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Trade Liberalization in Latin America and Eastern Europe: The Cases of Ecuador and Slovenia*

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Abstract

This paper analyzes the potential effects of two ongoing trade liberalization experiences: Ecuador signing a Free Trade Agreement with the United States and Slovenia joining the European Union as a full member. We construct a static Applied General Equilibrium Model and perform a numerical experiment that consists on eliminating all import tariffs that Ecuador and Slovenia impose on the United States and European Union, respectively. To calibrate our models, we work with Input-Output tables and construct a Social Accounting Matrix for each country. We perform additional numerical experiments, such as sensitivity analysis on the import and export elasticities of substitution, a partial liberalization scenario, the fiscal impact of eliminating the tariff revenues and how this loss can be compensated with other taxes, and an alternative trade liberalization framework for Slovenia. We find that both countries benefit from these trade liberalization reforms, with prices falling in the import sector and production rising in the export sector. However, different forms of trade liberalization (free trade agreement vs. customs union) have different implications on the patterns of trade and welfare.

JEL classification: F14, F15.
Keywords: Trade Liberalization, Free Trade Agreement, Customs Union, Fiscal Policy, Social Accounting Matrix, Ecuador, Slovenia.

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1 Introduction

In the recent years, a wave of trade liberalization episodes has swept the globe. In May 2004, ten countries in Central and Eastern Europe (Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, and Slovenia) joined the European Union as full members. In Latin America, several countries in the region have signed or are currently under negotiations for a bilateral Free Trade Agreement (FTA) with the United States. The Chile-United States Free Trade Agreement entered into effect in January 2004. Negotiations of the DR-CAFTA (the set of bilateral Free Trade Agreements between the Dominican Republic (DR), Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and the United States) ended in 2005 and it is expected to enter into effect by 2006. Colombia, Ecuador and Peru are currently negotiating similar FTAs with the United States. Other countries are expected to start negotiations in the near future.

These trade liberalization reforms propose, among other things, the elimination of all tariffs and non-tariff barriers among the signing parties. For example, the North American Free Trade Agreement (which has been used as a template for the FTAs under negotiation in Latin America), mandated the complete elimination of tariffs on trade among the United States, Mexico and Canada over a period of 15 years, and a substantial elimination of the non-tariff barriers over the same period. Therefore, these trade liberalization reforms can potentially have a large impact on the economies of the signing countries, especially if the trade relationship is important for at least one of the parties.

This paper concentrates on the effects of two of these ongoing trade liberalization episodes: Ecuador signing a FTA with the United States, and Slovenia joining the European Union. Although these are two small economies, the impact of these reforms is potentially large, because both the United States and the European Union are the main trade partners of Ecuador and Slovenia, respectively.

Many questions arise: What are the effects on the production structure of the economy? What sectors' output will expand or contract? Will exports or imports of a particular sector increase or decrease? What are the magnitudes of these changes? What will happen to the prices that domestic consumers face? What will happen to the welfare of the consumers as trade is liberalized? This paper aims to provide a quantitative answer to most of these questions.

To conduct our analysis, a standard static applied general equilibrium model is used, following the tradition of Shoven and Whalley (1984). Applied general equilibrium models have been the tool of choice to analyze the effects of these particular trade liberalization reforms. Examples of applied general equilibrium models used to quantify the effect of trade liberalization policies can be found, for instance, in Kehoe (1996) or Kehoe (2004).

Using Input-Output tables, we construct Social Accounting Matrices (SAM) for Ecuador and Slovenia, and these matrices are then used to calibrate most of the parameters of the artificial economies that are modelled. Once the model has been completely specified and the parameters have been calibrated, two simple comparative statics experiments are performed (labelled as the "benchmark" numerical experiments). For the case of Ecuador, the tariffs that Ecuador imposes on United States imports and the tariffs that the United States imposes on Ecuadorian imports are eliminated (all other tariff rates on other trade partners' imports

are kept unchanged) and the effects on sectoral production, exports, imports, prices and welfare are highlighted. For Slovenia, we assume that Slovenia and the European Union eliminate the import tariffs that they impose on one another, and that Slovenia, as a new member of the European Union, adopts the European Union's tariff schedule for imports from the rest of the world. Similarly, the effects on sectoral output, exports, imports, prices and welfare are traced out.

Note that the experiments conducted on Ecuador and Slovenia are different: because Ecuador is only signing a bilateral FTA with the United States, Ecuador does not necessarily have to change its tariff schedule for imports with the rest of the world. On the other hand, Slovenia, as a new member of the European Union, must adopt the tariff schedule that the EU, as a customs union (although membership of the EU implies much more than a customs union), imposes on imports from the rest of the world.

We find that for Ecuador, domestic production increases in the export sectors while prices fall in the main import sectors. Exports of primary and manufactured goods to the United States increase by 35% as a result of trade creation, while imports from the United States also increase by 46%. Despite improvement in the consumer welfare (0.90%), the overall social welfare increases by 0.21%, due to large tariff revenue loss and subsequent decline in government welfare (-4.36%). For Slovenia, the effects on prices and domestic production are similar to those of Ecuador, but since some sectors are both export and import intensive, the patterns are not as clear as those of Ecuador. Prices fall in the food & beverage, textile, leather, and transport sectors, whereas domestic production increases in the primary, textile, transport and other manufacturing sectors. The effects of trade creation are also large for Slovenia, with exports to and imports from the European Union increasing by 47% and 32%, respectively. Since Slovenia adopts a more protectionist tariff schedule of the European Union, the government tariff revenue increases by 4%. Coupled with increases in both the consumer and the government welfare, the social welfare also increases by 1.66%.

To complement the analysis, we perform several additional numerical experiments. For example, since most trade liberalization agreements follow a gradual transition period rather than an instantaneous tariff removal, we conduct a numerical experiment to assess the implications of a "partial" liberalization where the tariff rates are not completely removed but instead lowered to a uniform rate. The qualitative implications from the partial liberalization are similar to the benchmark case, but quantitatively, the magnitude is smaller as a partial liberalization can be interpreted as an intermediate step towards full liberalization. As for welfare analysis, the social welfare improves by 0.10% for Ecuador and 1.38% for Slovenia, respectively.

In addition, in the benchmark numerical experiment all the elasticities of substitution (for both imports and exports) were assumed to be the same across sectors. We perform a sensitivity analysis with differentiated values for the import elasticities of substitution for each sector, and explore the implications on prices, production, trade, and welfare. We take two sets of values from the literature, one from Hummels (2001) and the other from Rolleigh (2003). The quantitative implications are further amplified for sectors with higher elasticities of substitution. For example, Rolleigh (2003) reports import elasticities of substitution parameter ρ_m to be 0.91 in the transportation equipments sector. Compared to the benchmark case where $\rho_m = 0.9$ for all sectors, the domestic production in the transport sector

falls by more than 15% in Ecuador, which is more than three times the magnitude shown under the benchmark case (-4%). As for external trade, exports to the United States for Ecuador increase by 38%-59%, while imports from the United States increase by 52%-84%. For Slovenia, exports to the European Union increase by 33%-49%, whereas the imports from the European Union increase by 48%-64%. Especially, in the food and beverage sector, where Rolleigh (2003) reports import elasticities of substitution parameter ρ_m of 0.95, changes in the imports from the European Union and from the rest of the works are four times larger in magnitude than those under the benchmark case.

Also, a numerical experiment that is relevant for policy-makers in Ecuador is performed: in developing economies like Ecuador, tariff revenues not only are used to protect certain productive sectors, but also represent an important source of revenues for the central government. Between 1990 and 2004, tariff revenues in Ecuador have accounted, on average, for around 10% of the total revenues of the central government. Recall that the United States is the main trade partner of Ecuador. Thus, by signing the Free Trade Agreement and eliminating all tariff rates on imports from the United States, the Ecuadorian government is sacrificing an important stream of revenues. Our numerical experiment consists of finding what increase in other taxes (specifically, the Value Added Tax) must be imposed to compensate the loss of revenues generated by giving up the tariffs on US imports. We find that the required increase in the effective VAT rate ranges from 0.5% to 1.0%. However, raising the taxes puts burden on the consumer side and lowers the magnitude of consumers welfare. Compared to the benchmark case (0.90%), the consumer welfare rises by 0.2%-0.4%.

Similarly, a numerical experiment is performed for Slovenia. We discover that, by joining the European Union, Slovenia must adopt a tariff schedule that is more protectionist than the one it previously had. This is especially important for the case of primary goods, which Slovenia mainly imports from countries outside the European Union. The numerical experiment that we perform allows Slovenia to mutually eliminate its tariff barriers with the European Union while retaining its tariff schedule with the rest of the world. Under this "free trade agreement" experiment, both the exports and imports with the rest of the world increase, contrary to the benchmark case where the trade with the rest of the world decreases significantly. As for the welfare, consumer welfare gain is approximately 28% larger while the government welfare gain is around 70% smaller than those under the benchmark case. The overall social welfare gain is around 1.58%, slightly less than the gain shown under the benchmark case.

Our final experiment involves a sensitivity analysis on the parameter governing the export elasticity of substitution, ρ_x. We test for different values of ρ_x ranging from 0.8 to 0.95 and check the robustness of our results on the welfare analysis for Ecuador and Slovenia. For Ecuador, we compare the different results of trade liberalization scenarios and confirm that the full liberalization case of free trade agreement always results in higher social welfare than the case of partial liberalization, regardless of the value of ρ_x. For Slovenia, this is not always the case. For values of ρ_x lower than 0.93, the social welfare increase is higher under the customs union than under the free trade agreement. However, for values of ρ_x higher than 0.93, the welfare increase becomes larger under the free trade agreement. All these results are in line with the implications of optimal tariff discussed by Johnson (1954).

The remainder of this paper is organized as follows: Section 2 provides a brief overview of

the external sectors of both Ecuador and Slovenia, discusses the sectoral disaggregation that is used, and details the sources and features of the data that is used. Section 3 presents the model used, and Section 4 describes the calibration results; Section 5 discusses the results of the benchmark numerical experiment, as well as the results of the additional numerical experiments mentioned above; Section 6 presents some concluding remarks, and lays out some possible extensions for future research.

2 Background and Data

2.1 A Brief Overview

This section provides a brief overview of the main features of the foreign sectors of Ecuador and Slovenia. This overview is not intended to be a comprehensive description of the external sectors of these two countries, but rather a quick summary of their most important features. A more detailed exposition can be found in the Trade Policy Reviews that the World Trade Organization publishes. The most recent Trade Policy Review for Ecuador is the June 2005 issue and for Slovenia is the May 2002 issue.

Ecuador. Ecuador is a relatively open economy. From 1990 to 2004, the "openness" ratio (the sum of exports plus imports as a percentage of GDP) was around 60%, on average. Ecuador's main trade partner is the United States. According to Figure 1 in the Appendix, in 2004 the US accounted for 42.85% of Ecuador's merchandise exports and 16.52% of its imports. Another important trade partner is the Andean Community (a regional trade bloc composed of Bolivia, Colombia, Ecuador, Peru, and Venezuela), which accounted, in 2004, for roughly 13.43% of Ecuador's exports and 24.3% of its imports. The European Union, Japan, Korea and, more recently, China are among other important trade partners.

In terms of trade composition, Ecuador is basically an exporter of primary goods. Its main export goods are crude petroleum, bananas, flowers, and shrimp. On the other hand, it mainly imports chemical products, machinery and transportation equipments, and capital goods. Figure 2 in the Appendix contains more detailed information regarding the composition of imports and exports for Ecuador.

Finally, it is important to note that Ecuador has a relatively low tariff rate schedule. The weighted average tariff rate implied by the data is 5.89% (the simple average of the tariff rate code is around 11%). However, there are certain sectors that are heavily protected, such as cereals, shrimp, textiles, and transportation equipment, with implied tariff rates of 13.20%, 20%, 9.88% and 12.93%, respectively.

Slovenia. Since its independence in 1991, Slovenia has become a very open economy. From 1991 to 2003, the "openness" ratio has averaged 118%. The European Union is by far its most important trade partner, accounting, in 2004, for roughly 60% of Slovenia's exports and more than 80% of its imports. Other trade partners include Croatia, the United States and Bosnia and Herzegovina, but their individual importance is very small when compared to the European Union. Figure 3 in the Appendix contains a more detailed breakdown of the relative weights of Slovenia's trade partners.

In terms of foreign trade composition, primary goods represent a small fraction of Slovenia's imports and exports (accounting for 6% and 17% in 2000, respectively), but the majority of the foreign trade of primary goods is conducted with non-members of the European Union. Around 55% of both exports and imports of primary goods in 2001 was with non-EU members. In contrast, trade in manufactured goods is strongly biased towards members of the European Union. Around 62% of total exports of manufactures and 70% of total imports of manufactures were with EU countries. More detailed information can be found in Figures 4 and 5 in the Appendix.

