# THE INFLUENCE OF FREE TRADE AGREEMENTS ON AGRICULTURAL TRADE DIVERSION AND TRADE CREATION

By

**Bakibayev Rustam** 

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Supervisor: Associate Professor Miklós Koren

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## Abstract

This paper examines the influence of the membership in Free Trade Agreements (FTAs) on members' agricultural trade diversion and trade creation using gravity model of international trade. The focuses on 4 FTAs with a total number of 32 developing countries with significant share of the agricultural sector in GDP in the period of 2004-2015. Trade creation and trade diversion are estimated using Poisson Pseudo Maximum Likelihood (PPML) estimation technique. Aside from found studies this study distinguishes trade in agro products and processed food products. Study finds a positive impact of membership in FTAs on trade among involved countries. It can be concluded that in chosen FTAs trade creation effects overwhelm trade diversion effects.

Keywords: gravity model, trade creation, free trade agreement

# Acronyms

- AFTA ASEAN Free Trade Agreement
- AMU Arab Maghreb Union
- APEC Asia-Pacific Economic Cooperation
- CACM Central American Common Market
- CAN Andean Community
- CARICOM Caribbean Community and Common Market
- CEFTA Central European Free Trade Agreement
- CIS Commonwealth of Independent States
- COMESA Common Market for Eastern and Southern Africa
- CU Customs Union
- EU European Union
- FGLS Feasible Generalized Least Squares
- GATT General Agreement on Tariffs and Trade
- **GDP** Gross Domestic Product
- GLS Generalized Least Squares
- **GNP** Gross National Product
- GPML Gamma Pseudo Maximum Likelihood
- LDC Least Developing countries
- MERCOSUR Southern Common Market
- NAFTA North American Free Trade Agreement
- NLS Nonlinear Least Squares
- OLS Ordinary Least Squares
- PPML Poisson Pseudo Maximum Likelihood
- **RPTA Regional Preferential Trade Agreement**
- SAFTA South Asian Free Trade Area

UNMIK - United Nations Interim Administration Mission in Kosovo

WTO - World Trade Organization

## Introduction

In the last two decades there has been a rapid spread of trade liberalization around the world. One of the main consequences is the formation of free trade agreements (FTAs) among countries. The vast number of the WTO (World Trade Organization) members belongs to one or several FTAs. As of 5 May 2017, 274 RTAs are in force (WTO regional trade agreements database). FTA is the number of countries that reduce or eliminate barriers within the FTA and maintaining different tariffs on imports for the rest of the world. Graph 1 depicts the dynamics of the formation of FTAs in the period from 1948 to 2017 is depicted.

Such a rapid spread of trade agreements has become an essential part of trade liberalization. However, free trade agreements also involve regionalism, which has a potential to compete with multilateralism. Therefore, this issue has raised a massive discussion about the effect of these agreements on trade flows. Still, there have been a quite big number of studies trying to empirically estimate the effect of membership in particular FTA. (Rose, 2004; Bergrstrand and Baier, 2007; Anderson and van Wincoop, 2003). According to Viner (1950) the effect of membership in FTA is separated into trade creation, which is replacement of high-cost imports from nonmembers by member countries, and trade diversion which has an opposite effect of replacing low-cost by high-cost imports. Trade preferences for higher-cost producers within the FTA can lead to shutting out of production of more efficient nonmember countries, resulting in trade diversion and efficiency losses. There is no certain answer because the effect is different in case of each agreement for both developed and developing country. It is also important to take into account specific sectors of the economy, types of goods and period of time. Therefore, the effect of FTA on agricultural depending on these two effects is an empirical question.

In order to measure the extent of these two effects the gravity model is used. The traditional gravity model since the introduction by Isaac Newton was implemented to various types of flows such, but only in last 50 years it got the application for interregional and international trade flows. The model states that trade flows from country i to country j are proportional to their economic

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sizes (GDPs), and inversely proportional to the geographical distance between them. Later, augmentation of the gravity model by researchers allowed estimating some trade volume, direction and values inherent to particular trade relationship of different countries. (Anderson, 1979; Bergstrand, 1989; Baier and Bergstrand, 2004; Anderson and van Wincoop, 2003)

Although gravity model was preferred at that time due to its empirical superiority, originally gravity model had a very poor theoretical justification. Since 1970s there were lots of attempt to find theoretical derivations from various trade patterns such as a model of monopolistic competition, Heckscher-Ohlin (HO) model, Ricardian model (Deardoff, 1995; Bergstrand, 1989) and etc. One of the main characteristics of this model is its general use, since it can be applied to any pair of countries, and generally can be derived from any model of trade.

When the gravity model became widely applicable, it allowed researchers to estimate the effect of participation in various FTAs on trade flows. There are plenty of studies, mostly based on European Union (EU), East-Asian and African countries, which explore the overall effect of participation in FTA on trade. However, there are fewer researches done on the investigation of the diversion and creation effects. And, particularly there are only several studies that examine the diversion and creation effects in agricultural sector.

From available literature we can see that many studies argued that original aim of the membership in FTAs is not accomplished thus the trade from member countries is rather diverted than created. Particularly, there is a wide critique of the effect of FTA formation on agricultural trade. (Sun and Reed, 2010; Rose, 2004; Subramanian and Wei, 2007) However what should be noticed is that the researches do not distinct agricultural and food sectors. These studies argue that the effect of trade diversion from the formation of particular FTAs is likely to exceed the desired trade creation effect, leading to welfare losses to member of FTAs in agricultural production. Other studies, however find that being a member of FTAs leads to significant increase in the volume of trade through trade creation, and sometime this effect is even higher than for nonagricultural sector

(Lambert and Grant, 2008; Lambert and McKoy, 2009; Bureau and Jean, 2013) So, does really membership in FTAs leads to agricultural trade creation?

In order to fill the gap this research will be directed on the quantification of the agricultural trade diversion and trade creation effects of the membership in FTAs, with special emphasis on Commonwealth of Independent States (CIS). Furthermore, this study contributes to others by distinguishing of trade in processed food products and raw agricultural products. 89 countries in total and 4 FTAs are included in the sample for the period from 2004 to 2015. The study of effects of trade creation and diversion in the bilateral FTAs is important because FTAs are very important for developing countries, especially of import-based countries. With freer trade, trade flows will be smoother for both partners, eventually increasing each country's welfare. In this study traditional gravity model is augmented in order to quantify agricultural trade creation and diversion effects of membership in FTAs. The hypothesis is that with membership in FTAs the effect of trade creation in agricultural and food sectors exceeds the trade diversion effect.

Study organized as follows. Section 2 reviews the available analytical and empirical literature, concerning the issue of agricultural trade diversion and creation effect of FTA. Section 3 describes the theoretical background behind the gravity model formation. Section 4 describes the model, data, general description of the considered FTAs and methodology used for the estimation process. Section 5 contains the empirical results of the regression. Section 6 is the concluding remarks and policy recommendations.

## **Literature Review**

Since the issue of the influence of the FTAs on trade has been growing rapidly throughout the globe for the last 50 years, there are a vast number of literatures on this topic. Influence of the FTAs on trade is a disputed issue among researchers in international economics. There are plenty of studies examining the impact of FTAs on international trade flows. However, there are much less number of studies conducted on the topic of the influence of FTAs on trade diversion and trade creation. Unfortunately, there are even less studies that focus on the topic of agricultural trade, therefore leaving this issue unexplored.

Firstly, the discussion about studies that found negative or insignificant influence of the FTAs on trade goes. Then, the majority of studies, claiming that FTAs have a positive impact on trade are discussed.

