text{ser}} * \text{eutax}$$

$$\text{Eq. (19)} \quad \text{stax}I_{\text{nser}} = \text{stax}_{\text{nser}}$$

$$\text{Eq. (20)} \quad PD_i = (1 - \text{sub}_i) * PSD_i$$

$$\text{Eq. (21)} \quad PX_{\text{ite}} * XD_{\text{ite}} = PSD_{\text{ite}} * XXD_{\text{ite}} + PAE_{\text{ite}} * AE_{\text{ite}}$$

$$\text{Eq. (22)} \quad PAE_{\text{ite}} * AE_{\text{ite}} = \sum_{\text{reg}} (PE_{\text{ite}}^{\text{reg}} * E_{\text{ite}}^{\text{reg}})$$

$$\text{Eq. (23)} \quad PX_{\text{ine}} = PSD_{\text{ine}}$$

$$\text{Eq. (24)} \quad PX_i * (1 - \text{indtax}_i) = PV_i + \sum_j (aa_i^j * P_j^i)$$

$$\text{Eq. (25)} \quad PK_i = \sum_j (P_j * zz_j)$$

$$\text{Eq. (26)} \quad \text{PINDEX} = PVGDP / RGDP$$

**\* OUTPUT AND EMPLOYMENT**

$$\text{Eq. (27)} \quad XD_i = ad_i * L_i^{\alpha_i} * \bar{K}_i^{(1-\alpha_i)}$$

$$\text{Eq. (28)} \quad \bar{W} * \text{wdist}_i * L_i = XD_i * PV_i * \alpha_i$$

$$\text{Eq. (29)} \quad LS = \sum_i L_i$$

**\* FINAL DEMAND**

$$\text{Eq. (30)} \quad INT_i = \sum_j (aa_j^i * XD_j)$$

$$\text{Eq. (31)} \quad P_i * C_i = \text{calph}_i * \left( \left( \overline{YH - HOUINT} * \text{PINDEX} \right) * (1 - \text{savh}) * (1 - \text{taxh}) \right. \\ \left. - \sum_{\text{reg}} (\overline{HHOUTFLO}_{\text{reg}} * ER_{\text{reg}}) - \overline{HTRANF} * \sum_j (\text{calph}_j * P_j) \right)$$

$$\text{Eq. (32)} \quad G_i = gg_i * \overline{GOVCON}$$

$$\text{Eq. (33)} \quad Z_i = zz_i * \frac{INVFA}{P_i}$$

$$\text{Eq. (34)} \quad STK_i = inv_i * XD_i$$

$$\text{Eq. (35)} \quad X_i = INT_i + C_i + G_i + Z_i + STK_i$$

**\* BALANCE OF PARENTS BLOCK**

$$\text{Eq. (36)} \quad LABOUR_{reg} = \frac{LABINC * labouts_{reg}}{ER_{reg}}$$

$$\text{Eq. (37)} \quad PRINT_{reg} = \frac{INTEREST * prints_{reg}}{ER_{reg}}$$

$$\text{Eq. (38)} \quad PRCAP_{reg} = \frac{OCAPINC * prcaps_{reg}}{ER_{reg}}$$

$$\text{Eq. (39)} \quad CFLIGHT_{reg} = \frac{SAVING * cflights_{reg}}{ER_{reg}}$$

$$\text{Eq. (40)} \quad TRANOUT_{reg} = \frac{TRANSFER * transouts_{reg}}{ER_{reg}}$$

$$\text{Eq. (41)} \quad HHOUTFLO_{reg} = \frac{\left( (YH - \overline{HOUINT} * \overline{PINDEX}) * (1 - savh) * (1 - taxh) \right) * hhouts_{reg}}{\overline{ER}_{reg}}$$

$$\begin{aligned} \text{Eq. (42)} \quad & \sum_{ite} \left( \overline{PWM}_{reg}^{ite} * \overline{M}_{reg}^{ite} \right) + \overline{LABOUR}_{reg} + \overline{PRINT}_{reg} + \overline{PRCAP}_{reg} + \overline{TRANOUT}_{reg} + \overline{HHOUTFLOW}_{reg} \\ & = \sum_{ite} \left( \overline{PWE}_{reg}^{ite} * \overline{E}_{reg}^{ite} \right) + \overline{LABIN}_{reg} + \overline{INTIN}_{reg} + \overline{CAPIN}_{reg} + \overline{TRANIN}_{reg} \\ & \quad + \overline{REMIT}_{reg} + \overline{FSAVING}_{REG} \end{aligned}$$