Slovenia has a relatively low tariff schedule, especially when compared to the European Union's tariff schedule. Figure 6 in the Appendix shows the tariff rates for the sectors used in Slovenia's analysis. In general, Slovenia's tariff rates are lower than those of the European Union, and this difference is more evident in the primary goods and food and beverage sectors. This might have a potentially large effect in terms of how Slovenia's imports will evolve in the future. By adopting a more protectionist tariff schedule, Slovenian imports of primary goods will likely switch from non-EU members to EU members.

2.2 Sectoral Disaggregation

As mentioned earlier, the main objective of this paper is to quantify the impact of these trade liberalization reforms on the different productive sectors of Ecuador's and Slovenia's economies. Therefore, an important factor in this analysis is finding the correct level of sectoral disaggregation. We used a variety of criteria (i.e., the relative importance of the sector in the total economy, the level of tariff protection that the sector enjoys, the relative importance of the sector in the total imports or exports, and so on), to determine the number of sectors. The sectoral disaggregation we choose for Ecuador and Slovenia is the following:

Table 2.1: Sectoral Disaggregation for Ecuador and Slovenia

Ecuador	Slovenia
Bananas	Primary Goods
Cereals	Food and Beverages
Flowers	Leather
Petroleum (Crude Oil)	Wood and Furniture
Other Primary Goods	Textiles
Shrimp	Transportation Equipment
Textiles	Other Manufactures
Chemical Products	Services
Transportation Equipment	
Other Manufactures	
Services	

The model presented in the next section is flexible enough that it allows us to use a finer or coarser level of disaggregation than the one we have chosen here, in case a specific sector needs to be highlighted or a more compact aggregation is desired.

2.3 Social Accounting Matrices

Once the relevant sectoral decomposition is defined, Social Accounting Matrices (SAM) for Ecuador and Slovenia have to be constructed. A SAM is a record of all the transactions that take place in an economy during a particular period. The SAMs we construct are crucial elements for the numerical specification of the model described in the following section. The use of SAMs in Applied General Equilibrium Models is discussed, for example, in Kehoe (1996).

Input-Output tables are the main source for constructing each Social Accounting Matrix. For Ecuador, we use the most recently available Input-Output table, which is from 2001. This table contains 47 industries and 47 products. Other data sources are the Foreign Trade Statistics, produced by the Central Bank of Ecuador.

The analysis for Slovenia uses the Input-Output table from 2001 because it is likewise the most recently available one. This table consists of 60 industries and 60 products. Other data sources that we use are the Foreign Trade Statistics and the Trade in Services Statistics, produced by the Statistical Office of the Republic of Slovenia and the Bank of Slovenia.

Additional statistical sources could be used if a finer level of disaggregation is desired. For example, if we wanted to measure the effects of these trade liberalization reforms on the different types of households (rural/urban, high skilled/ low skilled), we could use the national household income and expenditure surveys to disaggregate the households. At this point, however, we do not conduct such decomposition.

3 The Model

The model is a standard static applied general equilibrium model that follows the tradition of Shoven and Whalley (1984). There are several agents in the economies of Ecuador and Slovenia: households, producers (firms), a domestic government, and foreign trade partners. For Ecuador, we consider the United States, the Andean Community, and the rest of the world as its trade partners. For Slovenia, the European Union (which includes the 15 members that belonged to the Union before the May 2004 expansion plus the new 9 members) and the rest of the world are considered as trade partners. For notational purposes, we will denote by T the set of trade partners for each economy. We describe the main features of the agents in detail.

3.1 Domestic Production Firms

We assume that the final goods are produced combining a locally-produced component and an imported component. The domestic production firms produce the domestic component of the final goods. They use intermediate inputs from all sectors in fixed proportions, and also combine capital and labor using a Cobb-Douglas technology for output. The production function of the domestic firm producing good j is:

$$y_{j,d} \;=\; \min\left\{x^d_{1,j}/a^d_{1,j}\,,\;\ldots\,,\;x^d_{j,j}/a^d_{j,j}\,,\;\ldots\,,\;x^d_{n,j}/a^d_{n,j}\,,\;\beta_j k_j^{\alpha_j}\ell_j^{(1-\alpha_j)}\right\} \tag{1}$$

where $\{1, ..., j, ..., n\}$ are the goods in $\mathsf{G_P}$, the set of the production goods; $y_{j,d}$ is the output of domestic firm j, $x^d_{i,j}$ is the amount of intermediate inputs of good i used in the production of good j, $a^d_{i,j}$ is the unit input requirement of good i in the production of good j, and k_j and ℓ_j are the capital and labor inputs used to produce good j.

3.2 Final Production Goods Firms

The firm that produces the final production good j combines the domestic component produced by the domestic production firms with imported goods using an Armington aggregator of the form:

$$y_j \;=\; \gamma_j \left[\delta_{j,d} y_{j,d}^{\rho_{m,j}} \;+\; \sum_{i \in \mathsf{T}} \delta_{j,i} y_{j,i}^{\rho_{m,j}} \right]^{\frac{1}{\rho_{m,j}}} \tag{2}$$

where $\sigma_{m,j} = 1/(1-\rho_{m,j})$ is the constant elasticity of substitution between domestic and imported goods (note that we allow for possibly different elasticities of substitution for different goods), y_j is the output of final good j, $y_{j,d}$ is the domestic component of final good j, and $y_{j,i}$ is the imported component from each of the trade partners. Note that, when $\rho_{m,j} \to 0$, the production function takes the usual Cobb-Douglas form, i.e., $y_j = \gamma_j \left[y_{j,d}^{\delta_{j,d}} \times \prod_{i \in \mathsf{T}} y_{j,i}^{\delta_{j,i}} \right]$. Finally, imports of good j from country i are subject to and ad-valorem tariff rate $\tau_{j,i}$. The set of production goods will be denoted by $\mathsf{G_p}$.

3.3 Consumption Goods Firms

We assume that the goods households purchase are different goods than those that production firms trade in their inter-industry transactions. For example, the strawberries that a consumer purchases at a supermarket have a very high component of services embodied in them and are different from the strawberries purchased by a firm that produces strawberry jelly. Thus, the goods the households purchase are labelled "consumption goods" to differentiate them from the production goods. The consumption goods firms combine the final production goods using a fixed proportion technology to produce goods that will be purchased exclusively by the consumers. The production function for the consumption good j firm is:

$$y^c_j \;=\; \min \left\{ x^c_{1,j}/a^c_{1,j} \;,\; \ldots \;,\; x^c_{j,j}/a^c_{j,j} \;,\; \ldots \;,\; x^c_{n,j}/a^c_{n,j} \right\} \tag{3}$$

where $\{1, \ldots, j, \ldots, n\}$ are all the goods in $\mathsf{G_c}$, the set of consumption goods. An additional assumption is made: $x^c_{i,j} = 0$ for $i \neq j, ser$, that is, the consumption good j firm only uses as inputs final goods of the same sector and services. The set of consumption goods will be denoted by $\mathsf{G_c}$.

3.4 Investment Good Firms

The model includes an investment good to account for the savings observed in the data. In a dynamic model, agents save in order to enjoy future consumption. In our model, agents derive utility from consuming this investment good, just as they derive utility from consumption goods. The investment good, y_{inv}, is produced by a firm that combines the final goods as intermediate inputs using a fixed proportions technology, as follows:

$$y_{inv} = \min\left\{x^{inv}_{1,inv}/a^{inv}_{1,inv},\ \ldots, x^{inv}_{j,inv}/a^{inv}_{j,inv},\ \ldots, x^{inv}_{n,inv}/a^{inv}_{n,inv}\right\} \tag{4}$$

3.5 The Government

A look at the SAM shows that goverments make purchases of some goods and also that they run deficits or surpluses. To account for this observation, we assume that, in the model economy, the government is another agent which enjoys utility from consuming (production) goods and the investment good. Purchases of these must be financed by the revenues derived from direct and indirect taxes and tariffs revenues. The problem of the government is then:

$$\begin{aligned} \max \quad & \sum_{i\in \mathsf{G_P}} \theta_{g,i}\log c_{g,i} + \theta_{g,inv}\log c_{g,inv} \\ \text{s.t.} \quad & \sum_{i\in \mathsf{G_P}} p_i c_{g,i} + p_{inv}c_{g,inv} = \tau_d(w\bar{\ell} + r\bar{k}) + \sum_{j\in \mathsf{G_P}} t_{p,j}p_{d,j}y_{d,j} \\ & \qquad + \sum_{j\in \mathsf{G_C}} t_{c,j}p_{c,j}y_{c,j} + \sum_{i\in \mathsf{T}}\sum_{j\in \mathsf{G_P}} \tau_{j,i}e_i\bar{p}_{j,i}y_{j,i} \end{aligned} \tag{5}$$

The left-hand side of the budget constraint of the government includes the purchases of goods and the investment good. The right-hand side of the equation includes the tax and tariff revenues: the first term is the direct tax (on the households income) receipts, the second and third terms are the revenues collected from taxing the domestic firms and consumption good firms, and the last term represents the tariff revenues collected.

3.6 Households

In each country there is a representative household that derives utility from consumption goods. Additionally, we model household savings observed in the data as purchases of the investment good. The problem of the household is:

$$\begin{aligned} \max \quad & \sum_{j\in \mathsf{G_C}} \theta_{c,j}\log c_j + \theta_{c,inv}\log c_{inv} \\ \text{s.t.} \quad & \sum_{j\in \mathsf{G_C}} p_{c,j}c_j + p_{inv}c_{inv} + \sum_{f\in \mathsf{T}} e_f\bar{p}_{f,inv}c_{inv,f} = (1-\tau_d)(w\bar{\ell} + r\bar{k}) \end{aligned} \tag{6}$$

where c_j is consumption of good j, $p_{c,j}$ is the price of consumption good j, p_{inv} is the price of the investment good, c_{inv} represents the purchases of the investment goods (note that $c_{inv} = c_{d,inv} + \sum_{f \in \mathsf{T}} c_{inv,f}$, where $c_{inv,f}$ represents the purchases of the investment good from country f if the domestic economy is running a trade surplus with country f), τ_d is the direct tax rate, w is the wage rate, r is the rental rate of capital, and $\bar{\ell}$ and $\bar{k}$ are the aggregate endowments of labor and capital, respectively.

3.7 Foreign Trade Partners

Each domestic economy trades with a set of countries, T. In each trade partner country, $f \in \mathsf{T}$, there is a representative consumer that purchases imported goods $x_{j,f}$ and consumes the local good $x_{f,f}$. The problem of the foreign household in country f is:

$$\begin{aligned} \max \quad & \left[\sum_{j \in \mathsf{G_P}} \theta_{j,f} x_{j,f}^{\rho_x} + \theta_{inv,f} x_{inv,f}^{\rho_x} + \theta_{f,f} x_{f,f}^{\rho_x} - 1 \right] / \rho_x \\ \text{s.t} \quad & \sum_{j \in \mathsf{G_P}} (1 + \tau_j^f) p_j x_{j,f} + p_{inv} x_{inv,f} + e_f x_{f,f} = e_f I_f \end{aligned} \tag{7}$$

where τ_j^f is the tariff rate country f imposes on the imports of good j, ρ_x is the parameter that determines the (common) exports elasticity of substitution σ_x (i.e., $\sigma_x = 1/(1-\rho_x)$), e_f is the (bilateral) real exchange rate between the domestic economy and country f, and I_f is the income of the household in country f.