The study by Rose (2004) reveals that membership in the WTO/GATT (General Agreement on Tariffs and Trade) is not associated with the increase in trade flows. He created a panel of 175 countries for 50 years, using several estimation methods and including country specific fixed effects, finds that there is no big difference both in trade diversion and creation if the country is a member of WTO. Although the study confirms that there is a no potentially harmful trade diversion, the results are highly correlated across the experiments. Dividing countries into five regions, Rose shows that countries apart trade less, while economically richer and larger countries trade more, therefore the distance between countries matters.

As a critique to Rose (2004), Subramanian and Wei (2007) published a paper that finds that WTO has had a positive impact on trade, adding the volume of global trade by 120%. Taking a sample of 172 countries in the period of 1950-2000 with 5 year intervals and focusing on particular goods, covered by WTO trade liberalization, they had interesting results. Using OLS and PPML estimation techniques, results show that membership in WTO promotes trade mostly in industrialized countries, while has little effect in developing countries. Additionally, they find that WTO has a large and significant negative effect on agricultural trade flow.

"It appears that the exemption of agriculture from WTO disciplines has provided the freedom for industrial countries to throttle trade by introducing very high levels of protection. This permissiveness toward agriculture has proved very costly". (p. 169)

Study done by Engelbrecht and Pearce (2009) which revisits study by Rose, using a sample of 46 countries in the period of 1965-1997, reveals that membership in WTO/GATT has been mainly associated with liberalization of trade in capital-intensive commodities and failed to create trade in agriculture and labor-intensive commodities. Although it might seem that in this case

mainly developed countries gain from the membership, but the study shows that developing countries derived lots of benefits from this involvement.

The study done Sun and Reed (2010) reveals that creation of FTAs leads to the lower multilateral trade barriers for agricultural products. The creation of some particular FTAs has created a large increase in trade of agricultural products within members and contributed to both, trade diversion and trade creation. The dynamic results obtained from using PPML differ from static and discover more trade diversion in case of particular FTAs, and most probably the reason is the high agricultural tariffs for non-FTA members. Study also suggests that the effects of FTAs vary over time, showing trade creation in early years, and disappearing later.

In contrast, the majority of studies support the hypothesis that membership in FTAs increases the volume of trade flows. There are number of studies that have opposite or different results. The publication by Rose induced a growing body of literature criticizing his results. The work by Tomz, Goldstein and Rivers (2007) claims that division of countries proposed by Rose (2004) was incorrect, leading to downward bias in estimating the effect of WTO/GATT. After correcting the dataset, using fixed effects method for estimation gravity model they found positive and significant increase in trade both of members and nonmembers of FTA.

Lambert and McKoy (2009) state that membership in FTAs increases agricultural and food trade, although mostly the trade goes with nonmembers. They analyze the effects of various FTAs on both intra- and extra-bloc agricultural and food product trade for three periods: 1995, 2000, and 2004. They find that membership in FTAs generally increases agricultural and food trade. For example, agricultural trade among NAFTA (North American Free Trade Agreement) members increased by 145% in 1995–2004. Their results support food trade diversion for members of the Caribbean Community and Common Market (CARICOM), the Central American Common Market (CACM), the Andean Community (CAN), and the Common Market for Eastern and Southern Africa (COMESA); yet they found that most FTAs create trade with nonmembers for food and agriculture.

Grant and Boys (2011) revisits some of the previous studies and confirms that membership in WTO/GATT increases trade within members in agricultural products by 161%, and by 72% in non-agricultural products. So, the paper concludes that developing counties gained substantially from participation in WTO/GATT, while also leading to the formation of new trade agreements within WTO/GATT.

The study done by Vicard (2009) confirms trade creation effect is huge under the membership in all kinds of FTAs. Although, he states that treatment effect of various FTAs does not differ statistically according to its form and depth. Trade creation effect does not differ according to the depth of integration when self-selection into agreements appears.

Study by Bergrstrand and Baier (2007) argues that the most effective method to estimate the effect of FTA's on bilateral trade employs a theoretically-motivated gravity equation using differenced panel data. Three different approaches for panel data: estimation with fixed effects, first difference with and without inclusion of multilateral price terms. This study finds significant change in trade flows and states that on average, participation in FTA gives member countries increase in trade by 86% in 15 years, although this study has not addressed the impact of such agreements on trade with nonmembers, nor trade among nonmembers.

Likewise, the study of Bergstrand and Baier (2007), the work by Martinez-Zarzoso et al. (2007) implements several techniques in estimation of the gravity model such as Gamma and Poisson Pseudo Maximum Likelihood (GPML and PPML), Heckman, and Feasible Generalized Least Squares (FGLS) in order to find the most precise results. The study investigates trade relationship among 47 countries, and includes several free trade areas: EU, NAFTA, CARICOM, and CACM. The integration dummies indicate increase in trade by 87% in case of EU and by 186% in case of NAFTA. However, the sign of the population variable changes from 1991 from negative to positive which indicates the importance of scale economies in international trade.

Jayasinghe and Sarker (2008) analyze the influence of NAFTA in the period of 1985-2000 for 6 agrifood commodities find that after implementation of NAFTA the increase in trade within

members started to exceed the level of trade between members and nonmembers of this FTA. Study shows that the level of openness for particular commodities has significantly decreased.

Similar to study of Jayasinghe and Sarker (2008), Karemera, Reinstra-Munnicha and Onyeocha (2009) make an analysis of trade flows for nine selected commodities of vegetable and fruit. Comparing trade flows of NAFTA, EU and Asia-Pacific Economic Cooperation (APEC) in the period of 1996 to 2002 they find strong gross trade creation effect of formation of these particular FTAs. The novelty of their study is the inclusion of dummy variable to identify the impact of seasonality on trade.

In the study of Koo, Kennedy, Skriptnichenko (2006) trade creation effects of selected regional trade agreements were positive. The trade creation effects of NAFTA were not significant, possibly because these countries already have a strong trade relationship as a result of their close proximity. The overall trade diverting effect was positive, indicating that Regional Preferential Trade Agreements (RPTAs) do not displace agricultural trade with nonmember countries. Although the benefits of RPTAs are greater for member countries than for nonmembers, the results of this analysis indicate that RPTAs are not harmful to nonmember countries. This suggests that RPTA improve global welfare by increasing agricultural trade volume among member countries and, to a lesser degree, among nonmember countries. This implies that, in general, RPTA are welfare enhancing with respect to agriculture for both member and nonmember countries.

The study by Nguyen (2009) focuses on factors influencing export trade flows in the AFTA countries using a sample of 39 countries, 26 of which are members of FTAs, including NAFTA, partially EU and MERCOSUR, during the period 1988-2002. Similar to many studies before, author uses the concept of institutional dummy variables, developed by Endoh (1999), which makes distinction between trade diversion and creation simpler. The way in which this study differs from many is that aside from the traditional variables that are used in the gravity model, study does not undermine the role of exchange rate and includes it in the model. Study employs the Hausman-Taylor method of estimation, which is rather rare, and the unobserved heterogeneous factors, which

were previously not addressed, are taken into account and treated through two-way error component model. Author notes that patterns of change in regional trade are not the same after formation of FTA, however trends in NAFTA and MERCOSUR are similar. Trade creation was found in all FTAs except for the EU, in which import trade diversion is dominant. In general, it was determined that on average AFTA members trade 87 percent more with member countries, however, at the same time member extra-regional trade is 1.2 times more than was predicted.

