International Journal of Economics and Financial Issues

ISSN: 2146-4138

available at http: www.econjournals.com

International Journal of Economics and Financial Issues, 2015, 5(2), 552-565.

Liberalization of Trade with the European Union and its Impact on the Reduction in Central European Free Trade Agreement 2006 Trade Balance Deficit

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ABSTRACT

This paper's main objective is to research the effect of liberalization of trade with the European Union and its impact on the reduction in trade balance deficit of Central European Free Trade Agreement (CEFTA) 2006. It utilizes panel data (PD) time-series in the interval from 2007 to 2013. It applies economical gravity model and econometric dynamic PD techniques: PD models, fixed effects models and random effects models (RE). It has been concluded that trade liberalization positively impacts the reduction in trade balance deficit of CEFTA 2006 countries, i.e. that export and import between the exporting country *i* and the importing country *j* within time period *t*, gross domestic product (GDP) of the country j, GDP per capita of the country *j* within time period *t*, distance between the country *i* and country *j*, dummy variables (free trade agreements and sharing a common border) are statistically significant. Additionally, it has been determined that FE is more favorable than RE when it comes to achieving better assessment of the effects of independent variables on a dependent variable.

Keywords: Liberalization, Trade Balance, Deficit, Integration, Export, Import
JEL Classifications: F1, F15

1. INTRODUCTION

European Union (EU) initiated the Stabilization and Association Agreement (SAA) with the Western Balkans countries at the Summit held in Zagreb in 2000. This agreement anticipated for each of the Western Balkans countries to sign the SAA with the EU. The agreement regulated the liberalization of trade between the EU and the signatory countries, gradual harmonization of legislation, integration of programmes and policies with the EU as well as regional cooperation between the signatories. The main instrument of regional cooperation in the area of trade policy is the creation of the Free Trade Agreement. The Free Trade Agreement was replaced by Central European Free Trade Agreement (CEFTA) 2006 (Bartlett, 2008). CEFTA 2006 has its roots in the previous CEFTA Agreement established in 1992 by Hungary, Poland and Czechoslovakia. After the establishment they were joined by Slovenia in 1996, Romania in 1997, Bulgaria in 1999, Croatia in 2003 and Macedonia in 2006 (Zenic-Zeljkovic, 2011). In 2006, Bulgaria, Romania, Albania, Bosnia and Herzegovina, Croatia, Macedonia, Kosovo, Moldova, Montenegro and Serbia negotiated changes to and enlargement of the original CEFTA which would become the new CEFTA 2006. The negotiations had support from the Stabilisation Pact for South-East Europe and the European Commission. CEFTA 2006 entered into force in July 2007 (Mostetsching, 2011). This Agreement replaced the existing Free Trade Agreement and supported multilateral trade cooperation between the South East Europe countries (Bjelic et al. 2013). Furthermore, the Agreement replaced 32 bilateral agreements concluded until then between the member countries pertaining to the exchange of trade concessions on a bilateral basis, which liberalized interregional trade of products and created a regional free trade zone (Kurtovic et al. 2013). CEFTA 2006 is a comprehensive free trade agreement aimed at total trade liberalization in the region, as well as at removal of various non-customs barriers to trade. Also, it enhances cooperation in other trade-related areas such as investments, services, public procurement and intellectual property rights (Handjiski et al. 2010).

The results of the liberalization of trade between CEFTA 2006 countries and the EU have been positive since the establishment of CEFTA 2006. EU trade with CEFTA 2006 countries has grown faster than trade with the rest of the world. EU became the main trade partner of CEFTA 2006. Therefore, 55-80% of export and import was directed towards the EU (Uvalic, 2008). CEFTA 2006 countries achieved an increase in mutual trade, albeit with unequal shares. Trade liberalization was supposed to lead to an improvement in investment climate in the region and to attraction of foreign direct investment (FDI), as well as to reduction in political instability and risks in the countries and to creation of greater market opportunities for foreign companies (Pjerotic, 2008). Liberalization of trade between CEFTA 2006 and the EU has led to a significant increase in the scope of trade. In 2013, two thirds of the total CEFTA 2006 trade was with the EU. The share of the entire region in the total EU trade was 1% in 2013, with very low individual shares: Serbia 0.50%, Bosnia and Herzegovina 0.25%, Macedonia 0.15% and Albania 0.10%, etc. (European Commission, 2014).

Total CEFTA 2006 trade with world amounted to 63.333.158 billion euros, while the intra-trade amounted to 7.864.029 billion euros in 2013. Dominant position within trade exchange belongs to non-agricultural products, the value of which amounted to 53.792.744 billion euros, while the total scope of trade exchange in agriculture products was 9.540.414 billion euros in 2013. CEFTA 2006 trade balance deficit in 2013 amounted to - 10.14%. However, in the first half of 2014 it was - 11.94%, which means there has been a certain negative growth. The most significant trade partners of CEFTA 2006 are the EU, Russia, Croatia, China and Turkey. CEFTA 2006 countries exported the most to the EU 64% in the first half of 2014, as compared to 60% in the first half of 2013. In the first half of 2014, CEFTA 2006 countries mostly exported to Russia 6%, China 19%, Turkey 2%, European Free Trade Agreement (EFTA) 1%, within CEFTA 2006 19% and to the rest of the world 8%. Also, CEFTA 2006 countries mainly imported from the EU 58% in the first half of 2014 as contrasted to 55% during the first half of 2013. Following the EU, in 2014, CEFTA 2006 countries mostly imported from Russia 8%, China 7%, Turkey 4% and EFTA 1%. Most of the CEFTA 2006 countries' import pertains to machinery and transport equipment, production materials or raw materials, food and livestock and chemicals, while they mostly export raw materials, minerals, chemicals, food and livestock, etc. Considering CEFTA 2006 countries individually, economic openness was 80% of gross domestic product (GDP) in 2013 as compared to 81% in 2012, which was generally due to reduction in imports, although exports registered a mild increase to 30% of GDP. Total coverage of imports by exports increased from 54.5% in 2012 to 58.7% in 2013 (CEFTA, 2013; CEFTA, 2014).

The main objective of this paper is to study the impact of liberalization of trade with the EU and its effect on the reduction in CEFTA 2006 countries' trade balance deficit. In accordance with this, we wish to determine whether trade exchange between the given economic integrations intensifies due to liberalization and whether this causes a trade balance deficit in CEFTA 2006 countries. In order to achieve the set objectives, we included independent variables essential to measuring the impact on CEFTA 2006 countries' trade balance deficit. This implies measurement of the total effect of independent variables such as import, export, GDP, GDP per capita (GDPPC), geographical distance between trade partner countries, free trade agreements signed with the EU and sharing of a common border on CEFTA 2006 countries' trade deficit. Based on the obtained results, we shall be able to identify the main reasons for trade balance deficit occurrence and the way to achieve reduction in trade balance deficit through explanatory variables.

This research paper sets the H_0 hypothesis that there is no significant impact of liberalization of trade with the EU on the reduction in CEFTA 2006 trade balance deficit.

$$H_0 : \beta_1 = 1$$

There is also an alternative hypothesis set that there is a significant impact of liberalization of trade with the EU on the reduction in CEFTA 2006 trade balance deficit.

$$H_1 : \beta_1 \neq 1$$

The paper consists of sections as follows: the introductory section provides the subject, research objectives and research hypotheses; Section 2 provides an overview of literature or research closely related to this paper's research subject; Section 3 describes the economic model; Section 4 describes econometric techniques and databases used in the research; Section 5 provides the empirical results of the research and, finally, Section 6 contains the Conclusion.