$$\text{Eq. (43)} \quad FST = \sum_{REG} (FSAVING_{REG})$$

**\* INCOME AND FLOW OF FUNDS BLOCK**

$$\text{Eq. (44)} \quad Y = \sum_i (PV_i * XD_i)$$

$$\text{Eq. (45)} \quad PVGDP = \sum_i (PV_i * XD_i) - SUBSIDY + TARIFF + SALTAX + ITAX$$

$$\text{Eq. (46)} \quad RGDP = \sum_i (C_i + G_i + Z_i + STK_i) * \overline{P}_i^0 + \sum_i \left( \overline{ER}_{reg}^0 * \left( \overline{PWE}_i^{reg0} * \overline{E}_i^{reg} - \overline{PWM}_i^{reg0} * \overline{M}_i^{reg} \right) \right)$$

$$\text{Eq. (47)} \quad INTEREST = (\overline{GOVINT} + \overline{ENTINT} + \overline{HOUINT}) * PINDEX + \sum_{reg} (\overline{INTIN}_{reg} * \overline{ER}_{reg})$$

$$\text{Eq. (48)} \quad \begin{aligned} TRANSFER = & \overline{GTRANF} * P_{PUSER} + trent0 * (1 - corptax) * (\overline{ENTINC} - \overline{ENTINT} * PINDEX) \\ & + HTRANF * \sum_i (calph_i * P_i) + \sum_{reg} (\overline{TRANIN}_{reg} * \overline{ER}_{reg}) \end{aligned}$$

$$\text{Eq. (49)} \quad OCAPINC = ocent0 * (1 - corptax) * (\overline{ENTINC} - \overline{ENTINT} * PINDEX) + \sum_{reg} (\overline{CAPIN}_{reg} * \overline{ER}_{reg})$$

$$\text{Eq. (50)} \quad \begin{aligned} ENTINC = & \sum_i (PV_i * XD_i - \overline{W} * wdist_i * L_i) + einter * \left( (1 - taxint) * INTEREST \right) - \sum_{reg} (PRINT_{reg} * \overline{ER}_{reg}) \\ & + etranO * \left( TRANSFER - \sum_{reg} (TRANOUT_{reg} * \overline{ER}_{reg}) \right) \end{aligned}$$

$$\text{Eq. (51)} \quad LABINC = \sum_i (\overline{W} * wdist_i * L_i)$$

$$YH = \sum_i (\overline{W} * wdist_i * L_i) + \sum_{reg} ((\overline{LABIN}_{reg} - LABOUT_{reg}) * \overline{ER}_{reg}) + \sum_{reg} (\overline{REMIT}_{reg} * \overline{ER}_{reg})$$

$$\text{Eq. (52)} \quad \begin{aligned} & + hinter * \left( (1 - taxint) * INTEREST \right) - \sum_{reg} (PRINT_{reg} * \overline{ER}_{reg}) \\ & + \left( OCAPINC - \sum_{reg} (PRCAP_{reg} * \overline{ER}_{reg}) \right) + htran0 * \left( TRANSFER - \sum_{reg} (TRANOUT_{reg} * \overline{ER}_{reg}) \right) \\ & + hoent0 * (1 - corptax) * (\overline{ENTINC} - \overline{ENTINT} * PINDEX) \end{aligned}$$

$$\text{Eq. (53)} \quad HNSAV = savh * (YH - \overline{HOUINT} * PINDEX) * (1 - taxh)$$

## \* GOVERNMENT REVENUES BLOCK

$$\text{Eq. (54)} \quad TARIFF = \sum_{ite} \sum_{reg} (tm_{reg}^{ite} * M_{reg}^{ite} * PWM_{reg}^{ite} * \overline{ER}_{reg})$$

$$\text{Eq. (55)} \quad SALTAX = \sum_i (PZ_i * X_i * stax1_i)$$

$$\text{Eq. (56)} \quad HHTAX = taxh * (YH - \overline{HOUINT} * PINDEX)$$

$$\text{Eq. (57)} \quad ENTAX = corptax * (\overline{ENTINC} - \overline{ENTINT} * PINDEX)$$

$$\text{Eq. (58)} \quad ITAX = \sum_i (indtax_i * PX_i * XD_i)$$

$$\text{Eq. (59)} \quad GR = \text{TARIFF} + \text{SALTAX} + \text{HHTAX} + \text{ENTTAX} + \text{TAXINT} * \text{INTEREST} + \text{ITAX} \\ + \text{gtran0} * \left( \text{TRANSFER} - \sum_{reg} (\text{TRANOUT}_{reg} * \text{ER}_{reg}) \right)$$

$$\text{Eq. (60)} \quad \text{SUBSIDY} = \sum_i (\text{sub}_i * \text{PSD}_i * \text{XXD}_i)$$