The study by Medvedev (2010) analyses trade flows for 150 countries in the short period between 2000 and 2002. The study follows the approach of Anderson and van Wincoop (2003) and uses Generalized Least Squares (GLS) estimation technique with inclusion of region-specific fixed effects. Results suggest that impact of trade agreement vary significantly depending whether total or preferential agreement is used as an explained variable: joining a FTA increases total trade by 87% and preferential trade by 119%. Also, this study suggests that researches which have not adjusted for the presence of low duty tariff lines in PTA members' tariff schedules have underestimated the marginal impact of FTAs.

Bureau and Jean (2013) taking a sample of 78 agrifood agreements in the period of 2002-2009 also confirm significant impact of FTAs on trade in agricultural products. The agricultural sector is characterized by a relative high rate of protection and tariff concessions may play an important role. Using PPML estimation technique they find that 1% preferential margin increases trade flows by 2%, also increasing the probability of export to a partner country by 0.1%.

Research of Korinek and Melatos (2009) takes a look on the RTAs of the developing world (ASEAN Free Trade Area (AFTA), Southern Common Market (MERCOSUR), COMESA) in the period of 1981 to 2006, using annual bilateral trade data for 55 products. The share of agriculture in export has fallen down in AFTA and COMESA although member countries may follow world trend in exporting less of agricultural products and more manufactured goods and services. In contrast, exports in MERCOSUR have increased over time; there is a large positive trade creating impact in the agricultural sector. The implementation of AFTA reduced exports from members to non-

members. The results show that there is a positive effect of FTA on imports from the outside. Thus it is mainly trade creating for the members of this particular FTA. Concerning COMESA, the intratrade in agricultural sector is growing, although it is still small, and mainly takes place between countries with common border, which shows negative trend in the distance between countries. In overall the implementation of MERCOSUR increased trade by 81% and induced member countries to drastically decrease intra-trade in products in which they had comparative advantage. In general, creation of FTAs in this study is trade creating, and there is no evidence that there is trade diversion from trading non-members.

Kahoulia and Maktouf (2015) analyze trade creation and diversion effects in the Mediterranean area with the emphasis of the effect of the global financial crisis on trade flows between considered FTAs in this region. Use of regional dummies for EU-15, EU, Arab Maghreb Union and AGADIR agreement in a sample of 27 countries in the period of 1980-2011 proves positive effect on export gravity models. In general, using OLS, static (pooled OLS, FE) and dynamic panel estimation techniques (GMM by Blundell and Blond, 2000) they observe mixed results, demonstrating both trade creation as well as trade diversion effects. What is interesting about this study is that it uses less popular indicator of similarity of the size of the GDPs, which takes the value from 0 to 0.5, where less indicates bigger difference in countries, which is quite rare. This study might be less related to my topic of interest; however, it demonstrates the results of the exogenous shocks that might happen during the formation of stable trade relationship within FTA.

Study done by Lambert and Grant (2008) doubting in the benefits for the agricultural trade creation compared agricultural and nonagricultural trade flows. Taking the period of 1982 to 2002, it finds that the increase in agricultural trade is even higher that of nonagricultural trade (72% versus 27%) for all considered agreements. The study also confirms previous observations concerning periods of the membership. It takes several years before real effects of the participation might occur. The study does not take specific commodities, but on average in twelve years the trade of members in agriculture rises by 149%.

The work of Hndi, Maitah and Mustofa (2016) is similar to the Grant and Lambert (2008) and covers the influence of FTA on agricultural trade as well as dairy, vegetable, live animals, meat and sugar. Four countries are selected as reporting countries (Algeria, Egypt, Morocco and Tunisia), and the reasoning for such choice is the large share of agriculture in the overall economy of these developing countries. Authors, looking at agricultural trade flows in the period of 1991-2013, find that there is a positive effect on agricultural trade flows, where presence of FTA boosts trade flows by 39 percent, as well as vegetables and dairy products, however having negative effect on meat, sugar and live-animal. There are not may studies, especially in the sphere of agricultural, which estimate the effect of FTA on specific products. What is interesting is that study finds that there is a discovery of potential trade creation between Latvia and Lithuania and North-African countries in diary and vegetables products as an outcome of EU agreement.

Rahman and Shadat (2006) investigate trade creation and diversion effects of a ten FTAs, with a special emphasis on SAFTA using a gravity model. In order to estimate these effects two stage process, which includes OLS and Tobit models, is implemented. Along with the significant intra-FTA export creation effects, net export diversion effects are present. Study finds that trade creation effects are distributed unequally benefitting some countries and having negative effect on others. Additionally, low level of increase in agricultural trade flow comparing to other notable FTAs such as NAFTA, SADC and CAN is explained by a large part of informal trade.

The study by Huchet-Bourdon, Le Mouël, Vijil (2012) (considering nearly all FTAs in agrifood trade) finds significant and substantial increase in the trade flows between members in agricultural goods and food products taking the sample of 180 countries in the time period of 2001-2011. Using PPML estimation method they find that on average, trade flows increased by 128% between member countries.

Majkovic, Bojnek and Turk (2007) looking at the after effects of Slovenian accession to EU on agri-food trade structures and trade flows in general on a disaggregated level. The study finds evidence on the dominance of trade creation effects in imports rather than exports, which in turn

severely reduces Slovenian competitiveness in export of the selected products. As many studies before, this study notes that it takes time for trade liberalization to become efficient, meaning that the trade volumes of the country, which joined FTA, will not rise immediately right after accession. What is notable in this study, besides the fact that it focuses only on one country, is that it employs different method proposed by Grubel & Lloyd (1975), which focuses on the pattern of intra-industry trade. The basic principle of this method relies on the assumption that quality differences are reflected in price differences, therefore, using variance in values of imports and exports, this study also finds quality differences of trade. Authors point out that big role in successful integration of Slovenia into EU markets is attributed to forthcoming structural changes, however at this period of time Slovenia agri-food trade concedes both in quality and price in the EU and ex-Yugoslav states markets.

Mogilevskii (2012) states that the major trade flow rise between member countries of CU is "critically dependent on the identification of exogenous shocks, which are not related to changes in trade policy". Paper reveals the presence of both trade diversion and trade creation effects on the member countries, although the biggest country is certainly a gainer of this particular RTA. Study finds trade creation effect mainly in agricultural products and foods, chemicals and machinery. However, the effect of the membership in CU requires a longer time to develop; therefore, it is too early to conclude that there is strongly negative or positive effect on trade flows.

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To summarize, from the reviewed literature it is clear that trade creation and diversion effects vary significantly in case of each particular FTA and depend on the choice of the estimation method. The majority of studies estimate gravity model through OLS and PPML estimation techniques, however several of them use different approaches in order to get better estimation results.

# Theory and empiricism behind gravity model

#### **Theoretical background**

Free trade agreement allows forming a free trade area within member countries which eliminates trade barriers on most goods and services traded between them. Usually under FTA member countries maintain different tariffs on goods imported from non-members. Starting from Viner (1950), economists had a quite big debate about trade diversion, rather than trade creation, possibilities under the FTAs. Viner was the first one who introduced terms of "trade diversion" and "trade creation". Trade creation is the situation when two member countries start to trade with each other, however one of the countries produced goods domestically, and now importing from member country at a lower cost. Therefore, two closed (in this good) countries by starting trading with each other gain. On the other hand, trade diversion happens when two countries start to trade with each other, however, due to the tariff preferences, one of these countries replaces low-cost imports from non-member country by imports of high cost member country. Thus, the switch from lower price to higher price has negative effect throough diverting trade from more efficient producers. Looking further, the membership in FTAs may change the relative prices of member's imports, leading to increased consumption in the domestic market. Thus trade creation can be separated into production and consumption effects. The effects of trade diversion and trade creation since the contribution of Viner have been investigated in the static framework (Jayasinghe and Sarker, 2008; Rose, 2004). So, generally the net welfare effect of the membership in the particular FTA can be negative or positive for member countries and non-members depending on the relative size of each effect.