2. LITERATURE REVIEW

Fidrmuc and Fidrmuc (1999) co-authored the paper assessing the intensity of trade flows between transition countries of the Central and Eastern Europe (CEE). They studied the impact of membership of the said countries in trade associations. They applied the gravity model and determined that CEE countries have not registered a significant increase in trade with EFTA countries. On the other hand, a significant increase has been achieved in trade with CEFTA countries, while the level of bilateral trade between the countries formerly constituting a common country has significantly dropped below the previous level. Christie (2002) explored the possibility of trade between the countries of South-East Europe. In his research he applied the gravity model on the basis of which he inspected the potential scope of trade between the given countries, as well as possible scenarios related to GDP levels, possible membership in economic institutions worldwide, geographical distance, etc. Apart from this, the research has shown that the countries of South-East Europe cannot be viewed as a region that could provide an aggregate offer. Paas and Tafenau (2005) researched the regional trade integration of the EU countries, i.e. the creation of potential regional trade clusters. Their research covered the Baltic region and they applied the gravity model. They came up with the results saying that the geographic distance is statistically significant, i.e. that it positively affects the trade flows between the given countries. They also determined that the trade in the Baltic countries cannot be explained by the new trade theories because these are the economies with various comparative advantages. Kandogan (2007) applied the gravity model in his paper in order to research the effect of trade on trade integrations. He introduced new variables into the gravity model such as year, exporter, importer and bilateral trade. He established that different trade blocs or integrations have different levels of trade depending on the level of integration, sector coverage, etc. Trade blocs with similar culture, language and geographical distance register increased trade. In the case of monetary and customs unions a weaker trade intensity has been noted. Begovic (2011) studied the fact that trade agreements do not necessarily lead to increase in trade between countries. The subject of her research was CEFTA 2006. In the research she applied the gravity model and reached the conclusion that liberalization does not lead to improvement of trade within the region, i.e. to improvement of trade performances between CEFTA member countries. Caporale et al. (2008) researched the impact of free trade agreements on trade flows between The European Monetary Union - 15 (EU-15) and the CEE countries i.e. Bulgaria, Hungary, Poland and Romania. They based their research on the application of the gravity model and the fixed effect (FE) vector decomposition technique – FEVD. The results of their research have shown that the CEE countries have an imbalance between imports and exports, i.e. a low coverage of imports with exports with EU-15 countries, which leads to trade balance deficit or trade asymmetry. Free Trade Agreement did not contribute to changes in export structure for the countries exporting to EU-15, i.e. export of labor-intensive products and a high elasticity of demand of EU-15 countries are still present. Pjerotic (2008) analyzed the effects of trade liberalization in the South-East European countries in her paper; namely, she analyzed the structure of trade between the member countries i.e. the intra-trade flows. Caporale et al. (2009) researched the Free Trade Agreement between EU-15 and the CEE countries. They applied the gravity model and generalized method of moments in order to analyze the effect of the agreements' variables. They established that there was a trade deficit in the case of the CEE countries. They also noted a positive trend in terms of the access of the CEE countries to the high-tech products, consumer products, capital and semi-products. Apart from this, they noticed an increase in horizontal investment towards CEE countries, which caused imports of technology and parts and an increase in trade deficit. Mojsovska-Blazevski and Peterski (2010) researched the problem of trade of the Western Balkan countries with the EU and CEFTA 2006, with a special overview of Macedonia. Having applied the gravity model, they concluded that trade relations between countries depend on the GDP level. Additionally, they determined that the income levels are not the same within the Free Trade Agreement and CEFTA 2006. The main reason for this is the existence of invisible trade barriers. Gjipali et al. (2012) researched the effect of intra-regional trade between the South-East Europe countries. They applied the gravity model and established that there is a significance in terms of historical, cultural and political factors, i.e. that they positively impact the improvement of trade flows between the given countries. On the other hand, there was no significance noted in the case of geographical distance. Braha et al. (2014) studied the effect of liberalization of trade of the EU with the Western Balkan countries. They applied the gravity model and established that exports positively affect the growth of GDP, as well as that exports decrease with the increase in geographical distance between trade partners. Finally, the research showed that there is a positive significance of the increase in exports for the enhancement of competitiveness of the Western Balkan countries. Azat (2014) studied the correlation between the economic indicators of the CEE countries. He used GMM model and Shapiro–Francia normality test. This research is concerned with the measurement of economic progress of the CEE countries i.e. their potential to join the EU integration process.

3. THE ECONOMIC MODEL

The gravity equation became a popular tool beginning in the early 1960s to explain actual aggregate gross bilateral trade flows. The mainstream theory – and empirical evaluation of it – in the 1960s was concerned instead with explaining the pattern and commodity composition of trade. Ricardo's theory of comparative advantage and the Heckscher–Ohlin model were basically silent on aggregate gross bilateral trade flows. By contrast, the study of aggregate gross bilateral trade flows has been referred to as the analysis of the "volume" of trade (Bergstrand and Egger, 2010).

The gravity model of trade bears a strong similarity to Newton's formula of gravitation. In this model, the two trading areas could be viewed as celestial objects and the value of trade could be viewed as the gravitational pull. Gravity models utilize the gravitational force concept as an analogy to explain the volume of trade, capital flows, and migration among the countries of the world. Jan Tinbergen used an analogy with Newton's universal law of gravitation to describe the patterns of bilateral aggregate trade flows between two countries A and B as "proportional to the gross national products of those countries and inversely proportional to the distance between them," (Chaney, 2011). The trade (~gravitational pull) is dependent on the GDPs (~mass) of the two trading areas, and their physical distance. The bigger the GDP (~mass) between the two trading areas (~celestial objects) the greater is the trade (~gravitational pull). The trade between the two areas decays exponentially as distance increases (~decrease in gravitational pull by the square of distance). The similarities end there as GMT can take other variables like infrastructure (~sources of friction) (Beronilla et al.). Thus a mass of goods or labor or other factors of production supplied at origin i, Y_i, is attracted to a mass of demand for goods or labor at destination j, E_j, but the potential own is reduced by the distance between them, d_{ij}. Strictly applying the analogy

$$X_{ij} = Y_i E_j / d_{ij}^2 \quad (1)$$

gives the predicted movement of goods or labor between i and j, X_{ij} (Anderson, 2010).

The gravity model is based on the assumption that trade between countries depends positively on their size and inversely on distance. Economically rich and geographically close countries trade more together than with third countries. In its simplest form, the gravity equation states that the bilateral trade between two countries is directly proportional to the product of the countries' GDPs. Thus, larger countries will tend to trade more with each other, and countries that are more even in their relative sizes will also trade more (Braha et al. 2014). The basic form of the gravity equation is as follows (Batra, 2004)

$$Trade_{ij} = \frac{\alpha \,.\, GDP_i \,.\, GDP_j}{Distance_{ij}} \quad (2)$$

where $Trade_{ij}$ is the value of the bilateral trade between country i and j, GDP_i and GDP_j are country i and j's respective gross domestic incomes. $Distance_{ij}$ is a measure of the bilateral distance between the two countries and i and j is a constant of proportionality.

Ravenstein pioneered the use of gravity for migration patterns in the 19th century UK. Tinbergen and Poyhonen did the first econometric studies of trade flows based on the gravity equation, for which they gave only intuitive justification. Jan Tinbergen is credited as the first to specify econometrically what has become a benchmark "traditional" gravity equation for studying international trade flows. Using a specification similar to equation (2), Tinbergen estimated (Bergstrand and Egger, 2010)

$$\ln PX_{ij} = ln\beta_o + \beta_1 lnGDP_i + \beta_2 lnGDP_j + \beta_3 lnDIST_{ij} + \beta_4 ADJ_{ij} + \beta_5 EIA1_{ij} + \beta_6 EIA2_{ij} + ln\varepsilon_{ij} \quad (3)$$

where ADJ, *EIA1* and *EIA2* are dummy variables with values of 1 if two countries share a common land border, are members of the British Commonwealth, and are members of the Benelux free trade agreements, respectively (and zero otherwise).

Linnemann added more variables and went further toward a theoretical justification in terms of a Walrasian general equilibrium system, but the Walrasian model tends to include too many explanatory variables for each trade flow to be easily reduced to the gravity equation (Deardorff, 1988). He explained exports of country i to country j in terms of the interaction of three factors: potential supply of exports of the country i, potential demand of imports from the country j and a factor representing trade barriers. Potential export supply is a positive function of the exporting country's income level and can also be interpreted as a proxy for product variety. Potential import demand is a positive function of the importing country's income level. Barriers to trade are a negative function of trade costs, transport costs, tariffs (Caporale et al. 2008). We will be using the modified gravity model displayed by McCallum (1995), where the simplest version of the estimated equation can be written as follows:

$$X^{ij} + X^{ji} = \left(\frac{2}{Y^W}\right) Y^i Y^j \quad (4)$$

This gives our simplest derivation of the gravity equation, where the bilateral exports from country to country are proportional to the product of their GDPs. Accordingly, the McCallum model is adjusted for logarithmic form by adding the supplementary variables (Braha et al. 2014)

$$\ln x_{ij} = \alpha_1 + \alpha_2 lny_i + \alpha_3 lny_j + \alpha_4 lnd_{ij} + \alpha_5 \delta_{ij} + \epsilon_{ij} \quad (5)$$

Here x_{ij} is exports from region i to region j, y_j and y_j are GDP in regions i and j, d_{ij} is the distance between regions i and j, and δ_{ij} is a dummy variable equal to one for inter-provincial trade and zero for state-province trade (Anderson and Wincoop, 2001).

