

Trade Creation and Diversion in the Enlarged EU Market: Evidence for Agricultural Trade in Slovakia

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Abstract

In the paper we analyze the changes in agricultural trade patterns in Slovakia influenced by the gradual trade liberalization that occurred prior to European Union enlargement in 2004. The results show a significant trade-diversion effect of the enlargement on Slovak agricultural trade. A one-percentage-point reduction in the agricultural tariff rate of Slovakia increases agricultural imports from EU15 and Central and East European countries (CEEC) by around 3 percent. Given that the average reduction in tariff rates was 10.4 percent, we can conclude that approximately 31.4 percent of the increase in agricultural imports from the EU15 and CEEC was due to elimination of tariffs as Slovakia (and the other CEECs) joined the EU.

1. Introduction

Since the collapse of communism the European Union (EU) has strongly determined the trade patterns and policies of Central and East European countries (CEEC). Mutual trade between the EU and the CEEC, including Slovakia, has been increasing since the beginning of the 1990s. Part of this increase has been also due to liberalization of trade between the EU15 and CEEC through a series of tariff reductions.

Agricultural trade between the CEEC and the EU15 was gradually liberalized too, although liberalization in agricultural trade lagged behind that in industry. Agriculture both in the EU15 and the CEEC was and still remains heavily subsidized. A bulk of these subsidies is provided in the form of price support, i.e. increasing the domestic price above the world price by setting a price floor. To sustain a high domestic price governments implement border protection in the form of import tariffs and quotas or export subsidies in the case of net exporters.

Non-tariff barriers, like sanitary and phytosanitary standards, quality standards, and import licensing, as well as differing regulatory policies inhibited trade between the CEEC and the EU15 as well. Initially many food processors in the CEEC did not meet high product standards imposed by the EU's common market and were forced to sell in domestic markets. The previously available Soviet Union market was effectively closed. Producers in the CEEC had to invest significantly in order to comply with sa-

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nitary, phytosanitary, and quality standards. Import licensing inhibited mutual agricultural trade until the day of accession.

In May 2004, eight of the CEEC¹ together with Malta and Cyprus joined the EU's common market followed by Bulgaria and Romania in January 2007. The EU enlargement of 2004 also fully liberalized mutual agricultural trade between the EU15 and new CEE member states and harmonized national legislations.

Agricultural trade between the enlarged EU and the rest of the world (ROW), however, remained significantly hindered by trade barriers. Upon their accession to the EU, new CEE member states adopted the common external tariffs of the European Union.

The goal of this paper is to evaluate the impacts of the discriminatory liberalization of agricultural trade that occurred when the CEEC became members of the EU common market. On the one hand, there are positive effects as new members will replace expensive domestic production with cheaper imports from other EU member states because trade barriers for intra-EU trade have been eliminated. Trade creation is taking place, which improves the allocation of resources in the economy. On the other hand, there is also a negative effect as new member states start to import from other member states at the expense of cheaper imports from the rest of the world because tariffs on goods from the rest of the world have not been eliminated. This is the case of trade diversion which worsens allocation of resources in the economy.

Whether trade creation or diversion prevails is a complex question because concurrently with gradual trade liberalization between the EU15 and CEEC many other important things have happened. These include the collapse of the Council of Mutual Economic Assistance system, transformation of the agricultural policies of the CEEC, reforms of the EU Common Agricultural Policy (CAP), completion of the GATT/WTO Uruguay Round and others.

In order to evaluate the issue of trade creation and trade diversion arising in agriculture after the EU enlargement of 2004, we first provide basic data on the development of agricultural trade between Slovakia and the EU15 as well as between Slovakia and the rest of the world. We use specific data at a high level of disaggregation (HS4, HS6 and HS8) that were collected from national sources. The data also cover the development of tariff protection in trade between Slovakia, the CEEC, the EU15 and the ROW. Second, we use regression analysis to relate the change of imports of Slovakia to the change of tariffs and other relevant variables resulting from EU accession. The regression analysis is based on the partial equilibrium trade model.

Descriptive statistics indicate that some Slovak agricultural trade with the ROW was replaced by trade with the EU15 and CEEC, or more precisely Slovak trade with the EU15 and CEEC has been growing faster than with ROW. The detailed data also shows that there are many cases when the gradual liberalization increased Slovakia's agricultural imports from the EU15+CEEC while at the same time agricultural imports from the ROW decreased.

¹ Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia. In the paper we assume a very high level of agricultural trade liberalization among the EU15, the 2004 EU newcomers and Bulgaria and Romania. Thus Slovak agricultural trade with Bulgaria and Romania is analyzed in a similar way as with the countries of the 2004 EU enlargement. For natural reasons, in the rest of the paper Slovakia is excluded from the CEEC.