The gravity model of trade can be considered as one of the most successful trade analysis tool for the last thirty years. The roots of the gravity model are in 17<sup>th</sup> century. Since the discovery by Isaac Newton, the gravity model was implemented to different flows: migration, foreign direct investment and international trade. In general gravity model predicts trade flows between two countries relying on their economic sizes, which are usually taken as GDP, and distance between them. Tinbengen (1962) was one of the first who applied gravity model to international trade flows.

The model itself is the trade flow from country i to country j, with application of the economic sizes (either GDP or GNP), the populations of two countries, geographical distance and different types of dummies associated with some specific characteristics inherent to particular trade flows.

In contrast to other international trade models, gravity model of trade was an econometric success, and only after some time was derived theoretically. From the very beginning theoretical support of the gravity equation was very poor, but since the second half of the 1970s several theories appeared in the support of gravity model. Therefore, for now there is a quite big amount of literature that attempts to find theoretical justification for the gravity model of international trade (Anderson, 1979; Bergstrand, 2004; Anderson and van Wincoop, 2003). The microeconomic foundations of the gravity equation (Anderson, 1979; Bergstrand, 1985; Helpman and Krugman, 1985) provide rough explanations for the log linear form. Afterwards, Matyas (1997), Egger (2000), and other researchers have developed the econometric measurement of the gravity model. Thus, in the 2000's gravity model got a solid theoretical justification and became a workhorse for the estimation of ex post effects of FTAs on trade flows. Additionally, Bergstrand (2004), Soloaga and Winders (1999), Anderson and van Wincoop (2003), and Bougheas et al (1999) contributed a lot to the modification of the main variables used in the model and introduced several new variables, leading to better explanation of trade volume. However, there is a massive amount of literature that discusses the use of some specific variables added in the general gravity equation.

Anderson (1979) was among the first who tried to derive the gravity equation. He employed Cobb-Douglas expenditure system and constant-elasticity of substitution (CES) preference, which is commonly known as "Armington assumption" (Armington, 1969) that differentiates products by their country of origin. Further Bergstrand (1985) adopted this approach and tried to derive the equation for bilateral trade which includes price indices. He specified the supply side of economies using GDP deflators in order to approximate price indices. Later, Bergstrand (1989) provided another approach for theoretical justification of the gravity model assuming Dixit-Stigliz (1977) monopolistic competition model. In this approach product differentiation by country of origin was replaced by product differentiation by firm. However due to two-sector economy and different factor proportions of two monopolistically competitive sectors this was a hybrid of HO model and one-sector monopolistically competitive model of Krugman (1979). By this he examined the bilateral intraindustry trade. However, at the same time Helpman (1987) believed that gravity equation cannot be derived from other models, and particularly cannot be explained by HO model. He stated that "the factor proportions theory contributes very little to our understanding of the determination of the volume of trade in the world economy, or the volume of trade within groups of countries".

Afterwards, Deardoff (1995) justified that general gravity equation characterizes many models including and explanation can be provided from standard trade models such as Ricardian and HO, considering two cases. Firstly, he took a case of frictionless trade, in which there are no trading barriers in trade of homogenous products. In second case product differentiation was considered. Deardoff derived expressions for bilateral trade both with Cobb-Douglas and CES preferences, similar to those used by Anderson (1972) and Bergstrand (1989).

Finally, Anderson and van Wincoop (2003) derived a credible gravity equation relying on the manipulation of the CES preferences that is easy to estimate and very helpful in solution "border puzzle". The important thing that AW (2003) stated is that multilateral trade resistance factors should be included in empirical estimation to correctly estimate the theoretical gravity model. One of the ways is to proxy these terms with country dummy variable or with fixed effects in a panel data framework.

## **Gravity Model Specification**

The gravity equation is developed to measure the effect of participation in FTA on agricultural trade flows. Furthermore, this model became a great tool for assessment of trade diverting and trade

creating effects associated with engaging in FTAs. The general form of the gravity model is following:

(1) 
$$T_{ijt} = GDP_{it}^{\beta 1} GDP_{jt}^{\beta 2} xPOP_{it}^{\beta 3} POP_{jt}^{\beta 4} / DIS_{ij}^{\beta 5} v_{ijt}$$

Where:

 $T_{ijt}$  = the volume of the export from country i to country j in the time t;

**GDPi** and **GDPj** = values of importing and exporting countries respectively;

**POPi** and **POPj** = populations of two countries;

**DISij** = the transportation costs associated with trade (distance is the proxy).

 $\mathbf{v}_{ijt}$  = the nonnegative error term.

Currently, many studies include additional variables either due to theoretical considerations derived from different trade models (Rose, 2004; Frankel and Rose, 2002; Matyas, 1997) or because they can better interpret the bilateral trade flows. The spatial factors such as two countries have a common border, being landlocked, or settled on the island, are usually included. When a country does not have an access to sea or ocean trade ways, its ability to participate in trade is reduced, negatively affecting trade volume. Other factors include colonial ties, common language, per capita GDP or income, and the abundance of factors of production. Usually, common currency, language and previous colonial ties affect positively the trade volume. In order to indicate whether the two countries belong to the same FTA, several dummies are used. Later, the values of these dummies will be interpreted.

#### Gravity model variables specification

In recent years the number of variables introduced by researchers to describe both bilateral and multilateral trade flows became quite diverse. However, majority of studies include several common variables such as GDP, distance, population and a set of dummies indicating the participation in some particular FTAs. In the general form of the gravity equation GDP serves as the indicator of the economic size of the country. The GDP of the exporting country is the measure of productivity, while for the importing country it is a measure of absorptive capacity. Both variables are expected to be positively correlated with trade volume because the larger the countries the higher the variety of products available for export and higher variety of product consumed. However, Baier and Bergstrand (2004) and Frankel (1997) argue that GDP, the function of exports and imports, is potentially endogenous to bilateral trade flows. Though, due two reasons the endogeneity can be ignored. First, GDP is the functions of net exports, which tend to be less than 5 percent of country's GDP. Second, the gravity model relates bilateral trade flows to countries' incomes, and trade between any pair of countries tends to be a very small share of any country's exports. Frankel's (1997) empirical testing has shown little difference in coefficient estimates. Thus, the endogeneity of GDP variable has little effect on the results.

The distance between two countries represents the transportation costs associated with trade. However, number of studies (Bougheas et al, 1999; Engelbrecht and Pearce, 2007) also included public infrastructure into transport costs, and introduced an infrastructure index. The distance is expected to have negative relationship with trade volume because more transportation costs are incurred leads to discourage of the trade. Thus, cheaper trade leads to higher volume of trade.

Population serves as a measure of the size of the country. Larger countries tend to have more diversified production, thus are more self-sufficient. Thus the population coefficient tends to have negative correlation with trade flow volume. Although, the study of Bergstrand (1989) states that big population allows economies of scale, which consequently leads to lower costs and higher exports.