In trade-theory, the gravity equation in its most basic and frequently used form is specified as (Gao, 2009)

$$ln\ X_{ij} = \beta_0 + \beta_1 ln\ Y_i + \beta_2 ln\ Y_j + \beta_3 ln\ D_{ij} + \beta_4 ln\ F_{ij} + \mu_{ij} \quad (6)$$

where X_{ij} is the amount of trade between country i (host) and country j (home), Y is the nominal GDP of each country, D_{ij} is the distance between the two countries, and F_{ij} represents any other factors that might affect the amount of trade conducted between country i and j. Miscellaneous F_{ij} factors are frequently represented by dummy variables. This is because more often than not, these factors tend to remain constant for each individual country. In conjunction with the economic size N_i of a country is its market size, meaning larger countries have greater potential markets which would attract more firms to export to that country. To account for this possibility, some theories have suggested an extension of the gravity model to include the population size of each country into the equation

$$ln\ X_{ij} = \beta_0 + \beta_1 lnY_i + \beta_2 ln\ Y_j + \beta_3 ln\ N_i + \beta_4 ln\ N_j + \beta_5 ln\ D_{ij} + \beta_6 ln\ F_{ij} + \mu_{ij} \quad (7)$$

In this extended model, the economic size coupled with the actual size of the countries is supposed to account for the market potential of a country that serves to predict trade value (Gao, 2009). A high level of income in the exporting country indicates a high level of production, which increases the availability of goods for export. Therefore β_1 is expected to be positive. The coefficient of Y_j, β_2 is also expected to be positive since a high level of income in the importing country suggests higher imports. The coefficient estimate for population of the exporters, β_3, may be negatively or positively signed, depending on whether the country exports less when it is big (absorption effect) or whether a big country exports more than a small country economies of scale. The coefficient of the importer population, β_4, also has an ambiguous sign, for similar reasons. The distance coefficient is expected to be negative since it is a proxy of all possible trade costs. The coefficients of all these trade β_5 variables are expected to be positive (Martinez-Zarazoso, 2003).

Anderson and Wincoop used the gravity model to study the effect of a border between USA and Canada on each country's domestic trade. Their version of the model is a refined version of the McCallum Gravity Equation. Even though these researches were conducted to study effects that a national border has on trade within a country, the principle of remoteness is also relevant in international trade. Firstly, the basic model including remoteness is

$$ln\ X_{ij} = \beta_1 + \beta_2 ln\ Y_i + \beta_3 ln\ Y_j + \beta_4 ln\ d_{ij} + \beta_5 ln\ REM_i + \beta_6 ln\ REM_j + \beta_7 ln\ \delta_{ij} + \varepsilon_{ij} \quad (8)$$

Where remoteness of a region I is

$$REM_i = \sum_{m \neq j} d_{im} / y_m \quad (9)$$

This is the average distance of region i from all trading partners except from j. This remoteness variable is very commonly used, although there is very little theoretical justification for such a variable. Also, using it doesn't increase the R^2 significantly. δ_{ij} = a dummy variable for whether the trade is within the country or with another country. This was the starting point of Anderson and van Wincoop's work. They were dissatisfied with the current theoretical backing for the theory, even though it did match very well with the empirics. Especially in their interest was to further develop the term of trade resistance, they divided it into three components: (1) bilateral trade barrier between regions i and j, (2) i's resistance to trade with all regions and (3) j's resistance to trade with all regions (Weckström, 2013).

4. THE ECONOMETRIC MODEL AND DATA

The econometric analysis is based on the application of dynamic panel data (PD) techniques. Within this dynamic panel analysis data was used pertaining to trade flows between CEFTA 2006 and the EU in the time period between 2007 and 2013. The data was taken from the databank of the World Bank, European Commission, CEFTA, OECD and Eurostat.

Our empirical analysis applies gravity model and econometric PD models, FE models and random effect (RE) models. The gravity model is used in order to establish or assess the impact of trade liberalization on the reduction in trade balance deficit of CEFTA 2006 as compared to the EU. This paper's empirical specification is as follows:

$$Log\left(TB_{ijt}\right) = \beta_0 + \beta_1 \log\left(X_{it}\right) + \beta_2 \log\left(M_{jt}\right) + \beta_3 \log\left(GDP_{it}\right) + \beta_4 \log\left(GDP_{jt}\right) + \beta_5 \log\left(GDPPC_{it}\right) + \beta_6 \log\left(GDPC_{jt}\right) + \beta_7 \log\left(Dist_{ij}\right) + \beta_8 FTA_{ijt} + \beta_9 CBord_{ij} +,\ldots,+\varepsilon_{ijt} \quad (10)$$

Where TB_{ijt} - is the trade balance and that is the dependent variable. The explanatory variables used are X_{it} and M_{Jt} and they denote exports and imports respectively between countries i and j at time t with $i \neq j$, GDP_{it}, GDP_{jt} - GDP of country i and country j, $GDPPC_{it}$ - GDPPC of country i and $GDPPC_{jt}$ per capita of country j, $Dist_{ij}$ - distance between country i and country j (km), FTA_{ijt} - dummy variable that is equal to 1 if country i and country j have signed a free trade agreement with EU, $CBord_{ij}$ - common border dummy: 1 if common border between country i and j, 0 if otherwise, ε_{ijt}- and the disturbance term, which is assumed to be normally distributed with a zero mean and a constant variance for all observations and to be uncorrelated.

An important advantage of PD compared to time series or cross-sectional data sets is that it allows identification of certain parameters or questions, without the need to make restrictive assumptions. For example, PD make it possible to analyze changes on an individual level. That is, PD are not only suitable to model or explain why individual units behave differently but also to model why a given unit behaves differently at different time periods (for example, because of a different past). Because PD sets are typically larger than cross-sectional or time series data sets, and explanatory variables vary over two dimensions (individuals and time) rather than one, estimators based on PD are quite often more accurate than from other sources. Even with identical sample sizes, the use of a PD set will often yield more efficient estimators than a series of independent cross-sections (where different units are sampled in each period). A second advantage of the availability of PD is that it reduces identification problems. Although this advantage may come under different headings, in many cases it involves identification in the presence of endogenous regressors or measurement error, robustness to omitted variables and the identification of individual dynamics (Marno, 2004).

A PD regression differs from a regular time-series or cross-section regression in that it has a double subscript on its variables, i.e. (Baltagi, 2005)

$$y_{it} = \alpha + X'_{it}\beta + u_{it} \quad i = 1,\ldots, \quad N; t = 1,\ldots,T \quad (11)$$

With i denoting households, individuals, firms, countries, etc. and t denoting time. The i subscript, therefore, denotes the cross-section dimension whereas t denotes the time-series dimension. α is a scalar, β is $Kx1$ and X_{ij} is the ith observation on K explanatory variables. Most of the PD applications utilize a one way error component model for the disturbances, with

$$u_{it} = \mu_i + v_{it} \quad (12)$$

Where μ_i denotes the unobservable individuals-specific effect and v_{it} denotes the remainder disturbance. In vector form (11) can be written as (Baltagi, 2005)

$$y = \alpha l_{NT} + X\beta + \mu = Z\delta + u \quad (13)$$

Where y is $NT\ x\ 1$, X is $NT\ x\ K, Z = [l_{NT} + X\beta + u], \delta' = (\alpha', \beta')$ and l_{NT} is a vector of ones of dimension NT. Aslo, (13) can be written as

$$u_{it} = Z_\mu \mu + v \quad (14)$$

PD may have group effects, time effects, or both. These effects are either FE or RE. A FE model assumes differences in intercepts across groups or time periods, whereas a RE model explores differences in error variances. A one-way model includes only one set of dummy variables (e.g. firm), while a two-way model considers two sets of dummy variables (e.g. firm and year). The functional forms of one-way PD models are as follows:

Fixed group effect model: $y_{it} = \left(\alpha + \mu_i\right) + X'_{it}\beta + v_{it}$ where $v_{it} \sim IID\left(0, \sigma_y^2\right)$ (15)

Fixed group effect model: $y_{it} = \left(\alpha + X'_{it}\beta + (\mu_i + v_{it}\right)$, where $v_{it} \sim IID\left(0, \sigma_y^2\right)$ (16)

The dummy variable is a part of the intercept in the FE model and a part of error in the RE model. $v_{it} \sim IID\left(0, \sigma_y^2\right)$ indicates that errors are independent and identically distributed (Uits Research Technologics, 2014).