The regression we run shows that approximately one-third of the increase in Slovak agricultural imports from the EU15 and CEEC between 2000 and 2005 was due to the elimination of tariffs for those commodities.

The rest of the paper is organized as follows. The next section describes how agricultural tariffs and non-tariff measures were applied in Slovakia (and also in the Czech Republic) in the pre-accession period. This is followed by an overview of the chronology of the EU enlargement. Then an empirical analysis of trade diversion and trade creation effects due to the EU enlargement is presented. The final section concludes the paper.

2. Agricultural Tariffs and Non-tariff Measures in Slovakia before EU Accession

After the breakup of Czechoslovakia in 1993, the Czech Republic and Slovakia formed a customs union. There were no barriers to agricultural trade between the two countries.

Slovakia and the Czech Republic used different tariffs for agricultural imports from the WTO members (MFN – most favored nation – tariffs) and for imports from non-members. Tariffs applied for imports from the WTO members were the same or lower than tariffs for imports from non-members.

In the European Union accession process, Slovakia other acceding states provided preferential access to their domestic markets for the EU15 and other CEEC. Lower tariff rates (preferential tariff rates) were applied for imports from the EU15 and other CEEC than for imports from the rest of the world. Preferential tariffs differed among the CEEC according to the country of origin. That is, the preferential tariff for Slovak importation of maize, for example, from Poland differed from the preferential tariff for importation of wheat from Hungary. The number of preferential tariffs applied to the EU15 and CEEC increased during 2000–2004. However, the number of items not covered by the preferential treatment was still significant.

Slovakia had preferential tariffs also with other countries in addition to the EU15 and CEEC. These countries included, for example, Croatia, Israel and Turkey.

Preferential tariffs in some cases were combined with import quotas within a so-called tariff rate quota. There was a preferential tariff rate for imports within the import quota (for instance, the first 205,000 kg of butter at a 15% tariff rate) and higher tariff rate for imports outside of the quota (for example, 25 % for volumes exceeding 205,000 kg). When a quota was fully used, the quantity outside of the quota was levied either using an applied MFN tariff, or by a tariff applied to non-WTO members. In general, tariff rate quotas for the EU15 and CEEC were less restrictive than those for the rest of the world.

Despite the customs union between the Czech Republic and Slovakia, the countries did not apply identical MFN tariffs. There were small differences in several commodities. The differences (in commodity coverage, tariff rate and/or quota quantity) were greater for preferential tariffs and quotas than for MFN tariffs. This suggests that some arbitrage in agricultural trade could be present. However, there is no reliable data on this.

3. The Chronology of the EU Enlargement

After the collapse of communism, the EU granted trade concessions to the CEEC. The concessions involved the removal of import quotas and extension of the Generalized System of Preferences (GSP). Trade and Cooperation Agreements between the EU15 and CEEC were signed.

Europe Agreements were signed between the EU15 and CEEC in the early 1990s. Europe Agreements allowed for the gradual creation of a free trade area between CEEC and the EU. In agriculture, Europe Agreements reduced duties and provided preferential access to each others' markets. Mutual concessions were asymmetric; the EU provided to the CEEC bigger reductions in tariffs, higher quotas and lower in-quota duties than vice versa. However, the CEEC did not fully utilize lower in-quota tariff rates and other preferential concessions.

Agricultural trade was further liberalized in 2000 when bilateral agreements between the EU and all eight Central and Eastern European candidate countries were concluded. The agreements liberalized a wide range of agricultural products either fully or with the use of tariff rate quotas. A further round of negotiations launched in December 2001 resulted in the expansion of sub-sectors of agriculture that were liberalized.

The Central European Free Trade Agreement (CEFTA) liberalized agricultural trade only marginally. There were many exceptions to free trade among CEFTA countries in agriculture. Agricultural products were considered sensitive for liberalization. In spite of this, agricultural trade among CEFTA countries was more liberal than trade between CEFTA countries and the EU. CEFTA had almost the same agricultural trade tariffs with the Baltic States as with the EU (Ciaian and Swinnen, 2007).

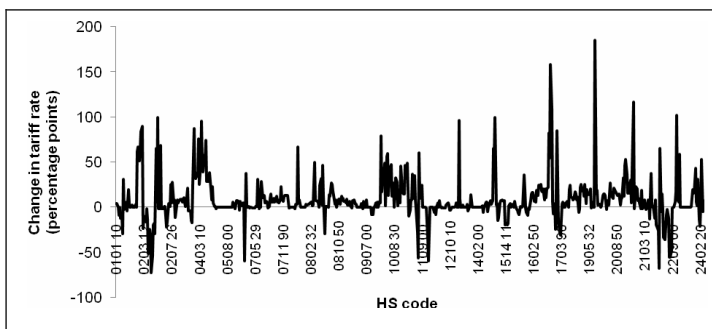
The trade provisions of the Association Agreements created a free trade area (FTA) including the EU and CEEC from January 1, 2001. The Association Agreements also liberalized movement of capital, services and workers.