Other commonly used variables used in estimation of the effect on trade are dummies for the preference agreement participation. First is the trade creating dummy which shows whether membership in particular FTA generates more trade between member countries, in addition to the trade volume expected by a gravity model. Basically it shows the overall influence of the particular

FTA on trade flow. Also, trade-diverting dummy is introduced, which measures the effect of nonmembership in FTA, and expected to have a negative sign because trade is more likely to be diverted from countries outside of FTA. The inclusion of the second dummy actually shows the composition of the overall effect on trade, which earlier is defined as trade diversion and trade creation. Thus, the use of these trade dummies measures the effect of participation in FTA on agricultural and food trade.

# **Empirical analysis**

## **Model specification**

From the perspective of Matyas (1997) the correct gravity specification is a three-way model. First if time dimension, which represents common business cycle or globalization process over the whole sample of countries. Second and third dimensions of group variables are export and import country effects that are time-invariant.

Additionally, the common practice of estimating the equation is taking the logarithms of both sides of the equation, leading to log-log form of the model.

$$\ln(X_{ij}) = \beta_0 + \beta_1 \ln GDP_i + \beta_2 \ln GDP_j + \beta_3 \ln POP_i + \beta_4 \ln POP_j + \beta_5 \ln DIS_{ij} + \varepsilon_{ij}$$

However, this approach as noted by various researchers creates a problem because it is valid only if Xij>0. (Silva and Tenreyro, 2006)

After introduction of the variables discussed above, some of them are added to the basic equation, and now the model can be re-written as follows

$$X_{ijt} = \beta_0 + \beta_1 GDP_{it} + \beta_2 GDP_{jy} + \beta_3 POP_{it} + \beta_4 POP_{jt} + \beta_5 DIS_{ij} + \beta_6 COMLN_{ijt} + \beta_7 BORDER_{ij} + \sum \gamma_m FTA_{ijt}^m + \sum \lambda_m FTA_{jt}^m + \sum \omega_m FTA_{it}^m + \varepsilon_{ijt}$$

Where:

**Xijt** is the value of agricultural/food export volume from exporting country i to importing country j at time period t. (measured in millions of dollars).

**GDPit**, **GDPjt** are gross domestic products of the exporting country i and importing country j at time period t (measured in millions of dollars).

**POPit, POPjt** are populations of exporting and importing countries (measured in thousands of people).

**DISij** is the transportation costs associated with trade. The proxy for the costs is the distance between the economic centers of country i and j, namely capitals of two countries.

**COMLNij** is a dummy variable; takes the value of 1 if country i and j have a common official language.

BORDERij is a dummy variable; takes the value of 1 if two countries share a border

**FTAijt** is a dummy variable; takes the value of 1 if both i and j countries are members of the same FTA (m), and zero otherwise.

**FTAjt** is a dummy variable; takes the value of 1 if importing country j is a member of FTA (m), but exporting country i is not; zero, otherwise.

**FTAit** is a dummy variable; takes the value of 1 if exporting country i is a member of FTA (m), but importing country j is not; zero, otherwise.

 $\alpha$ ij are the specific effects associated with each bilateral trade flow. These effects are country specific, therefore time invariant. i,j=1,...,N

 $\delta t$  are time specific effect, which are common for all trade flows. t=1,...,T

 $\epsilon i j$  is the error of the equation

In this equation the parameters of interest are FTA<sub>iit</sub>, FTA<sub>it</sub> and FTA<sub>it</sub>. The first coefficient,

 $\gamma_m$ , shows the effect on agricultural trade when both countries are FTA members. The second coefficient,  $\lambda_m$ , shows the extent to which members' agricultural imports are higher than normal levels from non-member countries. Third coefficient,  $\omega_m$ , is the measure of extent to which member countries' exports are higher than normal levels to nonmember countries.

Normally, the participation of both countries in the same FTA leads to  $\gamma_m>0$ . In case when  $\gamma_m>0$  and  $\lambda_m>0$  that is pure trade creation in terms of exports. Commonly, agricultural trade creation would be maintained if trade within free trade area was enhanced ( $\gamma_m>0$ ) and trade with the rest of the world also increased ( $\lambda_m+\omega_m>0$ ). The case of trade diversion is under the condition of  $\gamma_m>0$  and  $\lambda_m+\omega_m<0$  (Lambert and McKoy, 2009). Explicitly,  $\gamma_m>0$  along with  $\lambda_m<0$  is the indicator of the trade diversion in agricultural goods exports. Along with it, the condition of  $\lambda_m+\omega_m>0$  and  $\gamma_m+\omega_m>0$  is trade creation. If the increase in the volume of intraregional trade is fully compensated by decrease in volume of imports from the nonmember countries, then it is pure trade diversion in terms of exports. Basically, the level of trade is increase at the cost of the nonmember exports.

#### **Data description**

The sample used for this research totals 89 countries and includes 4 FTAs<sup>1</sup>. The period estimated in this paper is 2004-2015 with one year intervals. The statistics for the total population is taken from the World Bank database<sup>2</sup>. GDP for each country is taken from World Development Indicators database<sup>3</sup>.

Data for the export of agricultural and food products was provided by United Nations Commodity Trade Statistics Databases (UN Comtrade) and Food and Agriculture organization of United Nations (FAOSTAT)<sup>4</sup>. The data collection on FAO has been made possible by the cooperation of governments, which have supplied most of the information. Because we are considering the bilateral agricultural trade flow one country's export is second country's import. Therefore, each country becomes a reporter of the statistics to FAO. While FAO makes some

<sup>&</sup>lt;sup>1</sup> The list of countries and FTAs is described in Appendix 1

<sup>&</sup>lt;sup>2</sup> http://data.worldbank.org/

<sup>&</sup>lt;sup>3</sup> <u>http://data.worldbank.org/data-catalog/world-development-indicators</u>

<sup>&</sup>lt;sup>4</sup> <u>http://comtrade.un.org/</u>

adjustment to official figures, it leaves the trade flow data un-reconciled. However, it is possible that "what country A officially declares as imports from country B will not correspond to what country B officially, and reciprocally, declares as its exports to country A, for a given commodity in a given year". This happens due to time lags, difference in reporting periods, misclassification of type of commodities, misspecification of trade reports and simply data confidentiality.

Data on common language, common border and distance between capitals of the countries is taken from GeoDist database provided by Centre d'Etudes Prospectives et d'Informations Internationales<sup>5</sup>. The first dataset offered incorporates country-specific geographical variables for 225 countries of the world, including languages, variable indicating whether the country is landlocked and colonial links. Second dataset is dyadic and includes variables valid for the pairs of countries, one of which is distance between capitals. GeoDist uses the great circle formula for calculation of the distance between countries, referenced by latitudes and longitudes of the largest urban agglomerations in terms of population. The major source for the FTAs' membership dummies is the WTO Regional Trade Agreements database that includes types of the agreement, coverage specified by agreement and date of entry.

#### **Description of the specified FTAs**

Following section provides history and description of the specifics of chosen FTAs for better understanding of trade relationship among the countries in a separately taken FTA. The oldest FTA in this study is ASEAN Free Trade Agreement (AFTA), which entered into force in January, 1993. Using the scheme of the Common Effective Preferential Tariff (CEPT), AFTA is able to bring down the tariff range to 0-5 percent for 99 percent of the products. However, only ASEAN-6 countries, namely, Brunei Darussalam, Indonesia, Malaysia, the Philippines, Singapore and Thailand are enjoying this feature, while Cambodia, Laos, Myanmar and Vietnam are playing the role of catch-up countries, since they did not impose this scheme on the whole range of products,

<sup>&</sup>lt;sup>5</sup> <u>http://www.cepii.fr/anglaisgraph/bdd/distances.htm</u>

covering only 60-80 percent. Two main goals which lie behind the creation of AFTA is the increase of competitiveness in the world market, which is done through reduction of tariffs and trade barriers, and increase the openness to foreign direct investment to ASEAN. According to WTO trade report, such regionalism led to a massive growth in total merchandise exports of the original member countries. What was prominent is the increase in the exports of parts and components, rising from 2 to 17 percent to the time when agreement was signed.