The least squares dummy variables (LSDV) estimator is panel OLS including a set of $N - 1$ dummy variables which identify the individuals and hence an additional $N - 1$ parameters. Note that one of the individual dummies is dropped because we include a constant. Time-invariant explanatory variables, z_i, are dropped because they are perfectly collinear with the individual dummy variables. The LSDV estimator of β is numerically identical with the FE estimator and therefore consistent under the same assumptions. The LSDV estimators of the additional parameters for the individual-specific dummy variables, however, are inconsistent as the number of parameters goes to infinity as $N - 1$. This so-called incidental parameters problem generally biases all parameters in non-linear FE models like the probit model (Schmidheiny, 2014).

The implied estimator for β is referred to as the LSDV estimator. Fortunately one can compute the estimator for β in a simpler way. It can be shown that exactly the same estimator for β is obtained if the regression is performed in deviations from individual means. Essentially, this implies that we eliminate the individual effects α_i first by transforming the data. To see this, first note that (Marno, 2004)

$$\bar{y}_i = \alpha_i + \bar{x}_i^{'}\beta + \bar{\varepsilon}_i \tag{17}$$

where $\bar{y}_i = T^{-1}\sum t\, y_{it}$ and similarly for the other variables. Consequently, we can write

$$y_{it} - \bar{y}_i = \left(x_{it} - \bar{x}_i\right)^{'}\beta + (\varepsilon_{it} - \bar{\varepsilon}_i) \tag{18}$$

The transformation that produces observations in deviation from individual means is called the within transformation. The OLS estimator for β obtained from this transformed model is often called the within estimator or FE estimator, and it is exactly identical to the LSDV estimator described above. It is given by (Marno, 2004)

$$\hat{\beta}_{FE} = \left(\sum_{i=1}^{N}\sum_{t=1}^{T}(x_{it} - \bar{x}_i)'\right)^{-1}\sum_{i=1}^{N}\sum_{t=1}^{N}(x_{it} - \bar{x}_i)\,(y_{it} - \bar{y}_i) \tag{19}$$

The within FE model does not use dummy variables, but uses deviations from group means. Thus, this model is the OLS of $\left(y_{it} - \bar{y}_{in}\right) = \beta^{'}\left(x_{it} - \bar{x}_{in}\right) + \left(\varepsilon_{it} - \bar{\varepsilon}_{in}\right)$ without an intercept. You do not need to worry about the incidental parameter problem anymore. The parameter estimates of regressors are identical to those of LSDV. Since this model does not report dummy coefficients, you need to compute them using the formula $d_g^* = \bar{y}_{gm} - \beta^{'}\bar{x}_{gm}$. Since no dummy is used, the within effect model has a larger degree of freedom for error, resulting in a small mean square error and incorrect (larger) standard errors of parameter estimates. Thus, you have to adjust the standard error using the formula $se_k^{'} = se_k\sqrt{\frac{df_{error}^{within}}{df_{error}^{LSDV}}} = s_k\sqrt{\frac{nT-k}{nT-n-k}}$. Finally, $R2$ of the within effect model is not correct because an intercept is suppressed (Uits Research Technologics, 2014).

In the RE model (henceforth, quantities relating to the RE model will be indicated by the superscript RE), θ_i^{RE} is considered as a positive random variable, with probability density function g(.). Given θ_i^{RE}, the annual claim numbers $N_{i,1}, N_{i,2}, \ldots, N_{i,T}$ are independent. The joint probability function of $N_{i,1}, \ldots, N_{i,T}$ is thus given by (Boucher and Denuit, 2006).

$$Pr\left[N_{i,1} = n_{i,1}, \ldots, N_{i,T} = n_{i,T}\right] = \int_0^{\infty}\left[\prod_{t=1}^{T} exp\left(-\varnothing\lambda_{i,t}^{RE}\right)\frac{(\theta\gamma_{i,t}^{RE})^{ni,t}}{ni,t!}\right] g\left(\theta\right)d\theta \tag{20}$$

A RE model is estimated by generalized least squares (GLS) when the variance structure is known and feasible GLS when the variance is unknown. Compared to FE models, RE models are relatively difficult to estimate (PD model, 2014).

We can also use GLS to solve the serial correlation problem here. In order for the procedure to have good properties, it must have large *N* and relatively small *T*. We assume that we have a balanced panel, although the method can be extended to unbalanced panels. Deriving the GLS transformation that eliminates serial correlation in the errors requires sophisticated matrix algebra, but the transformation itself is simple. Define (Wooldridge, 2002).

$$\lambda = 1 - [\sigma_u^2 / (\sigma_u^2 + T\sigma_\alpha^2)]^{1/2} \tag{21}$$

which is between zero and one. Then, the transformed equation turns out to be:

$$y_{i,t} - \lambda\bar{y}_i = \beta_0\left(1-\lambda\right) + \beta_1\left(x_{it1} - \lambda\bar{x}_{i1}\right) +, \ldots, + \beta_k\left(x_{itk} - \lambda\bar{x}_{ik}\right) + \left(v_{it} - \lambda\bar{v}_{ik}\right) \tag{22}$$

where the over bar again denotes the time averages. This is a very interesting equation, as it involves a quasi-demeaned data on each variable. The transformation in (22) allows for explanatory variables that are constant over time, and this is one advantage of RE over either FE or first differencing. This is possible because RE assumes that the unobserved effect is uncorrelated with all explanatory variables, whether they are fixed over time or not (Wooldridge, 2002). There is a range of situations in which the RE model may be preferable to the FE model for estimating β, regardless of whether the assumption of "random" effects can be plausibly said to match the true data generating process (Clark and Linzer, 2012).

The Hausman test is the standard procedure used in empirical PD analysis in order to discriminate between the FE and RE model (O'Brien and Patacchini, 2006). Durbin and Wu introduced the idea that if a model is correctly specified, two consistent methods should produce estimates that are very close. Hausman, following a similar reasoning, developed a test that is based on looking for a statistically significant difference between an estimator that is consistent whether or not the null is true, and an estimator that is efficient (and consistent) under the null hypothesis, but inconsistent otherwise. He proves that asymptotically the test statistic has a Chi-square distribution, with a number of degrees of freedom equal to the number of unknown regression parameters when no misspecification is present (Dehon et al. 2008).

The Hausman test is designed to detect violation of the RE modeling assumption that the explanatory variables are orthogonal to the unit effects. If there is no correlation between the independent variable(s) and the unit effects, the estimates of β in the FE model ($\hat{\beta}_{FF}$) should be similar to estimates of β in the RE model ($\hat{\beta}_{RE}$). The Hausman test statistic H is a measure of the difference between the two estimates (Clark and Linzer, 2012)

$$H = (\hat{\beta}_{RE} - \hat{\beta}_{FE})' \left[Var\left(\hat{\beta}_{FE}\right) - Var\left(\hat{\beta}_{FE}\right) \right]^{-1} (\hat{\beta}_{RE} - \hat{\beta}_{FE}) \quad (23)$$

Under the null hypothesis of orthogonality, H is distributed chi-square with degrees of freedom equal to the number of regressors in the model. A finding that $P < 0.05\%$ is taken as evidence that, at conventional levels of significance, the two models are different enough to reject the null hypothesis, and hence to reject the RE model in favor of the FE model. If the Hausman test does not indicate a significant difference ($P < 0.05\%$), however, it does not necessarily follow that the RE estimator is "safely" free from bias, and therefore to be preferred over the FE estimator. In most applications, the true correlation between the covariates and unit effects is not exactly zero (Clark and Linzer, 2012). Hausman tests in individual-specific effects model and dynamic model are evaluated and compared through their probability of making mistakes. There are two types of mistakes the tests would make. If the FE are not present, but the Hausman test incorrectly rejects the null hypothesis, then Type I error occurs. If the FE are present, but the Hausman test accepts the null hypothesis, then Type II error occurs. The Hausman test in the model which has a larger probability of making mistakes is less efficient than the other one (Liu, 2010).