3.8 Definition of Equilibrium

An equilibrium for the economy described before is a set of prices for domestic goods $\{p_{d,j}\}_{j \in \mathsf{G_P}}$, prices for final goods $\{p_j\}_{j \in \mathsf{G_P}}$, price for the investment good p_{inv}, prices for consumption goods $\{p_{c,j}\}_{j \in \mathsf{G_c}}$, factor prices w and r, bilateral real exchange rates $\{e_f\}_{f \in \mathsf{T}}$, foreign prices $\{\bar{p}_{f,j}\}_{j \in \mathsf{G_P},\, \mathsf{f} \in \mathsf{T}}$, a consumption plan for households $\{c_j\}_{j \in \mathsf{G_c}}$ and c_{inv}, a consumption plan for the government $\{c_{g,j}\}_{j \in \mathsf{G_P}}$ and $c_{g,inv}$, a consumption plan for the household in country f $\{x_{j,f}\}_{j \in \mathsf{G_P}}$, $x_{inv,f}$ and $x_{f,f}$, a production plan for the domestic good j firm $(y_{d,j},\, x_{1,j}^d,\, \ldots,\, x_{n,j}^d,\, k_j,\, \ell_j)$, a production plan for the final good j firm $(y_j,\, y_{d,j},\, \{y_{j,f}\}_{f \in \mathsf{T}})$, a production plan for the investment good firm $(y_{inv},\, x_{1,inv}^{inv}, \ldots,\, x_{n,inv}^{inv})$, a production plan for the consumption good j firm $(y_{c,j},\, x_{1,j}^c,\, \ldots,\, x_{n,j}^c)$, such that, given tax rates and tariff rates:

- The consumption plan $\{c_j\}_{j \in \mathsf{G_c}}$, c_{inv}, solves the problem of the household.
- The consumption plan $\{c_{g,j}\}_{j \in \mathsf{G_P}}$, $c_{g,inv}$ solves the problem of the government.
- The consumption plan $\{x_{j,f}\}_{j \in \mathsf{G_P}}$, $x_{inv,f}$, $x_{f,f}$ solves the problem of the representative household of country f.

- The production plan $(y_{d,j},\ x^d_{1,j},\ \ldots,\ x^d_{n,j},\ k_j,\ \ell_j)$ satisfies

$$y_{d,j} = \min\left\{\frac{x^d_{1,j}}{a^d_{1,j}}, ..., \frac{x^d_{j,j}}{a^d_{j,j}}, ..., \frac{x^d_{n,j}}{a^d_{n,j}}, \beta_j k_j^{\alpha_j}\ell_j^{(1-\alpha_j)}\right\}$$

$$(1+t_{p,j})p_{d,j}y_{d,j} - \sum_{i\in \mathsf{G_P}} p_i x^d_{i,j} - w\ell_j - rk_j \leq 0, = 0 \quad \text{if} \quad y_{d,j} > 0$$

- The production plan $(y_j,\ y_{d,j},\ \{y_{j,f}\}_{f\in\mathsf{T}}\})$ satisfies

$$p_j y_j - p_{d,j}y_{d,j} - \sum_{f\in\mathsf{T}}(1+\tau_{j,f})e_f\bar{p}_{f,j}y_{j,f} \leq 0, = 0 \quad \text{if} \quad y_j > 0$$

where $y_{d,j}$ and $\{y_{j,f}\}_{f\in\mathsf{T}}\}$ solve

$$\begin{aligned} \min \quad & (1+t_{p,j})p_{d,j}y_{d,j} + \sum_{f\in\mathsf{T}}(1+\tau_{j,f})e_f\bar{p}_{f,j}y_{j,f} \\ \text{s.t} \quad & \gamma_j\left[\delta_{j,d}y^{\rho_m}_{d,j} \ + \ \sum_{i\in\mathsf{T}}\delta_{j,i}y^{\rho_m}_{j,i}\right]^{1/\rho_m} = y_j \end{aligned}$$

- The production plan $(y_{inv},\ x^{inv}_{1,inv}, ...,\ x^{inv}_{n,inv})$ satisfies

$$y_{inv} = \min\left\{\frac{x^{inv}_{1,inv}}{a^{inv}_{1,inv}}, ..., \frac{x^{inv}_{j,inv}}{a^{inv}_{j,inv}}, ..., \frac{x^{inv}_{n,inv}}{a^{inv}_{n,inv}}\right\}$$

$$p_{inv}y_{inv} - \sum_{i\in\mathsf{G_P}} p_i x^{inv}_{i,inv} \leq 0, = 0 \quad \text{if} \quad y_{inv} > 0$$

- The production plan $(y_{c,j},\ x^c_{1,j},\ \ldots,\ x^c_{n,j})$ satisfies

$$y_{c,j} = \min\left\{\frac{x^c_{1,j}}{a^c_{1,j}}, ..., \frac{x^c_{j,j}}{a^c_{j,j}}, ..., \frac{x^c_{n,j}}{a^c_{n,j}}\right\}$$

$$(1+t_{c,j})p_{c,j}y_{c,j} - \sum_{i\in\mathsf{G_P}} p_i x^c_{i,j} \leq 0, = 0 \quad \text{if} \quad y_{c,j} > 0$$

- Markets clear:
  - $y_j = \sum_{i\in\mathsf{G_P}} x^d_{j,i} + \sum_{i\in\mathsf{G_C}} x^c_{j,i} + x^{inv}_{j,inv} + c_{g,j} + \sum_{f\in\mathsf{T}} x_{j,f}$
  - $y_{c,j} = c_j$
  - $y_{inv} = c_{d,inv} + c_{g,inv} + \sum_{f\in\mathsf{T}} x_{inv,f}$
  - $\sum_{j\in\mathsf{G_P}} \ell_j = \bar{\ell},\ \sum_{j\in\mathsf{G_P}} k_j = \bar{k}$
- The balance of payments condition is satisfied:

$$e_f \sum_{j\in\mathsf{G_P}} \bar{p}_{f,j}y_{j,f} + p_{inv}c_{inv,f} = \sum_{j\in\mathsf{G_P}} p_j x_{j,f} + p_{inv}x_{inv,f}$$

4 Data and Calibration

We calibrate the parameters of the model so that, in equilibrium, the agents of the model replicate the same transactions that their counterparts in the real world undertake according to the Social Accounting Matrix. The Appendix contains the values of the calibrated parameters in the model economies as well as the Social Accounting Matrices of Ecuador and Slovenia. Most of the parameters can be directly calibrated from the SAM. For those parameters that cannot be calibrated from the data, we explain how we chose those values.

Trade Partners' Income. The incomes of the trade partners are extracted from the *International Financial Statistics* published by the International Monetary Fund.

Tariff Rates. The tariff rates that Ecuador and Slovenia impose on the imports from their trade partners are extracted implicitly from the Input-Output tables. We make an additional assumption that Ecuador imposes a tariff rate of zero on all imports that originate from the Andean Community (since this is the trading bloc which Ecuador is a member of). To determine the tariff rates that the trading partners impose on imports from Ecuador or Slovenia, the most recent editions of the *Trade Policy Reviews* by the World Trade Organization are used. The tariff rates imposed by Ecuador and the United States are shown in Table 4.1 and Table 4.2, respectively, while the tariff rates imposed by Slovenia and the European Union are shown in Table 4.3 and Table 4.4, respectively. To determine the tariff rates imposed by the "rest of the world", we assume that, for Ecuador, the tariffs of the rest of the world are a simple average of the tariffs imposed by the European Union and Japan; for Slovenia, the tariffs from the rest of the world are a simple average of the tariffs imposed by Japan and the United States.

Table 4.1 Tariff Rates - Ecuador

Sectors	Tariff Rates (%)
Bananas	0.0%
Cereals	13.4%
Flowers	1.3%
Petroleum	0.0%
Other Primaries	9.4%
Shrimp	22.2%
Textiles	16.1%
Chemicals	6.1%
Transport	16.4%
Other Manufactures	7.0%
Services	0.0%

Table 4.2 Tariff Rates - United States

Sectors	Tariff Rates (%)
Bananas	6.3%
Cereals	1.5%
Flowers	1.5%
Petroleum	2.2%
Other Primaries	9.7%
Shrimp	2.0%
Textiles	9.0%
Chemicals	3.7%
Transport	2.6%
Other Manufactures	4.0%
Services	0.0%

Table 4.3 Tariff Rates - Slovenia

Sectors	Tariff Rates (%)
Primary	3.0%
Food & Beverages	9.2%
Textiles	1.5%
Leather	2.3%
Wood Products	0.4%
Transport	0.6%
Other Manufactures	0.6%
Services	0.0%

Table 4.4 Tariff Rates - European Union

Sectors	Tariff Rates (%)
Primary	17.2%
Food & Beverages	12.6%
Textiles	9.5%
Leather	2.6%
Wood Products	2.3%
Transport	6.4%
Other Manufactures	5.1%
Services	0.0%

Elasticities of Substitution. Given the static nature of our model, the elasticities of substitution for exports and imports cannot be calibrated directly from the IO tables. Instead, we set different sets of values for these parameters. For our "benchmark" case, we set $\rho_{m,j} = 0.8 \ \forall j \in \mathsf{G_p}$, and $\rho_x = 0.9$. Additionally, we take two sets of values from the literature, one from Hummels (2001) and the other from Rolleigh (2003)[1]. The values used are the following:

Table 4.5: Ecuador
Import Elasticities of Substitution ($\rho_{m,j}$)

Sector	Hummels (2001)	Rolleigh (2003)
Bananas	0.59	0.80
Cereals	0.82	0.80
Flowers	0.59	0.80
Petroleum	0.82	0.80
Other Primaries	0.80	0.80
Shrimp	0.79	0.95
Textiles	0.84	0.93
Chemicals	0.82	0.77
Transport	0.86	0.91
Other Manufactures	0.81	0.91
Services	0.80	0.80

Table 4.6: Slovenia
Import Elasticities of Substitution ($\rho_{m,j}$)

Sector	Hummels (2001)	Rolleigh (2003)
Primary	0.77	0.80
Food & Beverages	0.79	0.95
Textiles	0.84	0.93
Leather	0.89	0.93
Wood Products	0.74	0.91
Transport	0.86	0.91
Other Manufactures	0.82	0.90
Services	0.80	0.80

For all cases, the export elasticity of substitution ρ_x is fixed to be 0.9. Later, in section 5.6 we conduct a sensitivity analysis by changing the values of ρ_x.

5 Results and Numerical Experiments

This section presents the results from the benchmark simulation, which examines the impact of trade liberalization on consumption good prices, total domestic production, trade volume,

[1]Rolleigh (2003) provides estimates for elasticities of substitution for manufacturing industries only. In this case, we use the same value of $\rho_{m,j}$ for the primary goods and services used in the benchmark experiment.

and welfare. For Ecuador, this implies signing a free trade agreement with the United States, while for Slovenia, this implies joining the European Union as a full-fledged member. For welfare analysis, we construct a social real income index that uses both the consumer real income index and the government real income index[2].

Next, with the benchmark simulation as a reference, we conduct five numerical experiments, each of which explores the implications on prices, production, trade, and welfare. First, we look at a case that we label as "partial" liberalization. In reality, trade liberalizations take place over a transition period. For example, the countries involved follow a carefully sequenced time agenda where they gradually lower tariff rates. We assume that the tariff rates on all primary and manufactured goods are uniformly set to 2% for the case of Ecuador and to 1% for the case of Slovenia, and we report the impact of this intermediate step on prices, allocations, and welfare. Second, we analyze how the benchmark results change when we allow for import elasticities of substitution that are different across sectors (as opposed to a uniform Armington elasticity for all sectors as in the benchmark case). For sectoral import elasticities, we take estimated numbers from Rolleigh (2003) and Hummels (2001), respectively.

Third, we realize that tariff revenues are an important source of government revenue in Ecuador. Since a free trade agreement with the United States implies an important loss of tariff revenues, we look at a possible government policy aimed to compensate for this loss. Specifically, we ask by how much the value added tax (VAT) must be raised in order to offset the loss in the tariff revenue and keep the government balance constant. We determine the effective VAT rate in the actual data from the Input-Output table and estimate the corresponding VAT rate for the benchmark economy as well as for the cases of partial liberalization and sector-by-sector import elasticities.

In our fourth experiment, we look at the hypothetical case of Slovenia signing a free trade agreement with the European Union instead of joining the European Union. This experiment could provide a useful comparison on the different types of trade liberalization.

Finally, in our last numerical experiment, we perform a sensitivity analysis to look at the relationship between different values of the export elasticity of substitution (σ_x) and the country's welfare from the trade liberalization. Specifically, we test the hypothesis argued by Johnson (1954) which documents the relationship between the elasticity of export substitution and the optimal tariff.

5.1 Benchmark Results

5.1.1 Ecuador

Table 5.1 below shows the percent change in the price of consumption goods and total domestic production after Ecuador and the United States signed a free trade agreement. The largest decline in prices takes place in the transport sector, which is the largest import

[2]The consumer real income index is given by $\prod_j c_j^{\theta_j}$, where j ranges over the consumption goods and the investment good. The government real income index is given by $\prod_j c_{g,j}^{\theta_{g,j}}$, where j ranges over the production goods and the investment good consumed by the government. The social real income index is defined as $\prod_j \mathbb{C}_j^{\Theta_j}$, where $\mathbb{C}_j = c_j + c_{g,j}$ and $\Theta_j = \frac{c_j + c_{g,j}}{\sum_j c_j + \sum_j c_{g,j}}$.

sector, while the largest increase in domestic production takes place in the bananas, flowers, and shrimp sectors, which are the three main export sectors. Details of the effect of the free trade agreement on the price and production of each disaggregate sector are shown in Table 5.1.