In May 2004, eight countries from Central and Eastern Europe plus Malta and Cyprus joined the EU followed by Bulgaria and Romania in January 2007. The enlargement did not lead to the same change (overall increase/decrease) of tariff rates. Chevassus-Lozza and Unguru (2001) predicted a rise in tariff protection after EU accession for Slovakia and the Czech Republic, while for Poland and Hungary the adoption of the EU tariffs was expected to diminish tariff protection. Kazlauškiene and Meyers (2003) also show that tariffs will increase for most agricultural commodities and acceding countries when EU border protection measures are adopted. For Slovakia, EU accession in most cases increased tariffs with the rest of the world (*Figure 1*). On average, Slovak tariffs for third countries increased by 8.6 percentage points² after EU accession.

The probability that trade diversion takes place is higher in agriculture than in industry because agricultural tariffs are significantly higher than industrial tariffs in the EU. The EU average level of customs duty protection amounts to around 4% on industrial goods (EC, 2006) while the average agricultural customs duty actually paid

² In fact, out of 635 tariff lines considered, there was an increase in tariff rates in 387 cases (average increase of 18.6 percentage points), a decrease in 134 cases (average decrease of 13.2 percentage points), and tariff rates did not change in 114 cases.

FIGURE 1 Change in Tariff Rates Applied by Slovakia for Third Countries after the EU Accession (tariff rates in 2005 minus tariff rates in 2002)



Source: own calculations

by exporters entering the EU market is 20 %, 10.5 % when EU preferences granted to developing countries are taken into consideration (EC, 2003).

4. Empirical Evidence

Formation of a preferential trade agreement (PTA), like a customs union, free trade agreement or common market, can be viewed as a move towards free trade because some trade barriers are eliminated. However, a PTA liberalizes trade only among a subset of countries, not globally like liberalization within the WTO. From the welfare perspective, PTAs are therefore the second best not the first best. Viner (1950) was the first to notice that a PTA can either increase the overall welfare or reduce it. As Viner concluded, a PTA does not automatically increase welfare. Whether a PTA has an overall positive or negative impact depends on the extent of trade creation and trade diversion effects. Trade creation occurs when one of the members of the PTA imports from the other member(s), which it formerly did not. Trade creation therefore occurs when production in a member country is replaced by imports from a more efficient producer in some other member state of the PTA. When one of the members starts to import from the other member at the expense of imports from the rest of the world because of discriminatory tariff reduction, then trade diversion occurs. Trade diversion therefore occurs when imports from a more efficient producer from outside of the PTA are replaced by imports from a less efficient PTA member because of discriminatory trade barriers.

The theory is not clear as to whether the PTA causes the overall trade creation or trade diversion or, in other words, whether a particular PTA is welfare-improving or -reducing. This ambiguity remains under all relevant assumptions on market structure or elasticities. The possibility of welfare reduction because of trade diversion must be evaluated empirically. The issue of the net effect of PTAs on the welfare of the member countries and on the world economy is therefore an empirical issue (Krueger, 1999).

Empirical literature on the effects of preferential trade agreements can be divided into three categories (Clausing, 2001):

1. Ex post studies examining the share of intra-agreement trade. These studies compare the shares before and after an agreement. It is assumed that shares

would not change without the agreement. These trade shares and the change thereof measure the extent of trade creation and diversion.

2. Gravity equations. Gravity equations include other variables that affect trade shares (trade shares are not constant as above). Dummy variables measure the impact of the PTA. However, they capture other impacts as well and do not measure the extent of trade creation and diversion. Gravity models are mostly aggregated and do not capture the individual impacts of liberalization of a given commodity.
3. Ex ante computable general equilibrium models. A model of the economy is produced which is then shocked by the creation of a preferential trade agreement (i.e. discriminatory removal of tariffs). The results are sensitive to assumptions on parameters and functional forms.

The empirical literature, however, parallels the development of the theory in a way that it provides ambiguous results (Panagaryia, 2000). The results depend crucially on the model structure, functional forms and parameter estimates (Srinivasan, Whalley, Wooton, 1993).

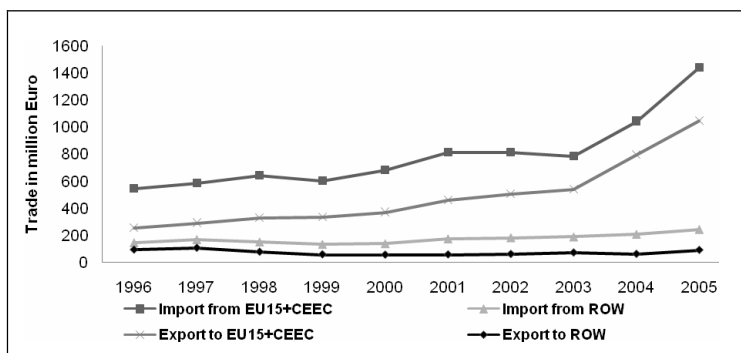
The impact of EU enlargement on trade was investigated mostly using gravity models.