5. ESTIMATION RESULTS

Based on the application of the gravity model and PD techniques (PD models, FE models and RE models) we have obtained certain results. The Table 1 shows the impact of trade liberalization on the reduction in trade balance deficit of CEFTA 2006 countries. The results tell us that there is a certain positive effect of trade liberalization on the reduction in trade balance deficit of CEFTA 2006 countries. Certainly, the results thus gained confirm earlier studies related to the fact that trade agreements positively affect the enhancement of trade flows to the satisfaction of all parties involved in the given process. In order to determine the effect of the liberalization of trade between CEFTA 2006 and the EU on the reduction in trade deficit, we have separately observed the effects of independent variables on the dependent variable.

It has been established that there is symmetry in imports and exports, while asymmetry has been noted with other variables. Export X_{it} has a $P = 0.0000\%$ that is statistically significant or lower than the determined value 0.05%, i.e. it positively affects the reduction in trade deficit of CEFTA 2006 countries. In terms of import M_{jt}, $P = 0.0000\%$, which means it is statistically significant i.e. that it positively affects the reduction in trade deficit of CEFTA 2006 countries. On the other hand, GDP GDP_{it} has a $P = 0.4494\%$, which exceeds the determined value of 0.05% and thus represents an insignificant value. This means that the increase of GDP_{it} in CEFTA 2006 countries is accompanied by an increase in imports and increase in trade balance deficit. In terms of the GDP of the EU, GDP_{jt} has a $P = 0.0283\%$, which is statistically significant i.e. positively affects the reduction in trade deficit of CEFTA 2006 countries. Increase in GDP in the EU leads to an increase in imports of raw materials, semi-products and products from CEFTA 2006 countries. Identical situation has been registered with CEFTA 2006 countries' GDPPC or $GDPPC_{it}$, where the established $P = 0.1916\%$ exceeds the determined 0.05%, which means that it is statistically insignificant i.e. negatively affects the trade balance deficit of CEFTA 2006 countries. GDPPC of the EU or $GDPPC_{jt}$ has a $P = 0.0034\%$ that is statistically significant i.e. positively affects the increase in exports from CEFTA 2006, which leads to the reduction in trade balance deficit. In terms of other independent variables that constitute our gravity model, assumptions that the given parameters would positively affect the reduction in trade deficit and the enhancement of trade flows have been fulfilled. Therefore, geographical distance between the exporting country and the importing country or $DIST_{ij}$ has a $P = 0.0009\%$ that is statistically significant i.e. positively affects trade flows. Dummy variables comprising the free trade agreements signed with the EU and sharing a common border by the importing country and the exporting country i.e. FTA_{ijt} and $CBORD_{ij}$ have $P = 0.0000\%$ and 0.0194% respectively, meaning that they positively affect the increase in trade and the reduction in CEFTA 2006 trade balance deficit.

After the PD model, we applied the FE models or FE enabling us to explain the existence of correlation between independent variables and bilateral specific effects. The results of FE are presented in Table 2. Based on the results, it can be concluded that X_{it} and M_{jt} have a $P = 0.0000\%$, which means that this is a significant value positively affecting the reduction in CEFTA 2006 trade deficit. Actually, what we have here is a symmetrical effect. The completely opposite happens in the case of GDP_{it} and GDP_{ij} where P values are insignificant. In the case of $GDPPC_{it}$ and $GDPPC_{jt}$ P values are statistically significant, i.e. they positively affect the reduction in trade deficit. Dummy variables have not been included in FE. Other statistical parameters such as *F-statistic*, probability (F-statistic) and Durbin–Watson stat are statistically significant i.e. they positively affect the reduction in trade deficit.

RE models – RE yielded similar results (Table 3). Majority of independent variables have significant values i.e. positively affect the reduction in CEFTA 2006 countries' trade deficit. However, it is only in the case of GDP_{jt} that we have determined an insignificant value, meaning that an increase in GDP in the country *j* is accompanied by an increase in imports from the country *i*. Other statistics, just as within FE, have significant values.

Application of Hausman test, as presented in Table 4, shows that there is a greater statistical significance of independent variables

Table 1: Impact of trade liberalization on the reduction in trade balance deficit of CEFTA 2006 countries

Dependent variable: TB_{ijt}
Method: Panel least squares
Sample: 2007-2013
Periods included: 7
Cross-sections included: 7
Total panel (balanced) observations: 49

Variable	Coefficient	SE	t-Statistic	*P*
C	18898377	26766886	0.706036	0.4844
Log (X_{it})	1241861	178572.8	6.954371	0.0000
Log (M_{jt})	−2923086	294647.1	−9.920634	0.0000
Log (GDP_{it})	69826.32	91374.11	0.764181	0.4494
Log (GDP_{jt})	4434007	1947018	2.277333	0.0283
Log ($GDPPC_{it}$)	−986498.5	742384.6	−1.328824	0.1916
Log ($GDPPC_{jt}$)	−8707294	2786654	−3.124641	0.0034
Log ($DIST_{ij}$)	3853634	1067496	3.609976	0.0009
FTA_{ijt}	−600303.6	153289.4	−3.916146	0.0000
$CBord_{ij}$	1028300	421711.2	2.438398	0.0194
R-squared	0.962839	Mean dependent variable		−1469183
Adjusted R-squared	0.954263	SD dependent variable		1227897
SE of regression	262601.1	Akaike info criterion		27.97456
Sum squared resid	2.69E+12	Schwarz criterion		28.36065
Log likelihood	−675.3768	Hannan-Quinn criterion		28.12104
F-statistic	112.2749	Durbin-Watson stat		197.9089
P (F-statistic)	0.000000			

SE: Standard error, CEFTA: Central European Free Trade Agreement, SD: Standard deviation, GDP: Gross domestic product, GDPPC: GDP per capita

Table 2: FE models

Dependent variable: TB_{ijt}
Method: Panel least squares
Sample: 2007-2013
Periods included: 7
Cross-sections included: 7
Total panel (balanced) observations: 49

Variable	Coefficient	SE	t-Statistic	*P*
X_{it}	1.000000	1.70E-14	5.90E+13	0.0000
M_{jt}	−1.000000	1.74E-14	−5.75E+13	0.0000
GDP_{it}	−1.07E-11	8.03E-12	−1.330359	0.1918
GDP_{jt}	−2.06E-14	2.08E-14	−0.991267	0.3282
$GDPPC_{it}$	−1.05E-10	4.48E-11	−2.345961	0.0246
$GDPPC_{jt}$	−5.30E-11	1.35E-11	−3.921042	0.0004
C	2.05E-06	3.61E-07	5.683705	0.0000
Effects specification				
Cross-section fixed (dummy variables)				
R-squared	1.000000	Mean dependent variable		−1469183
Adjusted R-squared	1.000000	SD dependent variable		1227897
SE of regression	3.08E-08	Akaike info criterion		−31.53376
Sum squared resid	3.41E-14	Schwarz criterion		−31.03185
Log likelihood	785.5772	Hannan-Quinn criterion		−31.34334
F-statistic	6.37E+27	Durbin–Watson stat		1.968395
P (F-statistic)	0.000000			

SE: Standard error, SD: Standard deviation, GDP: Gross domestic product, GDPPC: GDP per capita, FE: Fixed effects

affecting the dependent variable in the FE models than in the RE models. The test summary yielded the result that cross-section random has a $P = 0.0002\%$, which means that we reject the null hypothesis stating that there is no correlation among explanatory variables. On these grounds we have rejected the RE and accepted FE, which in this case represents a more favorable option, i.e. better explains the relation between independent variables and the dependent variable.