Table 5.1 Effect of FTA on Price and Production - Ecuador

	Consumption Good Price	Domestic Production
Bananas	0.42%	14.07%
Cereals	-0.57%	-9.29%
Flowers	0.53%	2.92%
Petroleum	-	1.11%
Other Primaries	0.28%	0.81%
Shrimp	0.51%	4.57%
Textiles	-0.12%	-0.86%
Chemicals	-0.23%	-2.29%
Transport	-1.35%	-4.08%
Other Manufactures	-0.42%	-1.67%
Services	0.44%	-0.61%

Tables 5.2 and 5.3 show the percent change in exports and imports with the United States and the rest of the world, respectively. On average, the exports and imports of all primary and manufactured goods with the United States increased by 34.80% and 46.23%, respectively. Hence, the share of Ecuador's exports to the United States increased from 38.09% to 45.87%, while the share of Ecuador's imports from the United States increased from 23.62% to 31.59%. On a disaggregate level, the exports to the United States increased in every sector, with the largest increase shown in the banana sector with an increase of around 77%. Four main export sectors, banana, shrimp, petroleum, and flower sectors, all showed robust increase of 9% or more. In contrast, the exports to the rest of the world decreased by around 2%. The imports from the United States in the transport sector, which is the largest import sector, recorded an significant increase of around 87%. Other main import sectors such as cereal, textiles and chemicals showed an increase of more than 30%. Just as with exports, imports from the rest of the world decreased for all main import sectors, except for the textile and other primaries sectors which showed a small increase of around 2%-4%. In terms of total quantity, the imports to the rest of the world decreased by 2%.

Table 5.2 Effect of FTA on Main Exports - Ecuador

	Exports to US	Exports to ROW
Bananas	76.66%	-6.34%
Flowers	9.65%	-7.73%
Petroleum	15.26%	-9.52%
Other Primaries	147.58%	-4.29%
Shrimp	15.00%	-7.86%

Table 5.3 Effect of FTA on Main Imports - Ecuador

	Imports from US	Imports from ROW
Cereals	73.48%	-6.52%
Other Primaries	60.84%	3.91%
Textiles	112.06%	1.91%
Chemicals	32.25%	-0.44%
Transport	87.15%	-11.37%
Other Manufactures	4.83%	-0.42%

Finally, we examine the impact of the free trade agreement on the national welfare. Here, the government's tariff revenue falls by 31% after signing the free trade agreement with the United States. This revenue loss is reflected in the decline in the government welfare, which fell approximately 4%. However, the consumer's welfare gain offsets the government's welfare loss, and the overall social welfare shows a slight increase, as shown in Table 5.4.

Table 5.4 Effect of FTA on Welfare - Ecuador

Welfare	Change
Consumer Welfare	0.90%
Government Welfare	-4.36%
Social Welfare	0.21%

5.1.2 Slovenia

Table 5.5 shows the percent change in the price of consumption goods and total domestic production following Slovenia's joining of the European Union. The largest decline in prices occurs in the leather and food and beverage sectors, while the biggest beneficiary in terms of domestic production is the textile sector, where production increases by 31.41%, followed by the transport sector, which shows an increase of 21.83%.

Table 5.5 Effect of Customs Union on Price and Production - Slovenia

	Consumption Good Price	Domestic Production
Primary	0.54%	1.12%
Food & Beverages	-1.06%	-4.00%
Textiles	-0.30%	31.41%
Leather	-1.25%	-2.59%
Wood Products	0.26%	-5.14%
Transport	-0.90%	21.83%
Other Manufactures	0.03%	5.06%
Services	0.67%	-2.28%

Tables 5.6 and 5.7 show the percent change in the volume of exports and imports with the European Union and the rest of the world, respectively. As for trade with the European Union, total exports and imports of goods increased by 46.71% and 31.63%, respectively. As for the composition of goods trade by destination, the share of Slovenia's export to

the European Union increased from 77.42% to 83.61%, while the share of import from the European Union increased from 68.59% to 77.13%. On a sectoral level, it is found that the largest increase in exports to the European Union took place in the primary goods sector, followed by food and beverage and textile sectors. This reflects the high trade barriers set by the European Union in those sectors before Slovenia joined the customs union. Exports and imports of transport equipments to European Union, which is the largest trade sector in Slovenia, increased by around 66% and 40%, respectively. Similarly, the imports from the European Union increased the most in the food and beverage sector, followed by the textile sector. As for trade with the rest of the world, imports suffered most, falling by approximately 12%, whereas the total exports to the rest of the world fell by around 5%. However, on a disaggregate level, as a result of higher tariff rates Slovenia adopted upon its accession to the European Union, imports from the rest of the world in the primary goods fell by around 38%.

Table 5.6 Effect of Customs Union on Main Exports - Slovenia

	Exports to EU	Exports to ROW
Primary	214.00%	-15.13%
Food & Beverages	201.11%	4.48%
Textiles	105.60%	-5.26%
Leather	20.25%	6.22%
Wood Products	-1.81%	-10.69%
Transport	65.92%	1.89%
Other Manufactures	35.24%	-6.45%

Table 5.7 Effect of Customs Union on Main Imports - Slovenia

	Imports from EU	Imports from ROW
Primary	37.07%	-37.58%
Food & Beverages	69.26%	-12.67%
Textiles	60.94%	-4.32%
Leather	24.48%	2.47%
Wood Products	12.40%	-6.11%
Transport	39.50%	-4.41%
Other Manufactures	24.45%	-9.69%

Finally, we look at the impact of joining the European Union on the national welfare. Note that in Slovenia, the tariff revenue increases by around 4% as the country adopts the protectionist tariff policy of the European Union. This explains why the government welfare increases in Slovenia, as opposed to the decrease observed in Ecuador. The overall social welfare also shows an increase of 1.66%, as shown in Table 5.8.

Table 5.8 Effect of Customs Union on Welfare - Slovenia

Welfare	Change
Consumer Welfare	1.37%
Government Welfare	2.85%
Social Welfare	1.66%

5.2 Partial Liberalization

5.2.1 Ecuador

Table 5.9 below shows the percent change in the price of consumption goods and total domestic production when Ecuador and the United States bilaterally lower the tariff rates to a uniform level of 2% on all primary and manufactured goods. Since most free trade agreements follow a gradual transition for the removal of tariffs, this step can be seen as an intermediate step toward full tariff removal. The quantitative effects are generally smaller in magnitude compared to the full liberalization case, but the qualitative implications follow the same direction.

Table 5.9 Effect of Partial Liberalization on Price and Production - Ecuador

	Consumption Good Price		Domestic Production	
	Benchmark	Partial Lib.	Benchmark	Partial Lib.
Bananas	0.42%	0.30%	14.07%	10.42%
Cereals	-0.57%	-0.45%	-9.29%	-6.65%
Flowers	0.53%	0.27%	2.92%	-1.20%
Petroleum	-	-	1.11%	-0.36%
Other Primaries	0.28%	0.16%	0.81%	0.98%
Shrimp	0.51%	0.32%	4.57%	0.16%
Textiles	-0.12%	-0.14%	-0.86%	-0.55%
Chemicals	-0.23%	-0.12%	-2.29%	-1.25%
Transport	-1.35%	-1.09%	-4.08%	-3.22%
Other Manufactures	-0.42%	-0.26%	-1.67%	-0.83%
Services	0.44%	0.30%	-0.61%	-0.16%

Next, Tables 5.10 and 5.11 show the percent change in the volume of main exports and imports to the United States and the rest of the world, respectively. On average, the total exports and imports of all primary and manufactured goods with the United States increased by 20.59% and 29.16%, respectively. In contrast, the exports and imports to the rest of the world decreased by 1.34% and 1.40%, respectively.

Table 5.10 Effect of Partial Liberalization on Main Exports - Ecuador

	Exports to US		Exports to ROW	
	Benchmark	Partial Lib.	Benchmark	Partial Lib.
Bananas	76.66%	57.03%	-6.34%	-4.87%
Flowers	9.65%	-0.73%	-7.73%	-4.55%
Petroleum	15.26%	5.34%	-9.52%	-5.47%
Other Primaries	147.58%	120.01%	-4.29%	-2.76%
Shrimp	15.00%	3.62%	-7.86%	-5.13%

Table 5.11 Effect of Partial Liberalization on Main Imports - Ecuador

	Imports from US		Imports from ROW	
	Benchmark	Partial Lib.	Benchmark	Partial Lib.
Cereals	73.48%	55.39%	-6.52%	-4.51%
Other Primaries	60.84%	39.83%	3.91%	2.96%
Textiles	112.06%	84.94%	1.91%	1.31%
Chemicals	32.25%	16.74%	-0.44%	0.19%
Transport	87.15%	68.21%	-11.37%	-9.18%
Other Manufactures	38.30%	21.78%	-0.42%	-0.02%

Finally, we examine the impact of the partial liberalization on the national welfare in Table 5.12. For the government, the tariff revenue falls by 22%. This loss is partly reflected in the decline in the government welfare, which decreases by approximately 3%. However, the consumer's welfare gain offsets this government welfare loss, and the overall social welfare remains positive, although the magnitude is halved compared to the case of full liberalization.

Table 5.12 Effect of Partial Liberalization on Welfare - Ecuador

	Change	
	Benchmark	Partial Liberalization
Consumer Welfare	0.90%	0.56%
Government Welfare	-4.36%	-3.01%
Social Welfare	0.21%	0.10%

5.2.2 Slovenia

Table 5.13 below shows the percent change in the price of consumption goods and total domestic production when Slovenia and the European Union decide to lower the tariff to a uniform 1% rate, while retaining its tariff rates toward the rest of the world. While the tariff imposed by the European Union decreases from this intermediate measure, the tariff rate imposed by Slovenia increases for most manufacturing sectors. This is because Slovenia, before its accession to the European Union, was an open economy. While it does not seem intuitive for Slovenia to raise tariffs on its imports, this can be interpreted as a step toward Slovenia adapting its tariff system to that of the European Union, which in general has higher tariff rates. The largest decline in the prices takes place in the food and beverage and leather sectors, while the largest increase in domestic production takes place in the textile and transport equipment sectors. In contrast to the full membership case shown in the benchmark case, there is a decrease in the consumption good prices and domestic production in the primary sector.

Table 5.13 Effect of Partial Liberalization on Price and Production - Slovenia

	Consumption Good Price		Domestic Production	
	Benchmark	Partial Lib.	Benchmark	Partial Lib.
Primary	0.54%	-0.14%	1.12%	-2.07%
Food & Beverages	-1.06%	-1.06%	-4.00%	-2.02%
Textiles	-0.30%	-0.37%	31.41%	28.22%
Leather	-1.25%	-0.77%	-2.59%	-3.03%
Wood Products	0.26%	0.32%	-5.14%	-6.06%
Transport	-0.90%	-0.53%	21.83%	16.11%
Other Manufactures	0.03%	0.11%	5.06%	4.01%

Next, we show the percent change in the volume of exports and imports to the European Union and the rest of the world are in Table 5.14 and 5.15, respectively. As for total trade volume with the European Union, exports and imports of goods increased by 39.97% and 21.70%. Regarding trade with the rest of the world, the both exports and imports increased slightly by 6.30% and 5.70%, respectively.

Table 5.14 Effect of Partial Liberalization on Exports - Slovenia

	Exports to EU		Exports to ROW	
	Benchmark	Partial Lib.	Benchmark	Partial Lib.
Primary	214.00%	221.18%	-15.13%	5.86%
Food & Beverages	201.11%	179.98%	4.48%	18.47%
Textiles	105.60%	92.88%	-5.26%	8.38%
Leather	20.25%	5.12%	6.22%	13.24%
Wood Products	-1.81%	-9.76%	-10.69%	0.11%
Transport	65.92%	47.04%	1.89%	10.10%
Other Manufactures	35.24%	23.88%	-6.45%	4.50%

Table 5.15 Effect of Partial Liberalization on Imports - Slovenia

	Imports from EU		Imports from ROW	
	Benchmark	Partial Lib.	Benchmark	Partial Lib.
Primary	37.07%	23.03%	-37.58%	-0.74%
Food & Beverages	69.26%	60.76%	-12.67%	-2.99%
Textiles	60.94%	46.78%	-4.32%	27.74%
Leather	24.48%	16.78%	2.47%	-2.60%
Wood Products	12.40%	4.01%	-6.11%	-4.46%
Transport	39.50%	26.15%	-4.41%	14.36%
Other Manufactures	24.45%	15.77%	-9.69%	5.14%

Finally, in Table 5.16 we present the impact of the intermediate steps for joining the European Union on the national welfare. For Slovenia, the tariff revenue remains unchanged from the partial liberalization. As for welfare, the effects are modest compared to the case of joining the European Union.