There are several reasons why AFTA might be considered as a deep and thoroughly thought FTA. First of all, AFTA covers over 90 percent of the products traded in the area, so called Inclusion List. Another reason is that AFTA strives to obtain free or almost free trade in the member countries for the products in the Inclusion List. Third reason, highlighted by Calvo-Pardo, Freund and Ornelas (2011), is that AFTA members "largely stuck to their announced goal of reaching near free intra-bloc trade". In general, looking at the rise of the trade volumes during the period of existence of AFTA, we can say that liberalization process pay offs well. According to the ASEAN trade statistics database we can observe steady growth of both imports and exports approximately by 9 percent per year, totaling in overall trade balance of US\$44 billion in 2013. (Appendix 3, Graph 2)

Next FTA that is considered in this study is Commonwealth of Independent States Free Trade Area (CIS FTA), which was established by former Soviet Union countries: Russia, Ukraine, Belarus, Uzbekistan, Moldova, Armenia, Kyrgyzstan and Kazakhstan in December 1994, however ratified only recently, in October 2011. Previous meeting, which was held on October, 2007, developed the Concept of further development of the CIS and the plan of the implementation of this Concept was approved. The Concept included following major directions: "completion of the introduction of a full-scale free trade regime; liberalization of conditions and further development of mutual trade, abolition of existing restrictions and exemptions from the free trade regime, including those relating to the import of raw materials and the export of finished products, in order to ensure free access of goods of national producers to the markets of CIS member states; development of an agreement on the use of energy resources and transport services, development of common markets for selected types of products, primarily agricultural products; development of interaction in the field of transport, including the formation of a network of international transport corridors in the CIS space; and increase in the effectiveness of tariff policy and elimination of the influence fiscal and administrative barriers at the national level during the process of international cargo transfers" (Concept of the further development of the CIS, 2007). Ratified agreement, which was established with the aim of creation friendly relationship among neighbor countries and promotion of free trade, covers variety of products in agriculture, forestry and fishery, yet not covering services. In addition, it explicitly covers exemptions, government purchases, barriers to trade, sanitary and phytosanitary standards as well as some administrative issues concerning tariffs and restrictions to trade (Agreement on CIS FTA, 2011). However, there is a critique of the agreement, since several articles (Shevtsova, 2009; Tsygankov, 2014) expose Russia as regional hegemon, which tends to be an imperialist in CIS region, creating "political platform for economic integration" (Trenin, 2011). It might be reflected in the fact from dossier that Russia saved nearly 100 export duties, including oil, gas, non-ferrous metals etc., while Ukraine having only 30 and other countries even less. (CIS FTA dossier, 2015). Another challenge that comes up in the region is the implementation of sanctions from US (Executive orders №13660, 13661, 13662, 13685, 2014) and EU (EU Council Regulation, № 833/2014, 2014) towards Russia in 2014, due to its political activity with respect to Ukraine. There are lots of consequences both on Russian economy, as well as CIS member countries, which are more or less depend on the prosperity of Russian economy. Schenkkan (2015) highlights that countries whose economies are closely tied with Russian ruble and countries that are most vulnerable from shocks affecting oil and gas prices, are the ones who were hit the most. One primary example of such economy is Kazakhstan, however many studies attribute the decline of trade mostly to the oil price shocks, rather than spillover effects of sanction on Russian economy (Schenkkan, 2015; Stepanyan, Roitman, Minasyan, Ostojic, Epstein, 2015). From the graph, we can vividly see the fall of overall level of exports in CIS in

general and in Kazakhstan in particular by 46 percent with the countries of EU, after the implantation of sanctions as well as shocks (Appendix 3, Graphs 3 and 4). Russell (2016) also notes that economic measures towards Russia gave a substantial short-term rise to a volume of re-export in neighboring countries, however only in a very specific range of products. One of the major consequences was the implementation of embargo from Russian side towards Ukraine until 31<sup>st</sup> December, 2017. (Presidential Decree №628, 2015)

The last FTA to be considered in this study is South Asia Free Trade Agreement (SAFTA), which came in force in January, 2006. Originally, countries from South Asian Association for Regional Cooperation (SAARC), which included Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka, signed this agreement, and only later, in 2011, Afghanistan joined. Basically, SAFTA was a replacement for earlier established South Asia Preferential Trade Agreement (SAPTA) and the next step towards South Asia Economic Union. SAFTA required India, Pakistan and Sri-Lanka to reduce their duties to 20 percent in the period of two years and to zero in the period of five years, while remaining countries had additional three years to bring down their tariffs to zero. According to the agreement, the main aim is the promotion of the free trade between member countries and enhanced economic cooperation which is done through following general measures: "eliminating barriers to trade in, and facilitating the cross border movement of goods between the territories of the Contracting States; promoting conditions of fair competition in the free trade area, and ensuring equitable benefits to all Contracting States, taking into account their respective levels and pattern of economic development; creating effective mechanism for the implementation and application of this Agreement, for its joint administration and for the resolution of disputes; and establishing a framework for further regional cooperation to expand and enhance the mutual benefits of this Agreement." (Agreement on SAFTA, 2004). What is interesting about this FTA is that each country has a sensitive list, which contains the list of products that are not eligible for tariff limitations, and it is quite outstanding. Even though there are measure directed on the reduction of the number of products, still, almost each country in SAFTA has over 1,000

products in sensitive least both for Least Developing countries (LDCs) and Non-Least Developing countries (non-LDCs)<sup>6</sup>. This might be the signal only partial commitment towards FTA, while prioritizing own interest in international trade, however looking at the growth of exports and imports two years after establishment (Appendix 3, Graph 5) it seems that SAFTA "bears some fruits".

Central European Free Trade Agreement (CEFTA) 2006 is the agreement signed on 19<sup>th</sup> of December, 2006 which substituted all bilateral agreements that were in force between Albania, Bosnia and Herzegovina, Macedonia, Moldova, Montenegro, Serbia and the United Nations Interim Administration Mission in Kosovo (UNMIK)/Kosovo. Original countries that formed previous version of CEFTA in 1992, the countries of Visegrad group (the Czech Republic, Hungary, Poland and the Slovak Republic), consequently left after becoming members of the EU. Slovenia, Romania, Bulgaria and Croatia, which later joined the FTA, decided to leave after 10 years of membership. The aim of the original agreement was to stimulate the development of trade relationship between member countries and establish closer economic cooperation with a perspective of creating free trade area in 2002. In general, the agreement determines common rules of origin and customs, conditions on agricultural and industrial trade as well as barriers to trade and intellectual property rights (IPR). (Agreement on amendment of and accession to the CEFTA, 2006). Analytical report of CEFTA secretariat (2016) shows that, even though there was a growth of intra-industry trade at the initial period of FTA, now, "there is not so much of intra-industry trade, as only few products dominate trade within CEFTA", and basically exports to EU became much more substantial. They explain this effect by changing structure of the economies in the postcrisis period, home bias, meaning that the countries within the block are not fully opened in terms of exports, and might be corrected with generic progress of economic performance in the area. CEFTA has a role of a valuable bridgehead for less developed Eastern Europe countries looking for cooperation and trade benefits with Western economies. In general, CEFTA might be viewed as a

trial-version of EU, and processes such as adjustment to the legal system of the EU, is a signal for the willingness of CEFTA countries to be accepted into EU.