Carrère (2002) analyzed EU enlargement to include Spain and Portugal and concluded that significant trade diversion occurred. The trade diversion effect of the EU was confirmed by Soloaga and Winters (2001), who analyzed EU trade in the 1980s and 1990s. However, Egger and Pfaffermayr (2002) conclude that intra-EU15 trade increased significantly as a result of the 1995 enlargement (they do not analyze extra-EU15 trade) and that intra-core (EU founding countries) trade relatively decreased as a result of Greece and later Portugal and Spain joining the EU. They also find that the EU enlargements have affected the EU core and periphery (new EU members) differently considering intra-EU trade only. Wilhelmsson (2006) found that the eastward enlargement of the EU resulted in increased trade between the EU15 and CEEC (trade creation), decreased trade between the EU15 + CEEC and the rest of the world (trade diversion) and decreased trade among the EU15 (trade displacement). Trade between the CEEC also increased.

Bartosova, Bartova and Fidrmuc (2007) analyze the effects of the 2004 EU enlargement on agricultural trade using a dynamic panel data gravitational model in the empirical analysis. The model combines the advantages of the computable general equilibrium approach and the approach of gravity model of international trade. These authors conclude that EU accession had positive effects on exports of agricultural commodities while negative impacts of liberalization of agricultural imports on domestic producers were rather limited.

Chevassus-Lozza et al. (2005) analyze the effect of non-tariff barriers on the CEEC' agro-food exports to the EU15 in the period just before the enlargement. Non-tariff barriers include sanitary and phytosanitary standards, quality, and import licensing. They conclude that sanitary and phytosanitary standards indeed inhibited the exports of the CEEC to the EU15 in 1999. In 2003, the effect of non-tariff barriers was smaller than in 1999. All non-tariff barriers were completely removed only after EU accession by the CEEC.

FIGURE 2 Slovak Agri-food Trade with EU15 + CEEC and ROW in million Euro



Source: own calculations

5. Data

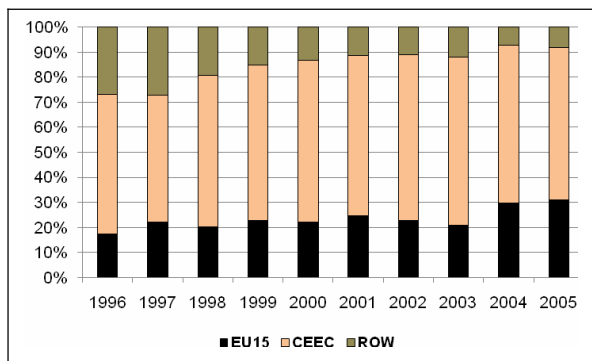
The data used in this paper comes from several sources. Because the object of our analysis is agricultural trade, we consider chapters 01–24 of the customs nomenclature. Fish and crustaceans (chapter 03) were omitted from the analysis as they are not common agricultural commodities. Trade flows and tariffs were collected from the Slovak Statistical Office. The territory classification of Slovak agricultural trade flows covers the following partners/groupings: CEEC (Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, and Slovenia), the EU15, and the rest of the world (ROW). We use annual (2000 to 2005) monetary trade flow data expressed in euros. Trade flows are specified either by four or six digits of the Harmonized System (HS). In order to ensure concordance between trade flow data and tariffs, tariff rates originally reported using an eight-digit code of the HS were converted into a six-digit code by computing simple averages. We consider data for three years in the analysis (2000, 2002, and 2005). 2000 represents the beginning of the trade liberalization process leading to EU accession. 2002 is included to catch the effect of agricultural tariff reductions in trade between the EU15 and CEEC that occurred in 2000 and 2001. 2005 is the year when agricultural trade between Slovakia and other EU countries was already fully liberalized. Before EU enlargement Slovakia used *ad valorem* tariffs (percentage of value of the imported commodities). After the enlargement, Slovakia accepted the common external tariffs of the EU, which are a combination of *ad valorem* tariffs and specific tariffs (e.g. euro/kg). In the empirical analysis we use *ad valorem* equivalents (AVE) of the EU combined tariffs as computed by Gallezot (2005).

The real exchange rates of the Slovak currency against the national currencies of partner countries were computed using the nominal exchange rates obtained from Eurostat and inflation rates obtained from national statistical offices. Wheat yields serving as a proxy for weather conditions and technological progress were obtained from the FAO.