6. CONCLUSION

With the emergence of the economic crisis in 2007, CEFTA 2006 has gradually achieved a decrease in trade deficit with EU. The main reason for the reduction in trade balance deficit lies in intensified exports to EU countries, particularly to Germany, Austria and Italy. On the other hand, there has been a reduction in imports to CEFTA 2006 countries resulting from reduced domestic

Table 3: RE models

Dependent variable: TB_{ijt}
Method: Panel EGLS (Cross-section random effects)
Sample: 2007-2013
Periods included: 7
Cross-sections included: 7
Total panel (balanced) observations: 49
Swamy and Arora estimator of component variances

Variable	Coefficient	SE	t-Statistic	*P*
X_{it}	1.000000	1.31E-14	7.64E+13	0.0000
M_{jt}	−1.000000	1.19E-14	−8.44E+13	0.0000
GDP_{it}	−1.14E-11	2.29E-12	−4.976358	0.0000
GDP_{jt}	1.00E-16	1.36E-14	0.007387	0.9941
$GDPPC_{it}$	1.72E-11	6.23E-12	2.766261	0.0084
$GDPPC_{jt}$	−6.95E-11	1.09E-11	−6.393244	0.0000
C	1.86E-06	2.81E-07	6.630497	0.0000
Effects specification				
			SD	**Rho**
Cross-section random			6.13E-09	0.0381
Idiosyncratic random			3.08E-08	0.9619
	Weighted statistics			
R-squared	1.000000	Mean dependent variable		−1299843
Adjusted R-squared	1.000000	SD dependent variable		1097118
SE of regression	3.98E-08	Sum squared resid		6.66E-14
F-statistic	6.07E+27	Durbin–Watson stat		1.291365
Probability (F-statistic)	0.000000			
	Unweighted statistics			
R-squared	1.000000	Mean dependent variable		−1469183
Sum squared resid	7.06E-14	Durbin–Watson stat		1.217744

RE: Random effects, SE: Standard error, SD: Standard deviation, GDP: Gross domestic product, GDPPC: GDP per capita

demand i.e. purchase power of consumers due to a decrease in economic activity. Apart from this, agreements have been signed by certain CEFTA 2006 countries with the EU, i.e. the SAA, Free Trade Agreement and Agreement with the European Free Trade Association - EFTA, enabling these countries to achieve greater increase in exports than in imports, although, despite that fact, certain countries have not achieved significant results. High level of economic openness, low economic competitiveness and high economic dependence in relation to the EU represent additional sources of trade deficit. Additionally, one of the main sources of CEFTA 2006's high deficit is the import and export structure. CEFTA 2006 countries mostly import machinery and transport equipment, production materials or raw materials, food and livestock, chemicals, while they mostly export raw materials, minerals, chemicals, food and livestock, etc. Such import and export structure is for the most part the result of historical industrial heritage, poorly implemented state property privatization and partly due to FDI in the form of horizontal investments. Accordingly, CEFTA 2006 countries need to undertake measures aimed at enhancing competitiveness and changing the structure of foreign trade exchange, i.e. they need to change trade direction favoring export of final products over raw materials and semi-products. This means that vertical FDI should be more present in CEFTA 2006 countries in the future.

This paper has analyzed the effect of liberalization of trade of CEFTA 2006 with the EU and its impact on the reduction in trade balance deficit. To that effect, we applied dynamic PD techniques (panel method, FE model and RE model) and used gravity model for assessment. The research has shown that the liberalization of trade of CEFTA 2006 countries with the EU has a positive effect on strengthening trade flows and the reduction in trade deficit. Accordingly, it has been determined that export X_{it} is statistically significant, i.e. positively affects the reduction in CEFTA 2006 trade deficit. In terms of imports M_{jt} we have established statistical significance, i.e. a positive effect on trade deficit reduction. GDP GDP_{it} is insignificant and it negatively affects the reduction in trade balance deficit. GDP GDP_{jt} is statistically significant, i.e. affects the reduction in trade balance deficit. GDPPC or $GDPPC_{it}$ is statistically insignificant, i.e. it negatively affects CEFTA 2006 trade balance deficit. GDPPC $GDPPC_{jt}$ is statistically significant, i.e. leads to the reduction in trade balance deficit. In the case of other independent variables, which constitute a part of gravity model assessment, assumptions regarding positive effect of the given parameters on the reduction in trade deficit and enhancement of trade flows have been fulfilled. Thus, $DIST_{ij}$, FTA_{ijt} and $CBORD_{ij}$ are statistically significant, i.e. positively affect the increase in trade and the reduction in trade deficit of CEFTA 2006.

This study can serve as a starting point for future research studying the effect of CEFTA 2006 on the reduction of the member countries' trade deficit, as well as for measuring competitive position as compared to the other economic partners.

Table 4: Hausman test

Correlated RE - Hausman test
Equation: EQ01
Test cross-section RE

Test summary	Chi-square statistic	Chi-square d.f.	*P*
Cross-section random	26.905672	6	0.0002

Cross-section RE test comparisons

Variable	Fixed	Random	Var (Diff.)	*P*
X_{it}	1.000000	1.000000	0.000000	0.1178
M_{jt}	−1.000000	−1.000000	0.000000	0.9322
GDP_{it}	−0.000000	−0.000000	0.000000	0.4402
GDP_{jt}	0.000000	0.000000	0.000000	0.0668
$GDPPC_{it}$	−0.000000	0.000000	0.000000	0.0000
$GDPPC_{jt}$	−0.000000	−0.000000	0.000000	0.0036

Cross-section random effects test equation
Dependent variable: TB_{ijt}
Method: Panel least squares
Date: 12/09/14 Time: 22:05
Sample: 2007 2013
Periods included: 7
Cross-sections included: 7
Total panel (balanced) observations: 49

Variable	Coefficient	SE	t-Statistic	*P*
C	4.18E-06	7.21E-07	5.794030	0.0000
X_{it}	1.000000	3.39E-14	2.95E+13	0.0000
M_{jt}	−1.000000	3.47E-14	−2.88E+13	0.0000
GDP_{it}	−2.37E-11	1.60E-11	−1.475659	0.1487
GDP_{jt}	7.19E-14	4.15E-14	1.734584	0.0914
$GDPPC_{it}$	−3.44E-10	8.94E-11	−3.853081	0.0005
$GDPPC_{jt}$	−1.42E-10	2.70E-11	−5.241305	0.0000

Effects specification
Cross-section fixed (dummy variables)

R-squared	1.000000	Mean dependent variable	−1469183
Adjusted R-squared	1.000000	SD dependent variable	1227897
SE of regression	6.14E-08	Akaike info criterion	−30.15041
Sum squared resid	1.36E-13	Schwarz criterion	−29.64850
Log likelihood	751.6851	Hannan-Quinn criterion	−29.95999
F-statistic	1.60E+27	Durbin–Watson stat	2.047714
P (F-statistic)	0.000000		

RE: Random effects, SE: Standard error, SD: Standard deviation, GDP: Gross domestic product, GDPPC: GDP per capita

REFERENCES

Anderson, J.E. (2010), The Gravity Model, Working Paper 16576, NBER Working Paper Series, NBER, December. Available from: http://www.nber.org/papers/w16576.pdf [Last accessed on 2013 Nov 12].

Anderson, E.J., Wincoop van, E. (2001), Gravity with Gravitas: A Solution to the Border Puzzle, NBER Working Paper No. 8079, January. Available from: https://www2.bc.edu/~anderson/BorderEffects.pdf. [Last accessed on 2014 Mar 13].

Azat, D. (2014), GMM Estimation and Shapiro-Francia Normality Test: A Case Study of CEE Economies. Int J Econ Sci III(1). Available from: http://www.iises.net/gmm-estimation-and-shapiro-francia-normality-test-a-case-st.html. [Last accessed on 2014 Sep 23].

Baltagi, B.H. (2005), Econometric Analysis of Panel Data. 3rd ed. Chichester, UK: John Wiley & Sons Ltd.

Batra, A. (2004), India's Global Trade Potential: The Gravity Model Approach, ICRIER Working Paper No. 151, December. Available from: http://www.dspace.africaportal.org/jspui/bitstream/123456789/21168/1/Indias%20Global%20Trade%20Potential%20The%20Gravity%20Model%20Approach.pdf?1. [Last accessed on 2014 Mar 16].

Bartlett, W. (2008), Regional integration and free-trade agreements in the Balkans: opportunities, obstacles and policy issues, Econ Change Restrict 42. Available from: http://www.lse.ac.uk/europeanInstitute/research/LSEE/PDFs/Latest%20Research/2009item2bartlett.pdf. Last accessed on 2014 May 24].

Begovic, S. (2011), The Effect of Free Trade Agreements on Bilateral Trade Flows: The Case of Cefta. Zagreb Int Rev Econ Bus 14(2). Available from: http://www.hrcak.srce.hr/78759?lang=en. [Last accessed on 2014 Feb 13].

Bergstrand, H.J., Egger, P. (2010), Gravity Equations and Economic Frictions in the World Economy. Available from: http://www3.nd.edu/~jbergstr/Working_Papers/Gravity_Survey.pdf. [Last accessed 2014 Apr 11].