### \* SAVINGS AND INVESTMENTS BLOCK

$$\text{Eq. (61)} \quad GR = \sum_i (P_i * G_i) + \text{GOVSAV} * PK_{PUSER} + \text{SUBSIDY} + \overline{\text{GTRNF}} * P_{PUSER} + \overline{\text{GOVINT}} * \text{PINDEX}$$

$$\text{Eq. (62)} \quad \text{DEPREC} = \sum_i (\text{depr}_i * PK_i * K_i)$$

$$\text{Eq. (63)} \quad \text{INVSTK} = \sum_i (\text{STK}_i * P_i)$$

$$\text{Eq. (64)} \quad \text{SAVING} = \text{HNSAV} + \text{GOVSAV} * PK_{PUSER} + \text{DEPREC} \\ + \text{saent0} * (1 - \text{corptax}) * (\text{ENTINC} - \overline{\text{ENTINT}} * \text{PINDEX}) \\ + \sum (\text{FSAVING}_{REG} * \overline{\text{ER}}_{REG})$$

$$\text{Eq. (65)} \quad \text{SAVING} - \text{INVEST} = \text{WALRAS}$$

$$\text{Eq. (66)} \quad \text{INVFA} = \text{INVEST} - \text{INVSTK}$$

### • OBJECTIVE FUNCTION

$$\text{Eq. (67)} \quad \text{OMEGA} = \prod_i (C_i * \text{calph}_i)$$

## VARIABLES

AE <sub>i</sub>	Aggregate Exports	PSD <sub>i</sub>	Price Received For Domestic Sales
AM <sub>i</sub>	Aggregate Imports	PV <sub>i</sub>	Value Added Price By Sector
C <sub>i</sub>	Final Demand For Private Consumption	PVGD <sub>P</sub>	GDP At Market Prices
CAPIN <sup>reg</sup>	Inward Payments To Capital	PWE <sub>i</sub> <sup>reg</sup>	World Market Price Of Exports
FSAVING <sup>reg</sup>	Net foreign savings by region	PWM <sub>i</sub> <sup>reg</sup>	Market Price Of Imports
FST	Total net foreign savings	PX <sub>i</sub>	Average Output Price By Sector
DEPREC	Total Depreciation Expenditure	PZ <sub>i</sub>	Selling Price Of Composite Goods
E <sub>i</sub> <sup>reg</sup>	Exports By Sector And Region	REMIT <sup>reg</sup>	Remittance To Households From The Row
ENTINC	Enterprise Income	RGDP	Real GDP
ENTINT	Enterprise Interest Payments	SALTAX	Sales Tax Revenue
ENTTAX	Enterprise Taxes	SAVING	Total Savings
ER <sup>reg</sup>	Nominal Exchange Rate	STAX1 <sub>i</sub>	Sales Tax Rate
EUTAX	Additional sales tax	STK <sub>i</sub>	Inventory Investment By Sector
G(I)	Final Demand For Government Consumption	SUBSIDY	Production Subsidy Amount
GOVCON	Total Volume Of Government Consumption	TARIFF	Tariff Revenue
GOVINT	Government Interest Payments	TRANIN <sup>reg</sup>	Inward Payments To Transfers
GOVSAV	Government Savings	TRANOUT <sup>reg</sup>	Outward Transfers
GR	Government Revenue	TRANSFER	Total Resources Transferred
GTRANF	Transfers To Government	W	Average Wage Rate By Labor Category
HHOUTFLO <sup>reg</sup>	Outward Household Payments	WALRAS	Variable To Verify Walras Law
HHSAV	Total Household Savings	X <sub>i</sub>	Composite Goods Supply
HHTAX	Household Tax Revenue	XD <sub>i</sub>	Domestic Output By Sector
HOUINT	Household Interest Payments	XXD <sub>i</sub>	Domestic Sales
HTRANF	Transfers To Households	Y	Private GDP
INT(I)	Intermediates Uses	YH	Total Income By Household Type
INTEREST	Interest Income	Z <sub>i</sub>	Final Demand For Productive Investment
INTIN <sup>reg</sup>	Inward Payments To Interest		
INVEST	Total Investment		
INVFA	Investment In Fixed Assets		
INVSTK	Inventory Investment		
ITAX	Indirect Tax Revenue		
K <sub>i</sub>	Capital Stock By Sector		
L <sub>i</sub>	Employment By Sector And Labor Category		
LABIN <sup>reg</sup>	Inward Payments To Labor		
LABINC	Labor Income		
LABOUT <sup>reg</sup>	Outward Payments By Labor		
LS	Labor Supply By Labor Category		
M <sub>i</sub> <sup>reg</sup>	Imports By Sector And Region		
OCAPINC	Other Capital Income		
OMEGA	Objective Function Value		
P <sub>i</sub>	Buying Price Of Composite Goods		
PAE <sub>i</sub>	Price Of The Aggregate Export Good		
PAM <sub>i</sub>	Price Of Aggregate Import Good		
PD <sub>i</sub>	Price Paid For Domestic Sales		
PE <sub>i</sub> <sup>reg</sup>	Domestic Price Of Exports		
PINDEX	GDP Price Deflator		
PK <sub>i</sub>	Price Of Composite Capital Good By Sector		
PM <sub>i</sub> <sup>reg</sup>	Domestic Price Of Imports		
PRCAP <sup>reg</sup>	Outward Capital Payments		
PRINT <sup>reg</sup>	Private Interest Payments		