6. Trade Creation and Trade Diversion

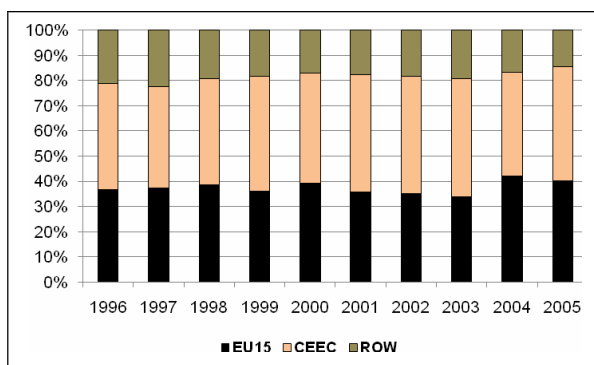
Total agricultural trade between the CEEC and the EU15 has been growing since the 1990s. *Figure 2* describes the development of Slovak agricultural trade with

FIGURE 3 Structure of Slovak Agri-food Exports by Regions



Source: own calculations

FIGURE 4 Structure of Slovak Agri-food Imports by Regions



Source: own calculations

the EU15 + CEEC and the ROW in the period 1996–2005. Slovak agricultural trade with the EU15 + CEEC grew faster than trade with the ROW, especially fast rates of Slovak trade growth with the EU15+CEEC are observed after the year 2003. Several factors could have contributed to the expansion of agricultural trade between Slovakia and the EU15 + CEEC. Probably the most important were: (1) liberalization of global agricultural trade due to the GATT/WTO, especially the Uruguay Round; (2) liberalization of the CEEC' economies; (3) reforms of the EU's CAP; (4) the gradual formation of a free trade area and subsequently a customs union and common market between the CEEC and the EU15; (5) the collapse of the Council of Mutual Economic Assistance.

It is therefore not clear whether the expansion of trade was due to the gradual integration of the Slovak economy into the EU or due to other reasons. Furthermore, it is not clear whether the expansion of Slovak agricultural trade with the EU15 + CEEC represents a trade creation or trade diversion effect.

In general, the share of Slovak agricultural exports to and imports from the EU15 + CEEC has been increasing at the expense of exports to and imports from the rest of the world (*Figures 3 and 4*). This could indicate that some of the Slovak

agricultural trade with the ROW was replaced by trade with the EU15 and CEEC, or more precisely trade with the EU15 + CEEC is growing faster than trade with the ROW, which implies the existence of the trade diversion effect of agricultural trade liberalization between Slovakia and the EU.

At the level of individual commodities the development of trade shares is crucially dependent on agricultural support policies such as price supports and accompanying border measures.

Additionally, a review of the detailed data shows that there are many cases when the gradual liberalization increased Slovakia's agricultural imports from the EU15 + CEEC while at the same time Slovak agricultural imports from the ROW decreased. Out of 193 agricultural commodities classified by the four-digit HS code, in 42 cases agricultural imports from the EU15 + CEEC increased between 2000–2001³ and 2004–2005, while imports from the ROW declined. This is an indication that imports from the EU15 + CEEC, which are positively discriminated against, replaced imports from the ROW, an indication of trade diversion. It is worth mentioning that out of 42 commodities where a pure trade diversion effect was seen, 39 are considered high-value commodities according to the USDA trade classification (classification conducted by the United States Department of Agriculture).

Figures 5 and 6 show how the growth of Slovak agro-food imports from the EU15 + CEEC and the ROW, respectively, is related to the extent of reduction of Slovak tariffs for the EU15 + CEEC that occurred between 2000 and 2002 and between 2002 and 2005, respectively.

In the period 2000–2002 tariff reductions on Slovak agricultural imports from the EU15 and CEEC did not lead to a high increase in those imports. Moreover, imports from the ROW grew faster (*Figure 5*). During the second wave of agricultural trade liberalization, from 2002 to 2005, Slovak agricultural imports from the EU15 + CEEC were positively related to the extent of tariff cuts. The highest increase of imports from the EU15 + CEEC occurred for commodities, for which tariffs were reduced by between 25 and 50 percentage points.

The behavior of imports from the EU15 + CEEC is not surprising. The relatively low increase in imports in the first wave of agricultural trade liberalization of 2001 is due to built-up inertia, as current imports are a function of past imports (Bartosova, Bartova, Fidrmuc, 2007). Importers did not have enough time to react to tariff cuts as early as in 2002. Additionally, prior to the accession of 2004 agricultural trade was strongly inhibited by a series of non-tariff barriers (Chevassus-Lozza et al., 2005).