Bjelic, P., Jacimovic, D., Tasic, I. (2013), Effects of the world economic crisis on exports in the CEES: Focus on the Western Balkans. Econ Ann LVIII(296). Available from: http://www.doiserbia.nb.rs/img/doi/0013-3264/2013/0013-32641396071B.pdf. [Last accessed 2014 Jan 28].

Boucher, J.P., Denuit, M. (2006), Fixed versus random effects in poisson regression models for claim counts: a case study with motor insurance. Astin Bulletin 36(1). Available from: http://www.

actuaries.org/LIBRARY/ASTIN/vol36no1/285.pdf. [Last accessed 2014 Apr 16].

Braha, K., Qineti, A., Smutka, L., Matejková, E., Pietriková, M. (2014), EU accession and trade integration: the gravity model of trade in the case of the EU candidate countries, Paper prepared for presentation for the 142nd EAAE Seminar Growing Success? Agriculture and rural development in an enlarged EU May 29-30, Corvinus University of Budapest Budapest, Hungary. Available from: http://www.ageconsearch.umn.edu/bitstream/168926/2/paper_Braha_Qineti_Smutka_Matejkova_Pietrikova.pdf. [Last accessed on 2014 Nov 15].

Caporale, G.A., Sova, R., Sova, A. (2009), The impact of association agreements on trade flows and the trade balance: evidence from the CEEC-4, Working Paper No. 09-17, January. Available from: http://www.brunel.ac.uk/__data/assets/pdf_file/0014/82103/0917.pdf. [Last accessed on 2013 Apr 16].

Caporale, M.G., Rault, C., Sova, A.M., Sova, R. (2008), On the trade balance effects of free trade agreements between the EU-15 and the CEEC-4 countries, William Davidson Institute Working Paper Number 912. March. Available from: http://www.deepblue.lib.umich.edu/bitstream/handle/2027.42/64367/wp912.pdf?sequence=1. [Last accessed on 2014 Jun 29].

CEFTA Trade Statistics. (2013), Half Year Update, CEFTA. Available from: http://www.192.232.255.119/~cefta/sites/default/files/Cefta_trade_statistics_1H-2013-2k.pdf. [Last accessed on 2014 Apr 14].

CEFTA Trade Statistics. (2014), Half year Update, CEFTA. Available from: http://www.192.232.255.119/~cefta/sites/default/files/Cefta_trade_statistics_1HY2014-low.pdf. [Last accessed 2014 Sep 06].

Chaney, T. (2011), The gravity equation in international trade: An explanation, NBER and CEPR, September, preliminary and incomplete. Available from: http://crei.cat/files/filesActivity/48/chaney.pdf. [Last accessed on 2013 May 17].

Christie, E. (2002), Potential Trade in Southeast Europe: a Gravity Model Approach, WIIW Working Papers No. 21, March. Available from: https://www.ideas.repec.org/p/wii/wpaper/21.html. [Last accessed on 2013 Oct 23].

Clark, S.T., Linzer, A.D. (2012), Should i use fixed or random effects? Available from: http://www.polmeth.wustl.edu/media/Paper/ClarkLinzerREFEMar2012.pdf. [Last accessed on 2013 Mar 04].

Deardorff, A. (1988), Determinants of bilateral trade: does gravity work in a neoclassical world? In: Frankel, A.J. editor. The Regionalization of the World Economy. University of Chicago Press. Available from: http://www.nber.org/chapters/c7818. [Last accessed on 2013 Mar 12].

Dehon, C., Gassner, M., Verardi, V. (2008), A New Hausman Type Test to Detect the Presence of Influential Outliers, February 23, Ecore Discussion Paper, International Association for Research and Teaching. Available from: http://www.ecore.be/DPs/dp_1203933974.pdf. [Last accessed on 2013 May 16].

European Commission. (2014), Countires and Regions – Trade Picture. Available from: http://www.ec.europa.eu/trade/policy/countries-and-regions/regions/western-balkans/. [Last accessed on 2014 Nov 29].

Fidrmuc, J., Fidrmuc, J. (1999), Integration, Disintegration and Trade in Europe: Evolution of Trade Relations during the 1990's, Zentrum für Europäische Integrationsforschung, Working Paper B 03. Center for European Integration Studies Rheinische Friedrich-Wilhelms-Universität Bonn, December. Available from: http://www.econstor.eu/bitstream/10419/39641/1/310109914.pdf. [Last accessed on 2012 Aug 08].

Gao, S. (2009), The Predictive Capacity of the Gravity Model of Trade on Foreign Direct Investment. National Ekonomiska Institutionen, Uppsala Universitet, June. Available from: http://www.diva-portal.org/smash/get/diva2:216318/FULLTEXT01.pdf. [Last accessed on 2013 Sep 14].

Gjipali, A., Jorgji, E., Liko, E. (2012), Intra-regional trade in transitional economy: prospects from South-Eastern Europe, European perspectives. J Eur Perspect Western Balkans, 4(2). Available from: http://www.europeanperspectives.si/index.php/home/list-of-all-volumes. [Last accessed on 2013 July 09].

Handjiski, B., Luca, R., Martin, F., Guerin, S.S. (2010), Enhancing Regional Trade Integration in Southeast Europe, World Bank Working Paper, No.185. The International Bank for Reconstruction and Development/The World Bank. Available from: https://www.openknowledge.worldbank.org/bitstream/handle/10986/5931/530990PUB0regi101Official0Use0Only1.pdf?sequence=1. [Last accessed on 2013 Oct 29].

Kandogan, Y. (2007), Sensitivity of international bloc's trade effect to alternative specifications of the gravity equation. J Appl Econ X(2). Available from: http://www.researchgate.net/publication/4806745_Sensitivity_of_international_blocs_trade_effect_to_alternative_specifications_of_the_gravity_equation. [Last accessed on 2013 Apr 23].

Kurtovic, S., Siljkovic, B., Dasic, B. (2013), The effect of non-tariff barriers on trading flows Bosnia and Herzegovina within CEFTA 2006. CEA J Econ 8(2). Available from: http://www.cea.org.mk/documents/journal/CEA_Journal_8-2.pdf. [Last accessed on 2014 Feb 19].

Liu, M. (2010), The Hausman test in dynamic panel model, Master Thesis in Statistics, Faculty of Statistics, Uppsala University, Sweden, May. Available from: http://www.diva-portal.org/smash/get/diva2:326974/FULLTEXT01.pdf. [Last accessed on 2013 Dec 16].

Marno, V. (2004), A Guide to Modern Econometrics. 2nd ed. Chichester: John Wiley & Sons Ltd.

Martinez-Zarazoso, I. (2003), Gravity model: an application to trade between regional blocs. AEJ, 31(2). Available from: http://www.faculty.ksu.edu.sa/ahendy/313%20ECON/Syllabus%20and%20Handouts/martinez_gravity%20model.pdf. [Last accessed on 2012 Nov 12].

Mojsoska-Blazevski, N., Petreski, M. (2010), Western Balkan's trade with the EU and CEFTA (2006), Evidence from Macedonian data, MPRA Paper No. 41942. Available from: http://www.mpra.ub.uni-muenchen.de/41942/. [Last accessed on 2012 Aug 09].

Mostetsching, A.M. (2011), CEFTA and The European Single Market: an appropriate preparatory exercise? Thesis of the Degree of Master of Arts in European Interdisciplinary Studies, College of Europe Natolin Campus.

O'Brien, R., Patacchini, E. (2006), The Hausman Test for Correlated Effects in Panel Data Models under Misspecification, December. Available from: http://econwkshop.pbworks.com/f/obrienpatac1206.pdf. [Last accessed on 2012 Mar 12].

Uits Research Technologics (2014), Panel data models, Indiana University, available at: http://www.rt.uits.iu.edu/visualization/analytics/docs/panel-docs/panel3.pdf. [Last accessed on 2012 Mar 12].

Paas, T., Tafenau, E. (2005), European trade integration in the Baltic Sea Region - A gravity model based analysis. HWWA Discussion Paper 331, Hamburgisches Welt-Wirtschafts-Archiv (HWWA), Hamburg Institute of International Economics October. Available from: http://www.ageconsearch.umn.edu/bitstream/26263/1/dp050331.pdf. [Last accessed on 2013 Oct 28].

Pjerotic, L. (2008), Trade Liberalization in the South East Europe - Effects and Controversial Issues, Panoeconomicus. Available from: http://www.doiserbia.nb.rs/img/doi/1452-595X/2008/1452-595X0804497P.pdf. [Last accessed on 2010 Apr 12].