Table 5.16 Effect of Partial Liberalization on Welfare - Slovenia

	Change	
	Benchmark	Partial Liberalization
Consumer Welfare	1.37%	1.15%
Government Welfare	2.85%	2.29%
Social Welfare	1.66%	1.38%

5.3 Sector-by-Sector Elasticity of Import Substitution

5.3.1 Ecuador

Table 5.17 shows the percent change in the price of consumption goods and total domestic production when the Armington elasticities of import substitution are differentiated sector by sector, rather than set uniformly for all sectors, as in the benchmark simulation. For sectoral elasticities, we take figures from two sources, one from Rolleigh (2003) and the other from Hummels (2001), as shown in Table 4.6 and 4.7.

Table 5.17 Effect of FTA on Price and Production - Ecuador ($\sigma_{mi} \neq \sigma_{mj}$)

	Consumption Good Price		Domestic Production	
	"Rolleigh" elasticities	"Hummels" elasticities	"Rolleigh" elasticities	"Hummels" elasticities
Bananas	0.39%	0.42%	20.67%	14.78%
Cereals	-0.47%	-0.59%	-12.18%	-10.44%
Flowers	0.61%	0.55%	11.00%	4.11%
Petroleum	-	-	4.12%	1.49%
Other Primaries	0.33%	0.29%	-0.53%	0.80%
Shrimp	0.54%	0.53%	13.10%	5.65%
Textiles	-0.50%	-0.17%	-11.69%	-1.99%
Chemicals	-0.23%	-0.26%	-2.43%	-2.98%
Transport	-1.69%	-1.53%	-15.53%	-8.08%
Other Manufactures	-0.34%	-0.41%	-6.10%	-1.89%
Services	0.45%	0.45%	-0.88%	-0.66%

Tables 5.18 and 5.19 show the percent change in the volume of exports and imports to the United States and the rest of the world, respectively. On average, using the estimates taken from Rolleigh (2003), the exports and imports with the United States increased by 58.71% and 83.89%, respectively. On the other hand, using the estimates taken from Hummels (2001), the corresponding numbers were 38.44% and 52.09%, respectively. Compared to the benchmark simulation, the percent increase in trade was larger, especially when estimates were taken from Rolleigh (2003). Looking at the disaggregate level in the main import sectors, the import of transport equipments from the United States increased by between 130-193%, compared to 87% under the benchmark case. For the textile sector, under the elasticity taken from Rolleigh (2003), the percent increase in the imports from the Unites States was around 494%, which is a huge increase from 112% under the benchmark case. Other main import sectors such as cereals and chemicals showed smaller increase in imports

from the United States. In contrast, the exports to and imports from the rest of the world decreased by 3-5%, also showing larger magnitude compared to the benchmark case.

Table 5.18 Effect of FTA on Exports - Ecuador ($\sigma_{mi} \neq \sigma_{mj}$)

	Exports to US		Exports to ROW	
	"Rolleigh" elasticities	"Hummels" elasticities	"Rolleigh" elasticities	"Hummels" elasticities
Bananas	111.21%	82.04%	-8.20%	-7.22%
Flowers	28.86%	12.60%	-11.09%	-8.90%
Petroleum	34.53%	18.09%	-13.33%	-10.83%
Other Primaries	191.71%	154.39%	-7.43%	-5.40%
Shrimp	35.99%	18.13%	-10.67%	-9.00%

Table 5.19 Effect of FTA on Imports - Ecuador ($\sigma_{mi} \neq \sigma_{mj}$)

	Imports from US		Imports from ROW	
	"Rolleigh" elasticities	"Hummels" elasticities	"Rolleigh" elasticities	"Hummels" elasticities
Cereals	53.78%	81.08%	-8.48%	-6.88%
Other Primaries	46.07%	58.65%	4.10%	4.47%
Textiles	494.23%	148.76%	-2.94%	1.97%
Chemicals	17.88%	33.61%	0.35%	-0.41%
Transport	193.26%	129.94%	-30.59%	-18.71%
Other Manufactures	66.97%	38.46%	0.27%	0.02%

Finally, the impact of the full liberalization on the national welfare is examined. For the government, the tariff revenue falls by 33-36%. This loss is partly reflected in the decline in the government welfare, which fell by around 4.6-5.7%. However, the consumer's welfare gain partly offsets this government welfare loss. The overall social welfare gain is 0.03% under the estimates from Rolleigh (2003) and 0.20% under Hummels (2001), as shown in Table 5.20.

Table 5.20 Effect of FTA on Welfare - Ecuador ($\sigma_{mi} \neq \sigma_{mj}$)

	Change	
	"Rolleigh" elasticities	"Hummels" elasticities
Consumer Welfare	0.89%	0.92%
Government Welfare	-5.73%	-4.60%
Social Welfare	0.03%	0.20%

5.3.2 Slovenia

Table 5.21 shows the percent change in the price of consumption goods and total domestic production with different sectoral import substitution elasticities when Slovenia became a full member of the European Union.

Table 5.21 Effect of Customs Union on Price and Production - Slovenia ($\sigma_{mi} \neq \sigma_{mj}$)

	Consumption Good Price		Domestic Production	
	"Rolleigh" elasticities	"Hummels" elasticities	"Rolleigh" elasticities	"Hummels" elasticities
Primary	0.75%	0.59%	-4.56%	1.70%
Food & Beverages	-1.85%	-1.03%	-38.75%	-3.42%
Textiles	0.11%	-0.32%	36.06%	30.81%
Leather	-0.74%	-1.31%	-9.55%	-10.62%
Wood Products	0.48%	0.27%	0.49%	-3.78%
Transport	-0.11%	-0.88%	26.66%	19.85%
Other Manufactures	0.37%	0.04%	8.95%	4.97%
Services	0.63%	0.65%	-1.94%	-2.21%

Table 5.22 and 5.23 show the percent change in the volume of exports and imports to the European Union and the rest of the world, respectively. For total trade volume with the European Union, exports of all primary and manufactured goods increased by 33.33%-48.93%, while imports from the European Union increased by 48.50%-64.30%. Regarding goods trade with the rest of the world, the exports decreased by 6.03%-11.95%, whereas the imports from the rest of the world fell by 12.96%-20.84%. Looking at individual sectors, the imports from non European Union countries in primary, food and beverage, and textiles sectors decrease significantly, by more than 30% when we take estimates of elasticities from Rolleigh (2003). This fall is offset by a huge increase in the imports from the European Union in the corresponding sectors.

Table 5.22 Effect of Customs Union on Exports - Slovenia ($\sigma_{mi} \neq \sigma_{mj}$)

	Exports to EU		Exports to ROW	
	"Rolleigh" elasticities	"Hummels" elasticities	"Rolleigh" elasticities	"Hummels" elasticities
Primary	264.33%	216.04%	-20.21%	-16.50%
Food & Beverages	300.21%	203.84%	12.55%	3.07%
Textiles	132.69%	108.99%	-13.13%	-5.86%
Leather	34.70%	22.93%	-3.58%	6.16%
Wood Products	12.97%	-0.68%	-16.73%	-11.68%
Transport	79.19%	67.73%	-10.85%	0.69%
Other Manufactures	51.71%	36.83%	-14.97%	-7.47%

Table 5.23 Effect of Customs Union on Imports - Slovenia ($\sigma_{mi} \neq \sigma_{mj}$)

	Imports from EU		Imports from ROW	
	"Rolleigh" elasticities	"Hummels" elasticities	"Rolleigh" elasticities	"Hummels" elasticities
Primary	18.03%	31.72%	-40.29%	-32.88%
Food & Beverages	294.20%	64.71%	-57.44%	-11.35%
Textiles	86.76%	66.70%	-33.77%	-11.73%
Leather	36.84%	37.24%	9.47%	-1.64%
Wood Products	21.88%	9.02%	3.25%	-4.24%
Transport	46.98%	44.07%	-14.82%	-14.67%
Other Manufactures	30.69%	25.65%	-15.05%	-10.89%

Finally, we analyze the impact of joining the European Union on the national welfare under differentiated elasticities of import substitution sector by sector. When we adopt estimates from Rolleigh (2003), the tariff revenue decreases by 11.48% due to larger decline in the imports from the rest of the world. On the other hand, tariff revenue increases by 2.75% under the estimates taken from Hummels (2001). However, both consumer and government welfare increases, and thus, the overall social welfare also shows an increase of 0.99%-1.59%. The results are summarized in Table 5.24.

Table 5.24 Effect of Customs Union on Welfare - Slovenia ($\sigma_{mi} \neq \sigma_{mj}$)

	Change	
	"Rolleigh" elasticities	"Hummels" elasticities
Consumer Welfare	1.08%	1.32%
Government Welfare	0.64%	2.68%
Social Welfare	0.99%	1.57%

5.4 Impact of Trade Liberalization on Government Revenues

For Ecuador, we observed that the tariff revenues decrease by a significant portion from signing a free trade agreement with the United States. For the benchmark case, the tariff revenue falls by more than 30%. Even in the partial liberalization case, the revenue falls by 22%. Finally, when we looked at differentiated sectoral import substitution elasticities, the magnitude was even higher at around 33% to 36%. Because tariff revenues are an important source of government receipts in Ecuador, the loss in the government revenue accounts for the loss in the government's welfare when the country signs a free trade agreement. Our analysis in this section considers a different closure rule by requiring the Ecuadorian government to keep its deficit unchanged. Specifically, it assumes that the government imposes a new uniform indirect tax rate on the consumption goods (or the Value Added Tax) to keep its deficit unaltered. We find the increases required in the effective VAT rate for the benchmark simulation as well as the cases of partial liberalization and sectoral import substitution elasticities. As shown in Table 5.25 below, the required increase in the effective VAT rate ranges from 0.52 to 1.05 percentage points. As for the national welfare, despite the fall in the tariff revenue, the government welfare does not decline as much. Compared to 4.36% decline in the benchmark simulation, the decline in government welfare ranges from -0.46% to -0.69% when the government raises the indirect tax rate to keep its deficit constant. However, the rise in the VAT rate negatively affects the consumer welfare, which only rises by 0.20%-0.39%, which is smaller than 0.90% increase shown under the benchmark simulation. The change in the overall social welfare gain ranges from 0.08% to 0.26%.

Table 5.25 Fiscal Policy and Welfare - Ecuador (Unit: Thousand US$)

		Data SAM	Benchmark Simulation	Partial Liberalization	"Rolleigh" elasticities	"Hummels" elasticities
Tariff Revenue	from US	111,334	0	34,666	0	0
	from ROW	278,529	267,468	270,273	249,949	261,291
Effective VAT Rate		8.92%				
Compensatory Effective VAT Rate			9.68%	9.44%	9.97%	9.72%
Consumer Welfare			0.39%	0.22%	0.20%	0.39%
Government Welfare			-0.65%	-0.46%	-0.69%	-0.68%
Social Welfare			0.26%	0.13%	0.08%	0.25%

5.5 Free Trade Agreement vs. Customs Union

In this section, we look at the hypothetical case of Slovenia signing a free trade agreement with the European Union, instead of joining the European Union as a full member. This implies that Slovenia and the European Union eliminate their tariffs on each other, while Slovenia retains its own tariff policy with the rest of the world, instead of adopting the tariff policy of the European Union. For comparison, we take the case of uniform import elasticity used in the benchmark case and compare the result of two different liberalization policies. This comparison could provide a useful insight on the effects of different trade liberalization arrangements. Table 5.26 shows the percent change in the price of consumption goods and total domestic production with different sectoral import substitution elasticities when Slovenia signs a free trade agreement with the European Union.

Table 5.26 Effect of Free Trade Agreement on Price and Production - Slovenia

	Consumption Good Price		Domestic Production	
	Customs Union	FTA	Customs Union	FTA
Primary	0.54%	-0.20%	1.12%	-3.47%
Food & Beverages	-1.06%	-1.16%	-4.00%	-2.73%
Textiles	-0.30%	-0.64%	31.41%	32.63%
Leather	-1.25%	-1.11%	-2.59%	-2.06%
Wood Products	0.26%	0.33%	-5.14%	-4.15%
Transport	-0.90%	-1.07%	21.83%	22.54%
Other Manufactures	0.03%	-0.02%	5.06%	5.88%
Services	0.67%	0.91%	-2.28%	-2.42%

Table 5.27 and 5.28 show the percent change in the volume of exports and imports to the European Union and the rest of the world, respectively. For total trade volume with the European Union, exports of all primary and manufactured goods increased by 49.59%, while imports from the European Union increased by 32.95%. Regarding trade in goods with the rest of the world, the exports increased by 9.67%, whereas the imports from the rest of the world also rose by 8.03%. Note that the trade with the rest of the world increases under free trade agreement scenario, which is different from the customs union case.