7. Regression Analysis

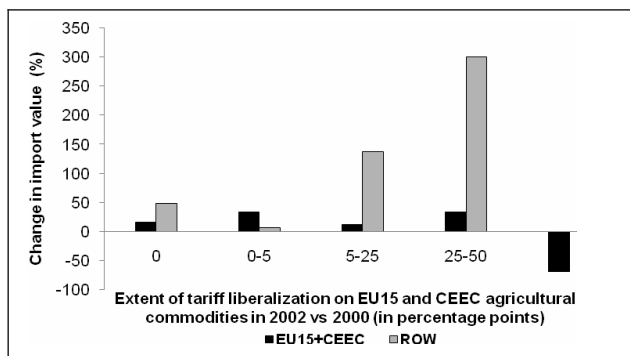
Following Clausing (2001), we model import demand for commodity i as follows:

$$\ln D_i = b_0 + b_1 \ln P_i + b_2 \ln Z \quad (1)$$

where b_1 is assumed to be negative because the rise of the world price (P_i) reduces

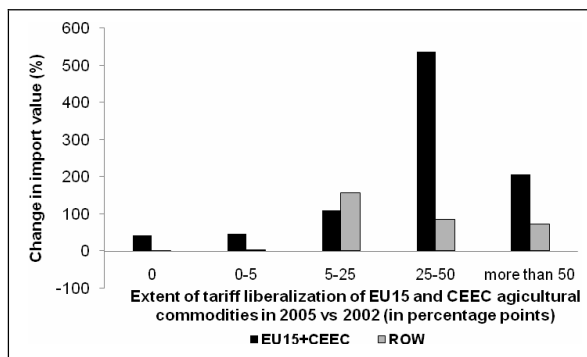
³ 2000–2001 (2004–2005) means the average value of trade flows of respective commodities in 2000 and 2001 (2004 and 2005). We averaged the values of agricultural imports in the respective years to get more robust results because weather could have led to fluctuations in imports.

FIGURE 5 Change of Slovak Agricultural Imports from EU15 + CEECs and ROW for Different Levels of Tariff Liberalization (2002 vs 2000)



Source: own calculations

FIGURE 6 Change of Slovak Agricultural Imports from EU15 + CEECs and ROW for Different Levels of Tariff Liberalization (2005 vs 2002)



Source: own calculations

the quantity imported. Z is a time dependent factor such as the real exchange rate or income.

Export supply is expressed in a similar manner:

$$\ln S_i = d_0 + d_1 \ln P_i + d_2 \ln Z \quad (2)$$

where d_1 is assumed to be positive because the rise of the world price increases the quantity exported.

When the *ad valorem* import tariff (T_i) is introduced, then domestic and world prices differ. The difference between the domestic price and the world price is equal to the amount of the tariff. The domestic price will become $P_i (1 + T_i)$, because we assume a small country case. Imports are highest when the tariff is equal to zero; higher tariff rates cause imports to decline.

Import demand with tariff (T_i) can be expressed as:

$$\ln D_i = b_0 + b_1 \ln P_i (1 + T_i) + b_2 \ln Z \quad (3)$$

which is

$$\ln D_i = b_0 + b_1 \ln P_i + b_1 \ln(1 + T_i) + b_2 \ln Z \quad (4)$$

The intersection of import demand with the tariff and export supply determines the equilibrium price and quantity of trade. The equilibrium quantity of trade can therefore be determined by solving the following system of equations:

$$\begin{aligned} \ln S_i &= d_0 + d_1 \ln P_i + d_2 \ln Z \\ \ln D_i &= b_0 + b_1 \ln P_i + b_1 \ln(1 + T_i) + b_2 \ln Z \\ \ln D_i &= \ln S_i \end{aligned} \quad (5)$$

Doing this, we arrive at:

$$\ln D_i = B_0 + B_1 \ln(1 + T_i) + B_2 Z \quad (6)$$

where: B_0 = is a constant term,

$$B_1 = b_1 d_1 / (d_1 - b_1)$$

The B_2 coefficient is a function of the elasticities of import demand and export supply and of the d_2 and b_2 coefficients.

By taking the differences of (6), we get:

$$\ln D_{i,t} - \ln D_{i,t-1} = B_1 (\ln(1 + T_{i,t}) - \ln(1 + T_{i,t-1})) + B_2 (Z_t - Z_{t-1}) \quad (7)$$

Equation (7) is a theoretical basis for the estimation. We augmented equation (7) into the form (8) to take into consideration also other relevant variables influencing agricultural trade:

$$\begin{aligned} \% \Delta \text{Imports}_{it} &= B_0 + B_1 \Delta \text{Tariff}_{it} + B_2 \text{TradeShare}_{it} + B_3 \text{YEAR}_{it} + \\ &+ B_4 \% \Delta \text{EXCH}_{it} + B_5 \text{YLD}_{it} + B_6 \text{EU}_{it} + B_7 \text{CZ}_{it} + B_8 \text{PL}_{it} + \\ &+ B_9 \text{HU}_{it} + B_{10} \text{LT}_{it} + B_{11} \text{LV}_{it} + B_{12} \text{EE}_{it} + B_{13} \text{BG}_{it} + B_{14} \text{RO}_{it} \end{aligned} \quad (8)$$

The specific time dependent factors (Z) are replaced with a time dummy (YEAR) that absorbs the changes of time dependent factors such as change in GDP, effect of gradual agricultural trade liberalization within the EU15 + CEEC, etc. The YEAR variable is equal to 0 for the period 2000–2002 and to 1 for 2002–2005. However, the change of the real exchange rate ($\% \Delta \text{EXCH}$) is included in the regression alone.