## PARAMETERS

a0 <sub>i</sub>	Aids Import Demand Price Index Intercept Term	indtax <sub>i</sub>	Indirect Tax Rates By Sector
a1 <sub>i</sub>	Aids Import Demand Base Share	inv <sub>i</sub>	Ratio Of Inventory Investment To Gross Output
aa <sub>i,j</sub>	Input-Output Coefficient Table	labouts <sup>reg</sup>	Share of Payments from Labor to Each Region
ad <sub>i</sub>	Production Function Shift Parameter	ocento	Fraction Of Enterprise Income Going To Other Capital
α <sub>i</sub>	Labor Share Parameter In Production Function	prcaps <sup>reg</sup>	Share To Each Region of Outbound Capital Payments
a <sub>i</sub>	Shift Parameter For Import Source Armington Function	prints <sup>reg</sup>	Share To Each Region Of Outbound Private Interest Payments
at <sub>i</sub>	CET Function Shift Parameter		
at1 <sub>i</sub>	Shift Parameter For Export Source CET Function	ρ <sub>i</sub>	Elasticity Parameter For Import Source Armington Function
b <sub>i</sub>	Aids Import Demand Income Effect Coefficient	ρ <sup>t</sup> <sub>i</sub>	Cet Function Elasticity Parameter
bt <sub>i</sub>	CET Function Share Parameter	φ <sup>t</sup> <sub>i</sub>	Elasticity Parameter For Export Source Cet Function
calph <sub>i</sub>	Cobb Douglas Consumption Parameters	saento	Fraction Of Enterprise Income Going To Savings
corptax	Tax Rate On Corporations	savh	Marginal Propensity To Save Of Households
delta <sub>i</sub>	Share Parameter For Import Source Armington Function	stax <sub>i</sub>	Sales Tax On Domestic Production
depr <sub>i</sub>	Depreciation Rates	sub <sub>i</sub>	Rate Of Subsidy By Sector
einter	Fraction Of Interest Income Going To Enterprises	taxh	Income Tax Rate On Households
etrano	Fraction Of Transfer Income Going To Enterprises	taxint	Tax Rate On Interest Income
gl <sub>i</sub>	Aids Import Demand Price Effect Coefficient	tm <sub>i</sub> <sup>reg</sup>	Tariff Rates On Imports
γ <sub>i</sub>	Share Parameter For Domestic Vs Export CET Function	tranouts <sup>reg</sup>	Share of Transfers Going to Each Region
χ <sub>i</sub>	Share Parameter For Export Source CET Function	trento	Fraction Of Enterprise Income Going To Transfers
gg <sub>i</sub>	Government Consumption Shares	wdist <sub>i</sub>	Ratio Of Sector Wage To Average Wage
gtrano	Fraction Of Transfer Income Going To Government	zz <sub>i</sub>	Shares Of Investment By Sector Of Destination
hhouts <sup>reg</sup>	Share of Household Payments Abroad Going to Each Region		
hinter	Fraction Of Interest Income Going To Households		
hoento	Fraction Of Enterprise Income Going To Households		
htrano	Fraction Of Transfer Income Going To Households		

## INDICES

i	Sectors
reg	Regions: EU and ROW
itm	Tradable Import Sectors
ite	Tradable Export Sectors
inm	Non-Tradable Import Sectors
ine	Non-Tradable Import Sectors
ser	Service sectors
nser	Non-service sectors