Table 5.27 Effect of Free Trade Agreement on Exports - Slovenia

	Exports to EU		Exports to ROW	
	Customs Union	FTA	Customs Union	FTA
Primary	214.00%	247.86%	-15.13%	6.67%
Food & Beverages	201.11%	203.91%	4.48%	19.64%
Textiles	105.60%	114.50%	-5.26%	12.14%
Leather	20.25%	17.54%	6.22%	17.81%
Wood Products	-1.81%	-2.49%	-10.69%	0.64%
Transport	65.92%	68.68%	1.89%	17.52%
Other Manufactures	35.24%	37.64%	-6.45%	8.02%

Table 5.28 Effect of Free Trade Agreement on Imports - Slovenia

	Imports from EU		Imports from ROW	
	Customs Union	FTA	Customs Union	FTA
Primary	37.07%	30.81%	-37.58%	-0.95%
Food & Beverages	69.26%	71.53%	-12.67%	-2.84%
Textiles	60.94%	62.05%	-4.32%	32.37%
Leather	24.48%	26.71%	2.47%	-0.80%
Wood Products	12.40%	14.28%	-6.11%	-1.47%
Transport	39.50%	40.26%	-4.41%	19.34%
Other Manufactures	24.45%	26.23%	-9.69%	7.61%

Finally, we examine the impact of signing a free trade agreement with the European Union on the national welfare. Compared to the customs union case, the consumer welfare increases more under free trade agreement. The consumer welfare increase under the free trade agreement is approximately 28% larger than under the customs union. However, the increase in government welfare is significantly less than under the customs union case, reflected in the government tariff revenue loss. The overall social welfare also shows an increase of 1.58%, slightly less than the customs union scenario. The results are summarized in Table 5.29.

Table 5.29 Effect of Free Trade Agreement on Welfare - Slovenia

	Change	
	Customs Union	FTA
Consumer Welfare	1.37%	1.76%
Government Welfare	2.85%	0.86%
Social Welfare	1.66%	1.58%

5.6 Exports Elasticity of Substitution and Welfare

In this section, we conduct a sensitivity analysis regarding the relationship between the parameter that governs the exports elasticity of substitution (ρ_x) and the national welfare of each country. Although we do not have calibrated values for ρ_x, we are interested in the optimal tariff argument presented initially in Johnson (1954), which states that for a small economy, as the ρ_x parameter goes to 1, the optimal tariff that the small economy should

set goes to zero. We are interested on the validity of this claim for the trade liberalization episodes that are analyzed in this paper.

5.6.1 Ecuador

Table 5.30 and 5.31 show the percent change in welfare under different values of ρ_x for the full liberalization versus the partial liberalization scenario, respectively.

Table 5.30 Welfare (Full Liberalization Scenario) for Different ρ_x - Ecuador

	0.80	0.85	0.90	0.91	0.92	0.93	0.94	0.95
Consumer Welfare	0.74%	0.81%	0.90%	0.92%	0.95%	0.98%	1.01%	1.06%
Government Welfare	-4.50%	-4.48%	-4.36%	-4.31%	-4.23%	-4.13%	-3.98%	-3.76%
Social Welfare	0.06%	0.12%	0.21%	0.24%	0.27%	0.31%	0.36%	0.43%

Table 5.31 Welfare (Partial Liberalization Scenario) for Different ρ_x - Ecuador

	0.80	0.85	0.90	0.91	0.92	0.93	0.94	0.95
Consumer Welfare	0.47%	0.51%	0.56%	0.58%	0.59%	0.61%	0.63%	0.66%
Government Welfare	-3.16%	-3.12%	-3.01%	-2.97%	-2.91%	-2.84%	-2.73%	-2.58%
Social Welfare	0.00%	0.04%	0.10%	0.12%	0.14%	0.16%	0.19%	0.24%

From the comparison of the changes in social welfare, we note that for all values of ρ_x tested, the social welfare gain is greater under the full liberalization scenario of free trade agreement than under the partial liberalization. The results are in line with the implications of optimal tariff discussed by Johnson (1954). Given the inverse relationship between the optimal tariff and the foreign export elasticity of substitution, we confirm that as the export elasticity of substitution increases, the optimal tariff becomes zero. Therefore, eliminating the tariff results in a higher social welfare than lowering the tariff to a positive value. This seems to be of particular importance for Ecuador, as its main export goods are agricultural goods that are considered to have a high degree of substitutability.

5.6.2 Slovenia

Table 5.32 and 5.33 show the percent change in welfare under different values of ρ_x for customs union and the free trade agreement scenario, respectively.

Table 5.32 Welfare (Customs Union Scenario) for Different ρ_x - Slovenia

	0.80	0.85	0.90	0.91	0.92	0.93	0.94	0.95
Consumer Welfare	0.98%	1.13%	1.37%	1.43%	1.51%	1.60%	1.72%	1.89%
Government Welfare	1.23%	1.74%	2.85%	3.23%	3.71%	4.33%	5.14%	6.25%
Social Welfare	**1.03%**	**1.25%**	**1.66%**	**1.79%**	**1.95%**	2.15%	2.41%	2.76%

Table 5.33 Welfare (Free Trade Agreement Scenario) for Different ρ_x - Slovenia

	0.80	0.85	0.90	0.91	0.92	0.93	0.94	0.95
Consumer Welfare	1.21%	1.43%	1.76%	1.85%	1.95%	2.08%	2.24%	2.45%
Government Welfare	-0.96%	-0.36%	0.86%	1.28%	1.79%	2.44%	3.28%	4.40%
Social Welfare	0.77%	1.07%	1.58%	1.73%	1.92%	**2.15%**	**2.45%**	**2.85%**

From the comparison of the changes in social welfare, we note that for values of ρ_x greater than 0.93, the social welfare gain is greater under the free trade agreement than under the customs union. The results are in line with the implications of optimal tariff discussed by Johnson (1954). Given the inverse relationship between the optimal tariff and the foreign export elasticity of substitution, we confirm that as the export elasticity of substitution increases, it becomes optimal for Slovenia to sign a free trade agreement (and setting its tariffs to zero) rather than entering a customs union.

6 Conclusions

This paper analyzes the potential effects of two ongoing trade liberalization episodes: Ecuador signing a Free Trade Agreement with the United States and Slovenia joining the European Union as a full member. Using a calibrated Applied General Equilibrium Model as our tool of analysis, we provide quantitative measures of the effects of these trade liberalization policies on production, prices, imports, exports, and welfare of the domestic consumers.

The predictions of the model are consistent with trade liberalization experiences observed in the past, with domestic production increasing in the export sectors and prices falling in the import sectors. Ecuadorian exports to the US and Slovenian exports to the EU show moderate increases in most sectors, while imports also show significant growth, especially in those sectors that were originally heavily protected. Since Slovenia adopts a more protectionist tariff schedule as it joins the EU, we observe that imports from the rest of the world fall significantly.

The impact on national welfare is mixed as Ecuador loses a large fraction of government tariff revenue, which drives down the aggregate social welfare despite gains in the consumers' welfare. For Slovenia, government tariff revenue increases due to the country's accession to the European Union and its adoption of a more protectionist tariff policy. Together with gains in the consumers' welfare, the overall social welfare increases.

It is important to note that this paper abstracts from several issues. First, due to the static nature of the model, this paper is not designed to capture the dynamic aspects of trade liberalization policies. Thus, some important issues of trade liberalization reforms, such as capital flows, foreign direct investment, and productivity gains and losses across sectors are beyond the scope of this paper. Adding dynamic features to the model would help shed light on these issues and capture the long term effects that these types of trade liberalization reforms encompass. This issues are of significant importance especially for the case of Ecuador (but also for Slovenia), which is a relatively capital poor economy opening not only to trade but to capital flows with its most important, and capital abundant, trade partner. Another interesting extension would be to quantify the impact of these trade liberalization reforms on different sectors of the society: for example, to conduct comparisons of the welfare effects of high-skilled households versus low-skilled ones, or to compare the welfare gains of urban households versus rural households. Incorporating these issues in a general equilibrium setting raises several challenging questions for future research.

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Appendix - Social Accounting Matrix (Ecuador)

SOCIAL ACCOUNTING MATRIX Ecuador 2001, current prices, Thousand USD

		Production											Consumption																				
		banana	cereals	flowers	petroleum	oprim	shrimp	textile	chem	transp	oman	service	banana	cereals	flowers	petroleum	oprim	shrimp	textile	chem	transp	oman	service	L	K	Household	Government	Capital	Exports(TOT)	Exports(US)	Exp (AND)	Exp(ROW)	Total
Production	banana	0	0	0	0	50,697	0	0	0	0	68,687	396	31,675	0	0	0	0	0	0	0	0	0	0				0	22,309	901,961	251,784	5,209	644,968	1,075,725
	cereals	0	26,742	0	0	20,695	0	0	0	0	459,394	1,111	0	2,389	0	0	0	0	0	0	0	0	0				0	0	12,608	192	12,400	16	522,939
	flowers	0	0	2,307	0	0	0	0	0	0	0	1,017	0	0	19,413	0	0	0	0	0	0	0	0				0	90,560	231,598	160,360	4,632	66,607	344,895
	petroleum	0	0	0	7,194	0	0	0	0	0	1,089,975	0	0	0	0	0	0	0	0	0	0	0	0				0	5,717	1,722,332	860,960	264,678	596,694	2,825,218
	oprim	1,650	980	616	745	571,371	86,366	24,662	15,100	0	1,188,983	189,944	0	0	0	0	616,383	0	0	0	0	0	0				0	81,833	119,416	39,977	30,582	48,857	2,898,049
	shrimp	0	0	0	0	0	0	0	0	0	7,248	17,192	0	0	0	0	0	38,546	0	0	0	0	0				0	27,318	280,106	170,082	391	109,633	370,410
	textile	6,564	2,036	1,394	1,858	18,072	2,341	347,970	0	3,012	88,463	39,225	0	0	0	0	0	0	849,927	0	0	0	0				0	29,303	86,244	16,598	52,778	16,868	1,476,409
	chem	175,956	47,404	10,086	65,940	88,145	1,423	77,065	315,455	11,960	188,128	299,506	0	0	0	0	0	0	0	536,299	0	0	0				0	189,602	119,448	219	113,593	5,635	2,126,417
	transp	4,580	0	10,596	6,508	17,589	881	35	28	208,216	73,685	193,183	0	0	0	0	0	0	0	0	71,901	0	0				0	591,148	104,705	1,278	23,410	80,018	1,283,055
	oman	6,641	690	6,684	63,460	345,649	11,251	34,425	43,369	0	2,274,619	2,636,357	0	0	0	0	0	0	0	0	0	3,283,821	0				0	1,852,135	1,164,128	305,271	349,968	508,889	11,723,229
	service	464,101	178,877	38,865	165,098	522,770	39,534	257,349	305,542	82,428	1,709,370	4,531,043	30,028	1,614	5,629	0	412,420	26,967	213,121	232,576	71,024	1,137,113	5,567,827				2,133,707	2,560,303	870,302	425,525	182,028	262,751	21,557,606
Consumption	banana																									61,703							61,703
	cereals																									4,003							4,003
	flowers																									25,042							25,042
	petroleum																									0							0
	oprim																									1,028,803							1,028,803
	shrimp																									65,513							65,513
	textile																									1,178,044							1,178,044
	chem																									890,813							890,813
	transp																									272,300							272,300
	oman																									5,187,668							5,187,668
	service																									5,721,724							5,721,724
	L	350,164	123,346	62,232	456,315	428,005	101,368	275,710	100,915	15,936	302,118	7,256,770																					9,472,882
	K	65,668	26,229	200,045	2,058,100	710,486	127,234	186,593	88,493	7,175	533,445	5,338,184																					9,341,649
Households																								9,472,882	9,341,649								19,383,993
Government		401	13,603	147	0	5,306	2	24,513	55,297	109,298	670,655	43,390	0	0	0	0	0	0	114,997	121,938	129,375	766,735	153,897										2,209,554
Direct tax																										591,660							591,660
Indirect tax		401	0	0	0	0	0	0	0	0	488,958	43,390	0	0	0	0	0	0	114,997	121,938	129,375	766,735	153,897										1,819,691
Tariff	*TOT*	0	13,603	147	0	5,306	2	24,513	55,297	109,298	181,697	0																					389,863
	US	0	5,803	21	0	3,057	2	4,524	8,024	23,503	66,399	0																					111,334
	CAN	0	0	0	0	0	0	0	0	0	0	0																					0
	ROW	0	7,800	126	0	2,249	0	19,989	47,273	85,795	115,298	0																					278,529
Capital																																	6,019,690
Imports	TOT	0	103,032	11,923	0	119,264	10	248,087	1,202,218	845,030	3,068,459	1,010,288														3,787,258	667,507		995,463	(569,462)	382,240	1,182,685	0
	US	0	43,202	1,621	0	32,479	9	28,149	131,480	143,255	941,959	340,628																					2,232,245
	AND	0	1,754	636	0	62,888	1	95,574	296,179	178,830	490,862	295,185																					1,421,909
	ROW	0	58,076	9,666	0	23,897	0	124,364	774,559	522,945	1,635,638	374,475																					3,523,619
TOTAL		1,075,725	522,939	344,895	2,825,218	2,898,049	370,410	1,476,409	2,126,417	1,283,055	11,723,229	21,557,606	61,703	4,003	25,042	0	1,028,803	65,513	1,178,044	890,813	272,300	5,187,668	5,721,724	9,472,882	9,341,649	19,383,993	2,801,214	6,019,690	0	2,232,244	1,421,909	3,523,619	