Additionally, we use the original trade share (TradeShare) as an independent variable. For each partner country and commodity it is computed as the share of imports in 2000 of a commodity in total Slovak agricultural imports of that commodity in 2000 (the first wave of trade liberalization). This is done similarly for the second wave (2002). The reason is as follows. The original (from the beginning of the observed period) share of Slovak agricultural imports from the EU15 + CEEC is related to the competitiveness of imports. A low (high) original share of imports of a given commodity from the EU15 + CEEC in the total agricultural imports could be an indication that the EU15 + CEEC was not competitive (was competitive) in a given commodity relative to the rest of the world prior to enlargement.

Discriminatory liberalization of agricultural trade between the EU15 + CEEC and Slovakia could increase the share or leave it low. The low share would most likely remain for commodities that the EU15 + CEEC do not produce or produce only

marginally. This could be the case of some commodities that are produced in tropical climates and are imported to both the EU15 and CEEC. However, if the originally low share of imports increases after enlargement, then imports from the EU15 + CEEC replace imports from the rest of the world and trade diversion occurs. Therefore, if growth of imports from the EU15 + CEEC is higher for low levels of the original import share then trade diversion is more likely. If growth of imports from the EU15 + CEEC is higher for higher levels of the original share then trade creation is more likely. The share variable determines whether Slovak agricultural imports from the EU15 + CEEC have increased more for commodities in which the EU15 + CEEC is competitive or for those in which the EU15+CEEC was not competitive originally and became competitive due to positive discrimination vis-à-vis the rest of the world.

The *YLD* variable stands for the wheat yield which is a proxy for weather and/or technological progress. Output in agriculture and subsequently in trade is heavily dependent on weather conditions. Additionally, technological convergence of agriculture in the CEEC to the EU15 level leads to higher yields that affect international agricultural trade. However, in order to control for a simultaneous increase in yields in Slovakia and the partner countries considered, we define the *YLD* variable as the difference between the percentage change of the wheat yield in a partner country and the percentage change of the wheat yield in Slovakia.

There are also country dummies standing for the EU15, the Czech Republic (CZ), Poland (PL), Hungary (HU), Lithuania (LT), Latvia (LV), Estonia (EE), Bulgaria (BG) and Romania (RO) representing country specific effects. Slovenia was left out of the dummies set and thus serves as a benchmark for the remaining countries.

The original trade database contained some commodities for which there were no imports reported in 2000, 2002 and 2005. These observations were omitted from the regression. Moreover, in order to control for outliers we also excluded those commodities for which the percentage change of imports (in absolute value) exceeded two standard deviations. This procedure was conducted for the EU15 and nine CEEC and as a result a panel of 3,504 observations was obtained.

In principle, the panel of observations we use consists of two time periods (the first wave of agricultural liberalization (2000–2002) and the second wave (2002–2005)) and ten cross-sectional units (the EU15 plus nine CEEC, Slovakia excluded). The specification of the model (8) in logarithms lessens the problem of heteroskedasticity, since the scale of data is reduced by a logarithm. However, to cope with heteroskedasticity fully, we used the Least Squares Dummy Variable model (LSDV) with White's heteroskedasticity corrected standard errors.

The results of the regression (8) are presented in *Table 1*. Four different models are estimated in order to check for robustness of our results. From the regression results, it follows that a one percentage point reduction in the tariff rate, because of agricultural trade liberalization due to EU enlargement, increased Slovakia's agricultural imports from the EU15 + CEEC by around 3 % (for example in *Model 1* it is 3.08).

A high original share of imports is akin to lower growth of imports. This indicates that the EU15 + CEEC' exports to Slovakia grow faster for commodities that were not originally competitive before the enlargement. Our results suggest that the enlargement process resulted in replacement of imports from the rest of the world

TABLE 1 Results of Regression (8)

Dependent Variable: Percentage Change in Slovak Agricultural Imports from the EU15 + CEEC in the Periods 2000–2002 and 2002–2005