Schmidheiny, K. (2014), Panel Data: Fixed and Random Effects, Short Guides to Micro Econometrics. Available from: http://www.schmidheiny.name/teaching/panel2up.pdf. [Last accessed on 2010 Apr 12].

Uvalic, M. (2008), Transition in Southeast Europe: Understanding Economic Development and Institutional Change, Working Paper No. 2010/41 May, UNU-WIDER. Available from: http://www.wider.unu.edu/stc/repec/pdfs/wp2010/wp2010-41.pdf. [Last accessed on 2010 Sep 25].

Weckström, A. (2013), Gravity Model of Trade and Russian Exports Economics, Master's Thesis, Department of Economics, Aalto University School of Business, May. Available from: http://www.epub.lib.aalto.fi/en/ethesis/pdf/13325/hse_ethesis_13325.pdf. [Last accessed on 2012 Jun 14].

Wooldridge, M.J. (2002), Introductory Econometrics: A Modern Approach. 2nd ed. Mason, OH: South-Wester.

Zenic-Zeljkovic, J. (2011), Influence of the CEFTA 2006 Agreement on Serbian Trade of Industrial Goods in the Region: Conditions, Issues and Prospects, CEFTA 2006 – Challenges and Opportunities, Collection of Essays, ISAC Fond, Belgrade. Available from: http://www.isac-fund.org/download/E-CEFTA_ENG.pdf. [Last accessed on 2012 May 11].

APPENDIX

Variable definitions

Variable	Data sources
TB_{ijt} - is the trade balance and that is the dependent variable	Author's calculation
X_{it} and M_{Jt} denote exports and imports respectively between countries *i* and *j* at time with $i \neq j$	European Commission http://exporthelp.europa.eu
GDP_{it}, GDP_{jt} - *GDP* of country *i* and country *j*	Eurostat http://ec.europa.eu/eurostat
$GDPPC_{it}$ - *GDPPC* of country *i*; $GDPPC_{jt}$ – GDPPC of country *j*	OECD http://stats.oecd.org
$Dist_{ij}$ - distance between country *i* and country *j* (km)	CEPII http://www.cepii.fr
$FTAcc_{ijt}$ - dummy variable that is equal to 1 if country *i* and country *j* have signed a free trade agreement with EU	Cefta 2006 (CEFTA SPS Database) http://www.ceftatransparency.com
$CBord_{ij}$ – Common border dummy: 1 if common border between country *i* and *j*, 0 if otherwise	Authors

GDP: Gross domestic product, GDPPC: GDP per capita

Data pertaining to CEFTA 2006 and EU from 2007 to 2013

Country	Year	X_{it}	M_{jt}	TB_{ijt}	GDP_{it}	GDP_{jt}	$GDPPC_{it}$	$GDPPC_{jt}$	$Dist_{ij}$	FTA_{ijt}	$Cbord_{ij}$
Serbia_	2007	3895623	8492401	−4596778	28474	12473648	3733	28420	1562	1	1
Serbia_	2008	4301965	9571173	−5269208	32679	12548545	3891	28417	1562	1	1
Serbia_	2009	3410367	6986625	−3576258	28952	11815764	3769	27060	1562	1	1
Serbia_	2010	4315623	7776541	−3460918	27968	12337153	3823	27520	1562	1	1
Serbia_	2011	5110514	9016247	−3905733	31472	12711206	3914	27919	1562	1	1
Serbia_	2012	5053011	9659044	−4606033	29601	12959735	3873	27717	1562	1	1
Serbia_	2013	6564095	9943352	−3379257	31980	13068600	3987	27696	1562	1	1
B&H_	2007	2367807	4419965	−2052158	11282	12473648	3210	28420	1646	1	1
B&H_	2008	2493200	5209297	−2716097	12774	12548545	3391	28417	1646	1	1
B&H_	2009	1933576	3938471	−2004895	12428	11815764	3299	27060	1646	1	1
B&H_	2010	2487923	4202255	−1714332	12720	12337153	3329	27520	1646	1	1
B&H_	2011	2950880	4745779	−1794899	13177	12711206	3378	27919	1646	1	1
B&H_	2012	2990543	4830422	−1839879	13158	12959735	3359	27717	1646	1	1
B&H_	2013	3242438	4786414	−1543976	13446	13068600	3375	27696	1646	1	1
FYRM_	2007	2019242	2170625	−151383	5965	12473648	3183	28420	1879	1	1
FYRM_	2008	1949343	2642892	−693549	6720	12548545	3337	28417	1879	1	1
FYRM_	2009	1320734	2169831	−849097	6703	11815764	3303	27060	1879	1	1
FYRM_	2010	1851966	2531621	−679655	7057	12337153	3396	27520	1879	1	1
FYRM_	2011	2280656	3038471	−757815	7473	12711206	3489	27919	1879	1	1
FYRM_	2012	2109639	3371582	−1261943	7454	12959735	3472	27717	1879	1	1
FYRM_	2013	2398556	3400033	−1001477	7683	13068600	3577	27696	1879	1	1
ALB_	2007	630805	1854906	−1224101	7828	12473648	3167	28420	1988	1	1
ALB_	2008	681100	2202689	−1521589	8798	12548545	3444	28417	1988	1	1
ALB_	2009	650742	2121195	−1470453	8661	11815764	3593	27060	1988	1	1
ALB_	2010	895417	2187319	−1291902	8999	12337153	3754	27520	1988	1	1
ALB_	2011	946024	2332596	−1386572	9268	12711206	3904	27919	1988	1	1
ALB_	2012	1118270	2443809	−1325539	9608	12959735	3994	27717	1988	1	1
ALB_	2013	1234314	2328668	−1094354	8419	13068600	4087	27696	1988	1	1
MOL_	2007	731818	1496278	−764460	3,219	12473648	902	28420	1970	1	0
MOL_	2008	753800	1715070	−961270	4,115	12548545	974	28417	1970	1	0
MOL_	2009	518855	1245821	−726966	3,894	11815764	917	27060	1970	1	0
MOL_	2010	585430	1562685	−977255	4,383	12337153	983	27520	1970	1	0
MOL_	2011	847148	1862202	−1015054	5,04	12711206	1050	27919	1970	1	0
MOL_	2012	943787	2038037	−1094250	5,669	12959735	1043	27717	1970	1	0
MOL_	2013	962293	2284436	−1322143	5,998	13068600	1136	27696	1970	1	0
MON_	2007	352272	832682	−480410	2681	12473648	4392	28420	1839	1	1
MON_	2008	276428	1135342	−858914	3086	12548545	4688	28417	1839	1	1
MON_	2009	171631	692967	−521336	2981	11815764	4416	27060	1839	1	1
MON_	2010	185470	715163	−529693	3104	12337153	4522	27520	1839	1	1
MON_	2011	224769	786380	−561611	3234	12711206	4663	27919	1839	1	1
MON_	2012	298301	892819	−594518	3149	12959735	4544	27717	1839	1	1
MON_	2013	188174	913369	−725195	3327	13068600	4700	27696	1839	1	1
KOS_	2007	47086	423670	−376584	3461	12473648	2418	28420	1902	1	0
KOS_	2008	85621	532708	−447087	3883	12548545	2571	28417	1902	1	0
KOS_	2009	78204	623750	−545546	4070	11815764	2627	27060	1902	1	0
KOS_	2010	149398	681066	−531668	4402	12337153	2689	27520	1902	1	0
KOS_	2011	140044	735607	−595563	4815	12711206	2787	27919	1902	1	0
KOS_	2012	123765	713784	−590019	5059	12959735	2836	27717	1902	1	0

GDP: Gross domestic product, GDPPC: GDP per capita, EU: European Union, CEFTA: Central European Free Trade Agreement

Free trade agreements between CEFTA 2006 countries and EU until 2013

Country	EU		
	ATP	EFTA	SAA
Albania	Yes	Yes	Yes
Bosnia and Herzegovina	Yes	Yes	Yes
Kosovo	Yes	No	No
FYR Macedonia	Yes	Yes	Yes
Montenegro	Yes	Yes	Yes
Moldova	Yes	No	No
Serbia	Yes	Yes	Yes

Note: ATP: Autonomous trade preferences, EFTA: European Free Trade Agreement, SAA: Stabilization and Association Agreement, CEFTA: Central European Free Trade Agreement