#### Methodology

The traditional approach in estimation the gravity model is taking its multiplicative form and estimating using OLS technique, assuming that error variance across observations is constant. Another approach is using the panel techniques, assuming constant error across country or country-pairs. As was noted by Santos Silva and Tenreyro (2006) that in the presence of heteroskedasticity the standards methods used can lead to severe biasedness of the estimated coefficients. Therefore, they stated that log-linearization of the gravity model changes the charactersitics of the error term and in this case OLS is inconsistent estimation technique and nonlinear estimators should be used. One of the problems that occur while using the gravity model is the problem of endogeneity. According to Krugman's (1991) hypothesis of "natural trading partners" countries are likely to form FTAs with countries with which they already have high volume of trade. So, basically there is a potential reverse causality between high level of trade and formation of FTAs in the gravity equation.

Baier and Bergstrand (2007) confirm that FTA dummy variables are most likely to be endogenous and correlated with the error term because the unobserved characteristics of the pair of countries explain why they trade a lot and make it most probably to form an FTA. Usually, in order to solve endogeneity problem, instrumental variable (IV) approach is used. However, Baier and Bergstrand (2007) pointed out that IV approach is not reliable in solving endogeneity problem since it is very hard to find instrument which will be correlated with FTA dummy and not correlated with trade. The approach they propose is to include country-and-time effects and country-pair fixed effects. In contrast to them, Koo, Kennedy and Skriptnichenko (2006) do not expect the endogeneity to be a significant problem while considering agricultural trade flows since "policies that affect GDP or a decision to from FTAs are unlikely to be dependent on the volume of agricultural trade". Another problem that occurs due to the use of log-linearized gravity model is "zero-trade flows" problem. This happens when there is no trade between the pair of countries, usually because of the large distance between them and transport costs associated with trade. Solving this issue is important since the logarithm of zero is undefined and in this study zero trade flows are present. Previous studies deal with this problem in several ways: truncate the observation with zero values, implement some transformation (giving small number to the zero observation), or using the levels model. The first way reduces efficiency and may lead to biased estimates due to the omission of data. Second and third strategies are inconsistent if OLS estimation is implemented. Assigning small values to zero observations in order to prevent omitted observations is in fact ad hoc and there is no certainty that it will reflect the underlying expected values, thus yielding unreliable estimates. The third approach is to estimate the model employing a Tobit estimator and leaving zero trade observations. However, Linders and de Groot (2006) and Santos Silva and Tenreyro (2006) prove that the use of Tobit model is not appropriate in explaining the miss of the trade flows, thus estimation will probably lead to unreliable results.

As suggested by Santos Silva and Tenreyro (2006), nonlinear estimated should be used. The most frequently used are Nonlinear Least Squares (NLS), FGLS, GPML and PPML. Silva and Tenreyro (2006) find NLS to be inefficient because it gives more weights to observations and is not robust to heteroskedasticity. Martinez-Zarzoso et al. (2007) suggests to use FGLS if the specific form of heteroskedasticity in data is discounted, weighting the observations according to the square root of their variances and is robust to any form of heteroskedasticity. GPML behaves differently, assigning less weight to observations with a larger conditional mean, however showing less precision results when zero trade flows exist (Manning and Mullahy, 2001). Finally, Santos Silva and Tenreyro (2006) state that PPML is the most natural process to estimate gravity model with zero trade observations without any further information on the pattern of heteroskedasticity, assigning the same weight to all observations. Therefore, PPML estimation technique is used in this study to measure trade creation and diversion effects.

## **Estimation results**

The results of the regression for the impact of FTAs on agricultural trade flows with PPML estimation technique are given in the Table 1. As expected the GDP of pair of countries have significant and positive effect on the level of trade. Increase in the GDP of exporting country by 1% leads to 0.29% increase in the level of trade of agro products and 0.27% in case of food products. 1% increase in GDP of partner country leads to 0.32% increase in the level of trade of agro products and 0.31% in case of food products. The coefficient of the importing country is smaller which can be explained by the different level of countries' import and export orientation. The coefficient of common border dummy is significant at 1% significance level indicating that sharing a common border increases trade by 1% on average. Common border has positive and significant effect on the level of agricultural trade flows since lower transport costs will probably boost the trade. Distance is also significant at 1% level, however has negative sign since higher distance between trading countries leads to higher transport costs, therefore discouraging trade and decreasing the volume of trade. On average, increase in remoteness between pair of countries leads to 0.35% decline in the level of trade of both group of products. Common language also has a statistically significant. positive impact on trade because common language facilitates trade negotiations. Sharing common language increases the volume of trade by 0.2%. Population was found insignificant; however, it was not that surprising, since many studies do not include this variable at all.

As was described in the methodology section the main variables of interest are dummy variables FTA<sub>iit</sub>, FTA<sub>it</sub> and FTA<sub>it</sub>, from which trade diversion or trade creation is determined. Since PPML estimates the multiplicative form of the gravity model, some transformations of the results are needed. In order to see the effect on agricultural trade flows, the coefficients of the trade diversion and creation dummies should be substituted in the following formula: ((exp(coefficient) - $1 \times 100$ ). The results of the calculation will allow us to know the percentage increase or decrease in member and nonmember agricultural trade.

In case of SAFTA the estimation results show that the trade creation effects are present however not very strong, and the explanation for this is the period of the implementation of FTA. Since it entered into force in 2006 it may take several years more or in the case of agriculture even a decade before the effect of membership becomes clearly visible, especially after the global financial crisis. If two countries are the members of SAFTA, the level of export between them is 62% higher in agricultural products and 54.6% higher in food products. However, estimation shows that SAFTA is also net export diverting. Basically, the export increase among members in reached at the costs of decline in export to nonmember countries. Nonetheless, trade creation effect overwhelms trade diversion effect almost ten times.

The impact of ASEAN on agricultural trade flows shows strong trade creation effect on member countries. On average, the volume of agriculture trade increased by 67% in agricultural products and by 54% in raw processed food. Such strong trade creation effect might be explained by long period of implementation, almost 25 years, consequently resulting in strong trade relationship among members of ASEAN. Thus, there is not much to discuss, although it must be noted that trend of trade with developed countries like USA, Japan and EU-28 has changed its vector towards China, which became ASEAN's largest trade partner starting from 2011. (ASEAN Community in Figures, 2014)

Significant trade creation effect is also found for the CEFTA, which suggests increase in the trade among members by 64% in agricultural products and 51% in food products. However, there is also significant net export creation effect, which shows that increase in the volume of trade with nonmember countries is also big. As was previously mentioned, changing structure of CEFTA member countries in the post-crisis period allowed for dominant position of EU exports. The explanation for this is that all member countries have signed agreement with the EU, so in fact CEFTA is a basement for full EU membership. Prospective members are forming free trade agreements, and a large share of trade is conducted with EU countries.

Finally, formation of CIS is associated with statistically significant trade creation effect in both groups of products. Membership in CIS on average increases the level of export by 31% in case of agro products and by 33.5% in case of food products. In spite of strong trade creation effect, import diversion effect is present. Estimation results suggest that import is diverted by 6% at 10% significance level. One possible explanation for this is the formation of the CU by Russia, Belarus and Kazakhstan, that discouraged trade since CU has common external tariff for nonmember countries. In my opinion, these results do not show long-term picture of trade considering recent oil price shocks and implementation of sanctions towards Russia, however, looking at the huge decrease of exports and imports (almost 30% in CIS in 2015), it will be interesting to observe further development of this particular FTA.