	Model 1	Model 2	Model 3	Model 4
<i>Δtariff EU15 + CEEC</i>	3.08*** (1.00)	3.06*** (0.96)	2.94*** (0.95)	2.95*** (0.98)
<i>TradeShare</i>		-3.31*** (0.18)	-3.31*** (0.19)	
<i>YEAR</i>	0.34 (0.32)	0.40 (0.31)	0.37*** (0.13)	0.36*** (0.14)
<i>%ΔEXCH</i>	-1.58 (1.38)	-1.44 (1.35)		
<i>YLD</i>	-2.01** (1.00)	-2.12*** (0.98)		
<i>EU</i>	0.63*** (0.15)	1.80*** (0.17)	1.81*** (0.11)	0.62*** (0.08)
<i>CZ</i>	0.71*** (0.19)	1.70*** (0.21)	1.48*** (0.14)	0.49*** (0.12)
<i>PL</i>	1.69*** (0.22)	1.92*** (0.22)	1.80*** (0.20)	1.58*** (0.20)
<i>HU</i>	0.57** (0.27)	0.84* (0.26)	0.53*** (0.19)	0.26 (0.20)
<i>LT</i>	0.62 (1.00)	0.61 (1.00)	0.62 (1.00)	0.62 (1.01)
<i>LV</i>	1.40 (0.85)	1.47* (0.84)	1.35 (0.85)	1.30 (0.86)
<i>EE</i>	1.73 (1.09)	1.89* (1.07)	1.51 (1.04)	1.37 (1.07)
<i>BG</i>	1.07 (0.57)	1.02* (0.57)	0.92 (0.56)	0.97* (0.56)
<i>RO</i>	1.84*** (0.69)	1.80*** (0.69)	1.46** (0.70)	1.50** (0.70)
Constant	-0.73*** (0.22)	-0.67*** (0.22)	-0.20** (0.08)	-0.28*** (0.08)
<i>F statistics</i>	6.71***	20.98***	23.66***	7.19***
DW	1.81	1.80	1.80	1.81
Adjusted <i>R</i> ²	0.02	0.07	0.07	0.02

Notes: standard errors in parentheses; DW – Durbin-Watson statistics

***, **, * mean 1%, 5% and 10% level of significance, respectively.

A decrease in the tariff rate enters the regression as a positive number. The change of the tariff rate, the original share and the change of the real exchange rate are not converted in percentages in the regression.

Source: authors' own calculations

with imports from the EU15 + CEEC, which means that some trade diversion was brought about by EU enlargement. Namely, for every one percentage point increase in the original share of agricultural imports from the EU15 + CEEC for commodity *i*, there is approximately a 3% slowdown in the consequent dynamics of agricultural imports. In *Model 1* this is represented by the coefficient 3.08 (*Table 1*).

The time dummy (*YEAR*) may also reflect the impact of enlargement on agricultural imports. The positive sign of the *YEAR* shows that EU accession had a posi-

tive effect on Slovak agricultural imports from the EU15 + CEEC. Therefore, EU accession caused a rise in trade because of the elimination of tariffs and also because of harmonization of standards and other regulatory policies.

The signs of all coefficients are as expected except for the yield variable (*YLD*).

A one percentage point reduction in the agricultural tariff rate of Slovakia increases agricultural imports from the EU15 + CEEC by around 3 %. Because the simple mean reduction in tariff rates was 10.4 percentage points, we can conclude that approximately 31.4 % of the increase in agricultural imports from the EU15 + CEEC was due to elimination of tariffs as Slovakia (and other CEEC) joined the EU. This is 28.4 % of the total increase in agricultural imports from the EU15 + CEEC between 2000 and 2005. The remaining 71.6 % of the increase in imports occurring in that period was due to other reasons such as globalization, transformation of the economy, harmonization of regulatory policies, elimination of non-tariff barriers and others.

8. Conclusions

Total agricultural trade between Slovakia on the one hand and the EU15 + CEEC on the other has been growing since the 1990s. EU accession led to significant changes in Slovak agricultural trade. The results indicate that 31.4% of the increase in agricultural imports from the EU15 + CEEC between 2000 and 2005 was due to the discriminatory trade liberalization between Slovakia and the EU15 + CEEC, i.e. due to the formation of a customs union. The rest of the increase in respective agricultural imports was due to other reasons such as globalization, transformation of the economy, harmonization of regulatory policies, elimination of non-tariff barriers and others.

Part of the increase in agricultural trade with the EU15 + CEEC was at the expense of trade with more efficient producers from the rest of the world, i.e. there is an indication that some trade diversion could have occurred. The possibility of occurrence of trade diversion leads to the conclusion that the overall global trade liberalization is better from the welfare perspective than “fortress Europe”, which eliminates trade barriers only within Europe and retains significant protection rates against imports from outside Europe.

Furthermore, we found that for Slovakia the second wave of agricultural trade liberalization (from 2002 onward) brought about greater effects in terms of the increase in agricultural imports from the EU15 + CEEC than was the case with the first wave.

However, to reach our conclusions we did not consider some trade barriers that affect international agricultural trade. In particular, there are no data on fill rates of the quotas and it is not possible to unequivocally attribute the quota share to a commodity specified by an eight-digit code.

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