Appendix - Social Accounting Matrix (Slovenia)

SOCIAL ACCOUNTING MATRIX Slovenia 2001, current prices, Million USD

		PRODUCTION								CONSUMPTION											
	CPA	Primary	Food &Bev	Textile	Leather	Wood prod.	Transport	Other man.	Service	Primary	Food &Bev	Textile	Leather	Wood prod.	Transport	Other man.	Service	L	K	C	G	I	X	TOTAL
PRODUCTION	Primary	335.3	387.9	15.2	19.2	57.1	0.4	166.6	430.5	375.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	0.0	46.1	1,833
	Food &Bev	0.0	611.6	6.0	0.0	3.3	0.4	10.9	593.6	0.0	1,607.7	0.0	0.0	0.0	0.0	0.0	0.0			0.0	0.0	29.6	346.2	3,209
	Textile	6.9	0.0	740.6	0.0	1.4	19.3	103.0	157.2	0.0	0.0	436.1	0.0	0.0	0.0	0.0	0.0			2.1	0.0	0.0	638.9	2,106
	Leather	1.8	10.6	18.4	81.1	5.2	1.3	46.5	31.3	0.0	0.0	0.0	148.1	0.0	0.0	0.0	0.0			0.0	0.0	0.0	161.4	506
	Wood prod.	3.7	1.3	0.8	0.0	188.3	4.8	97.3	73.7	0.0	0.0	0.0	0.0	3.5	0.0	0.0	0.0			0.0	0.0	0.0	282.7	656
	Transport	2.4	0.4	0.0	0.0	0.5	589.5	0.0	223.8	0.0	0.0	0.0	0.0	0.0	570.2	0.0	0.0			0.0	491.8	1199.9		3,079
	Other man.	173.2	198.0	35.6	26.7	37.6	537.3	5,237.6	2,636.9	0.0	0.0	0.0	0.0	0.0	0.0	1,054.5	0.0			233.0	1632.3	6599.7		18,402
	Service	222.2	624.9	170.6	34.7	59.7	199.4	1,684.1	7,572.3	156.7	498.5	143.3	38.6	2.5	157.2	876.4	3,288.4			3780.1	2556.9	2030.7		24,087
CONSUMPTION	Primary																			592.0				592
	Food &Bev																			2,144.4				2,144
	Textile																			613.5				613
	Leather																			196.4				196
	Wood prod.																			7.7				8
	Transport																			747.7				748
	Other man.																			2,273.0				2,273
	Service																			4,463.0				4,463
	L	188.2	300.0	286.7	78.4	123.6	134.5	2,194.6	7,601.0															10,907
	K	413.9	181.8	54.2	18.5	42.2	68.2	1,227.0	4,145.4															6,151
	Households																	10,907.1	6,151.1					17,058
	Government																							
	Direct Tax	(23.7)	351.4	84.3	27.8	3.1	177.5	766.9	(504.9)	60.2	48.2	34.1	9.7	1.7	20.3	342.2	1,174.6							2,573
	Indirect tax	(39.1)	301.7	74.1	22.7	2.6	168.8	726.4	(505.0)	60.2	48.2	34.1	9.7	1.7	20.3	342.2	1,174.6			1,497.2				1,497
	Tariffs TOTAL	15.4	49.7	10.2	5.1	0.5	8.6	40.6	0.1															2,443
	EU	8.8	34.5	8.0	3.9	0.4	7.8	32.2	0.1															130
	ROW	6.6	15.2	2.2	1.2	0.1	0.8	8.4	0.0															
	Capital																			4,523.4	55.3		132.0	4,711
	Imports	510	541	693	219	134	1,346	6,868	1,126															11,438
	EU	291	376	542	168	103	1,214	5,288	653															8,635
	ROW	218	166	151	52	31	132	1,579	474															2,802
TOTAL		1,833	3,209	2,106	506	656	3,079	18,402	24,087	592	2,144	613	196	8	748	2,273	4,463	10,907	6,151	17,058	4,070	4,711	11,438	

Appendix - Calibrated Parameters

Table A1. Preference Parameters (θ) - Ecuador

	Consumer	Government
Bananas	0.0033	0.0000
Cereals	0.0002	0.0000
Flowers	0.0013	0.0000
Petroleum	0.0000	0.0000
Other Primaries	0.0547	0.0000
Shrimp	0.0035	0.0000
Textiles	0.0627	0.0000
Chemicals	0.0474	0.0000
Transport	0.0144	0.0000
Other Manufactures	0.2761	0.0000
Services	0.3045	0.7617
Investment Good	0.2318	0.2383

Table A2. Domestic Goods Firm Parameters (α, β) - Ecuador

	α	β
Bananas	0.1579	4.0015
Cereals	0.1754	4.3214
Flowers	0.7627	2.1949
Petroleum	0.8185	1.8043
Other Primaries	0.6241	4.7230
Shrimp	0.5566	3.2198
Textiles	0.4036	5.1114
Chemicals	0.4672	9.1552
Transport	0.3104	26.4270
Other Manufactures	0.6384	19.5090
Services	0.4238	3.2250

Table A3. Armington Aggregators (γ, δ) - Ecuador

	γ	δ_{dom}	δ_{US}	δ_{AND}	δ_{ROW}
Bananas	1.0000	1.0000	0.0000	0.0000	0.0000
Cereals	3.5131	0.3410	0.2584	0.1280	0.2726
Flowers	1.7852	0.7001	0.0799	0.0538	0.1662
Petroleum	1.0000	1.0000	0.0000	0.0000	0.0000
Other Primaries	2.8645	0.4271	0.1920	0.2003	0.1806
Shrimp	1.2565	0.8350	0.1096	0.0554	0.0000
Textiles	3.7137	0.3215	0.2046	0.2144	0.2595
Chemicals	3.9428	0.2764	0.2087	0.2277	0.2872
Transport	4.2467	0.2383	0.2469	0.2188	0.2960
Other Manufactures	3.7017	0.3257	0.2297	0.1896	0.2551
Services	2.8251	0.4315	0.1901	0.1847	0.1937

Table A4. Preference Parameters (θ) - Slovenia

	Consumer	Government
Primary	0.0364	0.0000
Food & Beverages	0.1318	0.0000
Textiles	0.0377	0.0005
Leather	0.0121	0.0000
Wood Products	0.0005	0.0000
Transport	0.0460	0.0000
Other Manufactures	0.1397	0.0572
Services	0.2742	0.9287
Investment Good	0.3218	0.0136

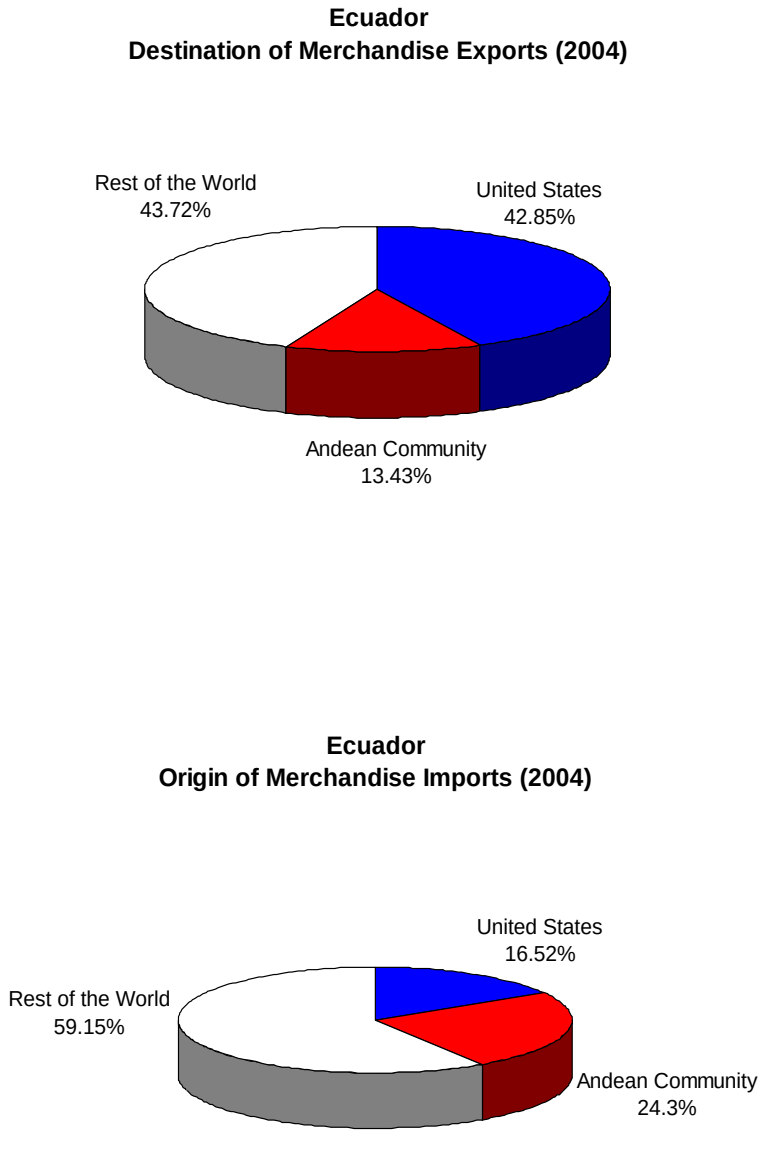
Table A5. Domestic Goods Firm Parameters (α, β) - Slovenia

	α	β
Primary	0.6875	4.0447
Food & Beverages	0.3774	10.5440
Textiles	0.1589	6.3727
Leather	0.1911	4.7257
Wood Products	0.2546	5.5479
Transport	0.3364	16.1090
Other Manufactures	0.3586	6.4516
Services	0.3529	3.7414

Table A6. Armington Aggregators (γ, δ) - Slovenia

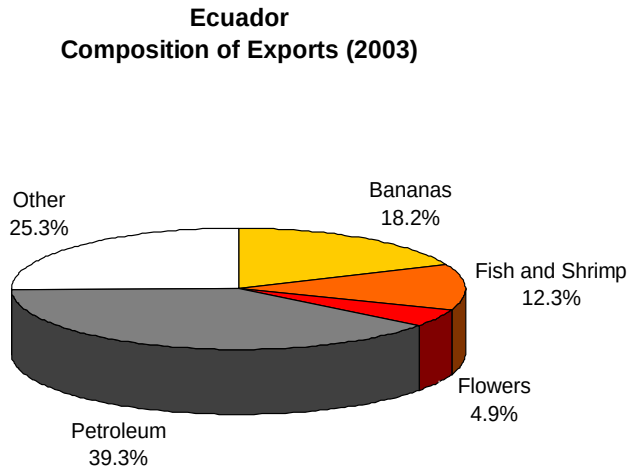
	γ	δ_{dom}	δ_{EU}	δ_{ROW}
Primary	2.8363	0.4147	0.3024	0.2830
Food & Beverages	2.7753	0.4278	0.3107	0.2615
Textiles	2.8629	0.3873	0.3375	0.2752
Leather	2.9765	0.3551	0.3433	0.3016
Wood Products	2.5796	0.4672	0.3078	0.2250
Transport	2.8384	0.3759	0.3602	0.2638
Other Manufactures	2.8624	0.3879	0.3393	0.2728
Services	2.2782	0.5126	0.2515	0.2359

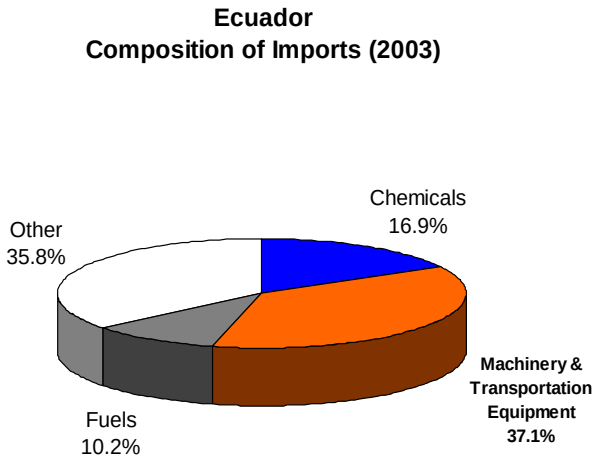
Figure 1: Ecuador - Geographical Distribution of Merchandise Trade.