## **Conclusion and policy recommendations**

The issue of trade liberalization has been a fast-growing issue recently all over the world. Particularly, liberalized trade became of a high importance for economic development of importbased countries. One of the main consequences of trade liberalization is the formation of FTAs, which almost tripled in the last 10 years. There is a variety of studies aimed on the quantification of the impact of FTA membership on trade flows, however fewer studies consider agricultural trade flows. This paper estimates the effects of free trade agreements on agricultural trade creation and trade diversion considering two groups of products: agricultural goods and raw processed food. The study focuses on the effect of FTAs on 32 import-based countries with high percent of agriculture in the GDP which are ASEAN, CEFTA, SAFTA, and CIS. The period of estimation is 2004-2015. The estimation technique used in order to estimate gravity model is PPML, which deals with zero-trade flows problem and avoids issues from using the log-linearized form of the equation in the presence of heteroskedasticity.

Results suggest that the overall effect of FTAs depends on the specific agreement and the period of implementation. In general, membership in FTA has positive and significant effect on the

level of trade; however, trade creation and diversion effects differ in analyzing different FTAs in both food and agricultural products. The positive results in case of CEFTA and ASEAN confirm that removing trade barriers promotes agricultural trade flows not only among members of FTAs, but also nonmembers of the agreement. In case of SAFTA the effect is not so strong due to the small period of implementation. In addition, there are several issues, resolution of which might increase trade in the region substantially. First of all, increase in the intra-regional trade goes through loosing of trade volumes with the non-member countries. Another issue is tense political relationships between India, Nepal and Pakistan, which definitely not making trade easier. And finally, as previously mentioned, lack of full commitment of the countries and prioritizing own interests in no way can boost intra-regional trade. In case of CIS along with increase in agricultural trade flows, trade creation effects exceed trade diversion effects in both agro products and food. This might be explained by growing level of imports of some particular countries from nonmembers of CIS. Recent exogenous shocks, such as oil price changes and implementation of sanctions towards Russia, might be a good strength test for the CIS FTA. It is too early to determine the direction of further development of CIS FTA, however looking at the rise re-export of banned products we can conclude that neighboring countries are more than willing to support biggest economy in the region, which some calling hegemon. In my opinion member countries of CIS FTA should work out current situation, as we could see from the example of ASEAN, long term collaboration pay offs well. In general, from the results we can conclude that formation of an FTA is not always beneficial for some member countries and it is very important to determine the production potential of future member country. Although the benefits for member countries are greater than for nonmembers, the results show that the volume of trade in agricultural products with member and nonmember countries increases, improving global welfare. In future, in order to observe the benefits and losses of the participation in FTAs for particular country, detailed research regarding all sectors of the economy should be done.

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# Appendices

# Appendix 1: List of countries and FTAs used in sample

- CIS
  - Armenia
  - Belarus
  - Kazakhstan
  - Kyrgyzstan
  - Moldova
  - Russia
  - Ukraine
  - Uzbekistan

\*Tajikistan was not included in the sample due to the lack of the data \*\*Since my dataset is limited to the year 2015, Ukraine is included in the sample

# • ASEAN

- Brunei
- Cambodia
- Indonesia
- Laos
- Malaysia
- Myanmar
- Philippines
- Singapore
- Thailand
- Vietnam

# • CEFTA

- Albania
- Bosnia and Herzegovina
- Bulgaria
- Kosovo
- Macedonia
- Montenegro
- Serbia

# SAFTA

- Bangladesh
- Bhutan
- India
- Maldives
- Nepal
- Pakistan
- Sri Lanka

Albania Algeria Argentina Australia Austria Azerbaijan Belgium Brazil Bhutan Burundi Canada China Croatia Cyprus Czech Republic Denmark Egypt Fiji Finland France Georgia Germany Greece Hungary Iran Israel Italy Japan Jordan Korea, Republic Kuwait Latvia Lebanon Lithuania Malta Mongolia Nepal Netherlands New Zealand Norway Poland Portugal Qatar Romania Saudi Arabia Slovakia Slovenia Spain

Sweden

Switzerland Thailand Turkey United States United Arab Emirates United Kingdom Vanuatu Vietnam

# **Appendix 2: Estimation results**

	Agricultural products	Food products
Ln_GDPi	0,2896***	0,2752***
	(-0,0344)	(-0,033)
Ln_GDPj	0,3258***	0,3086***
	(-0,0411)	(-0,0388)
Ln_POPi	0,1235	0,1572
	(-0,0744)	(-0,1027)
Ln_POPj	0,1266	0,1583
	(0.0930)	(-0,1041)
I.n DISii	-0.3457***	-0.3523***
	(-0,1208)	(-0,1219)
BORDER	1,0892***	0,9832***
Denablic	(-0,3795)	(-0,384)
COMING	0,1982**	0,1877**
	(-0,0888)	(-0,0849)
CIS IN	0,2124***	0,2682***
	(-0,1198)	(-0,1076)
CIS EXP IN	0,239	0,1853
	(-0,1943)	(-0,1992)
CIS IMP IN	-0.0623*	-0.0563*
	(-0,0342)	(-0,0301)
CEFTA IN	0,4971***	0,4115***
	(-0,114)	(-0,0994)
CFFTA FXP IN	0,1562**	0,1112**
	(0.0650)	(-0,0444)
CEFTA_IMP_IN	-0.0829	-0.0275
	(-0,0575)	(0.0202)
	0,4852***	0,4356***
SAFIA_IN	(0.1622)	(-0,1387)
SAFTA_EXP_IN	-0.0727**	-0.0572**
	(-0,0341)	(0.0245)
SAFTA_IMP_IN	0,5912	0,3445
	(-0.5231)	(-0.3664)
	0.5122**	0.4212**
ASEAN_IN	0,3122**	0,4312**
	(-0,2427)	(-0,2005)
ASEAN_EXP_IN	0,0695	0,552
	(-0,0522)	(-0,0441)
	-0.0151	-0.0118
ASEAN_IMP_IN	(-0.0117)	(-0.0083)
Ν	126.348	125.449
Constant	-32.3244	-33.2358
Dage	0.68	0.64

Notes: (i) \*\*\*p < 0.01; \*\*p < 0.05; \*p < 0.1.

## **Appendix 3: List of figures**





**Source**: RTA Section, WTO Secretariat (https://www.wto.org/english/tratop\_e/region\_e/regfac\_e.htm)

Figure 2. AFTA Exports and Imports of Agricultural Products, 1993-2013



1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013

**Source**: ASEAN Trade Statistics Database (<u>http://asean.org/resource/statistics/</u>)

100 B 90 B 80 B 70 B 60 B 50 B 40 B 2011 2012 2013 2014 2015 World

Figure 3. Kazakhstan Export for All Products World in 2011-2015 (billion US dollars)

**Source**: World Integrated Trade Solution Database (<u>http://wits.worldbank.org/CountryProfile/en/KAZ</u>)

Figure 4. Foreign trade of the CIS countries in 2012-2015 (billion US dollars)







Figure 5. SAFTA exports and imports in the period 2008-2012

**Source:** SAARC group on Statistics (http://www.saarcstat.org/db/statistics/merchandise\_trade/mrc\_trade)