Source: International Monetary Fund, Direction of Trade Statistics (2005).

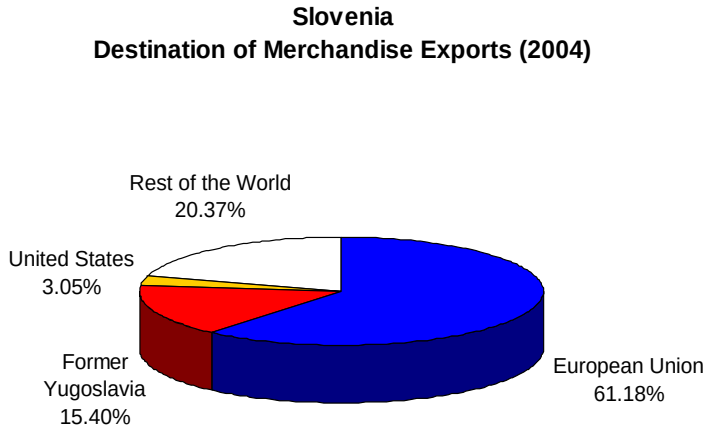
Figure 2: Ecuador - Composition of Exports and Imports.

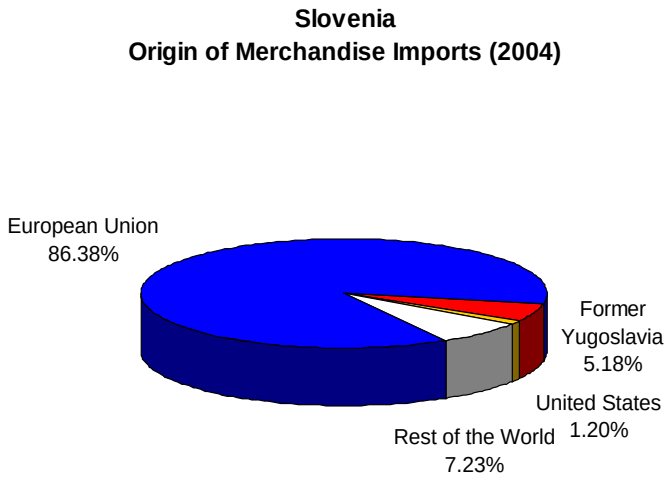




Source: World Trade Organization, Trade Policy Review Ecuador (2005).

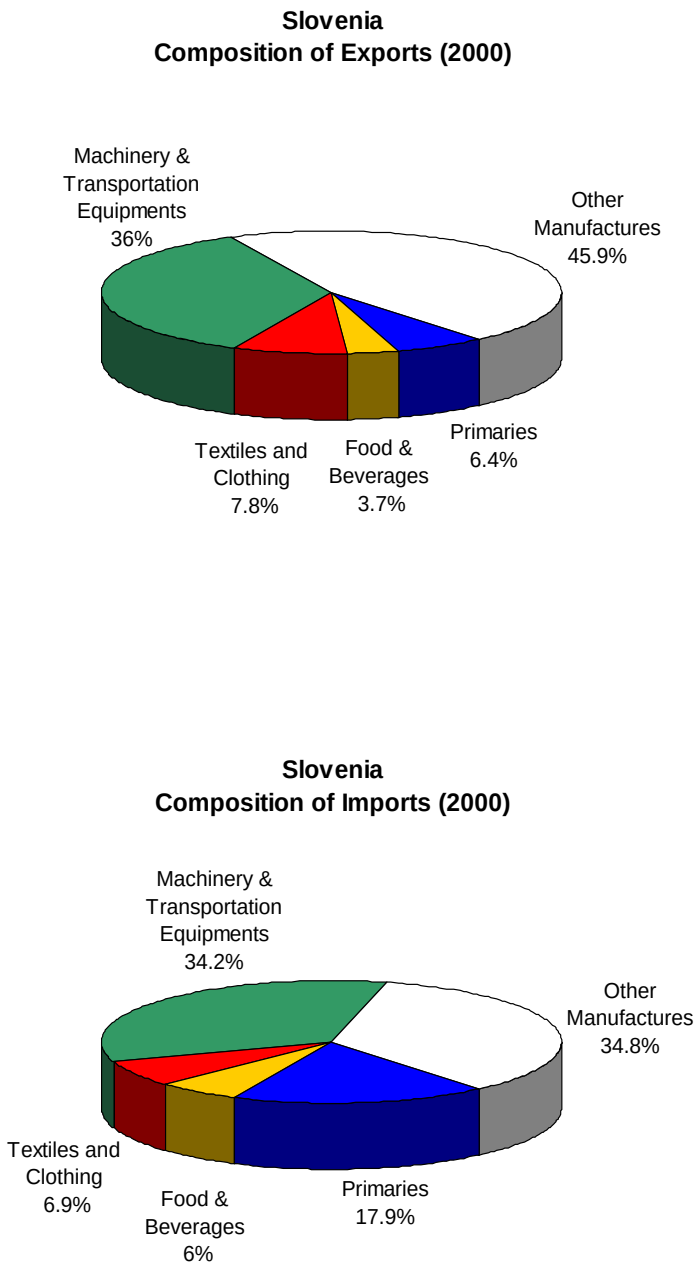
Figure 3: Slovenia - Geographical Distribution of Merchandise Trade.





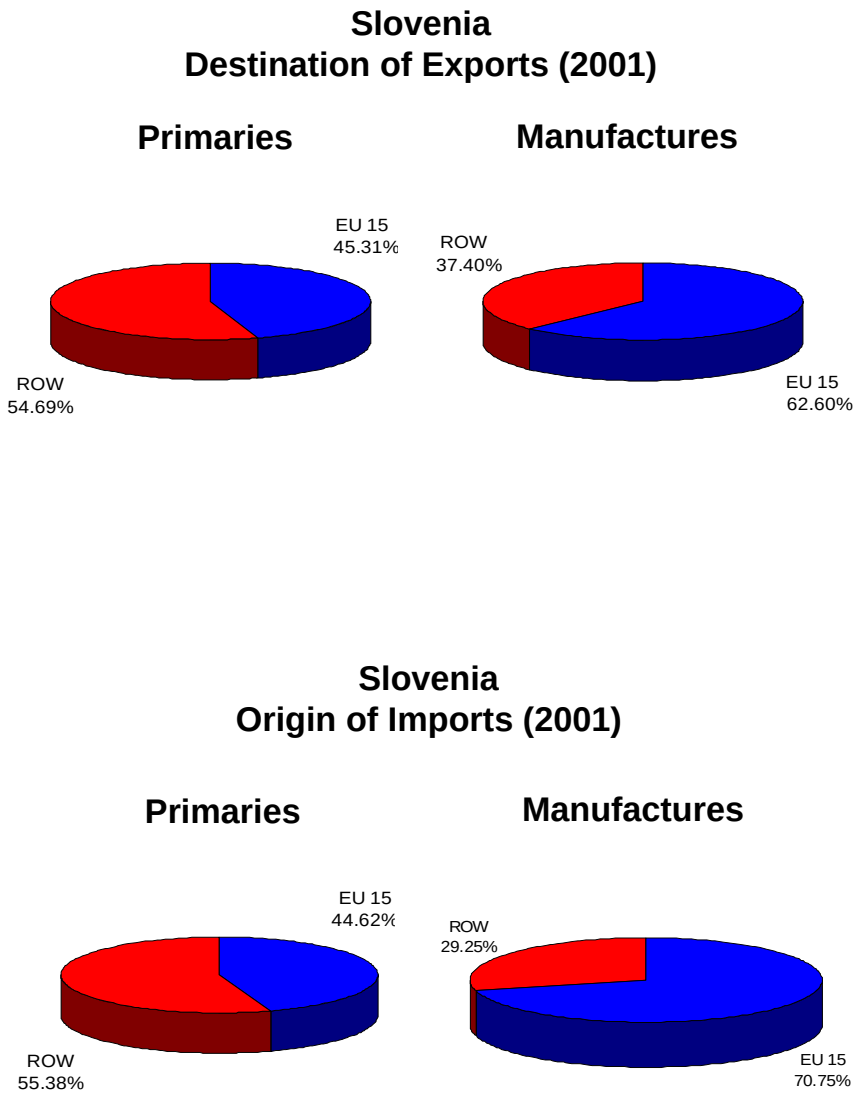
Source: International Monetary Fund, Direction of Trade Statistics (2005).

Figure 4: Slovenia - Composition of Exports and Imports.



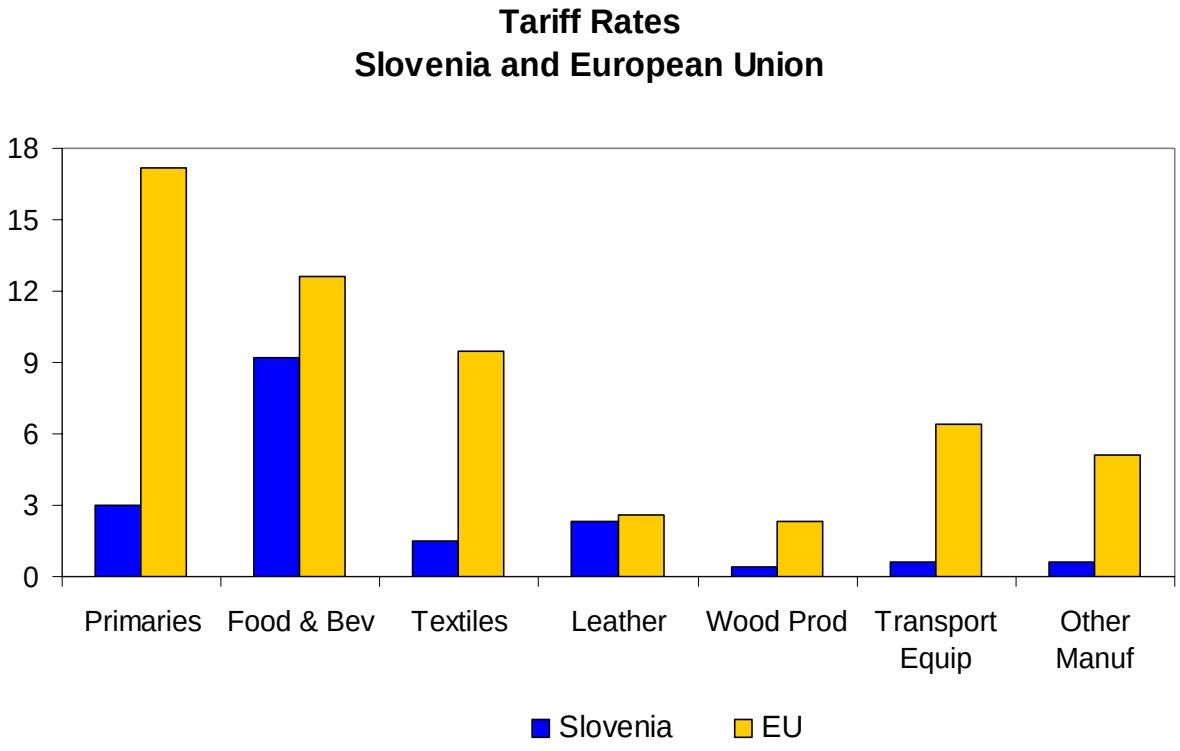
Source: World Trade Organization, Trade Policy Review Slovenia (2002).

Figure 5: Slovenia - Trade in Primary and Manufactured Goods.



Source: Statistical Office of the Republic of Slovenia

Figure 6: Tariff Schedules of Slovenia and European Union.



Source: World Trade Organization, Trade Policy Reviews