Bilateral Trade Elasticity: BH versus its seven trade partners

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Abstract: Bilateral trade elasticity is important in the analysis of the international trade flows and their anticipation in the process of establishing macroeconomic policy. Our research is based on bilateral data and the assessment of the influence of currency depreciation on the bilateral trade elasticity of B&H and its seven leading trade partners from Central and Southeast Europe. We applied the ARDL econometric technique in the research. In the short term we investigated the presence of the Marshall-Lerner condition (M-L condition) for Croatia and FYR Macedonia, while in the long term we investigated the presence of the M-L condition for Slovenia. In addition, we investigated, in certain cases, the presence of the J-curve, i.e. long-term impact of currency depreciation on the elasticity of export and import demand function. Finally, based on the application of diagnostic statistics and stability tests, the stability of the coefficient was confirmed in the majority of cases.

Keywords: M-L condition, J-curve, elasticity, exchange rate, trade

JEL classification: F14, F31, F32,

1. Introduction

Literature is familiar with three approaches of creating a balance of trade: elastic, absorption, and monetary approach. Our paper focuses on the principle of elasticity. The traditional concept of the evaluation of bilateral trade is based on the quantity of import and export elasticity of demand and on whether their absolute value is equal or greater than one. This concept is more well known as the Marshall-Lerner condition (Bahmani-Oskooee and Brooks 1999; Hatemi-J and Irandoust 2005; Bahmani-Oskooee and Ratha 2007; Halicioglu 2007; Aftab and Khan 2008; Ketenci and Uz 2011). The Marshall-Lerner condition helps us to understand the perfect elasticity of demand, i.e. when domestic elasticity of import and foreign elasticity of export equals or is greater than one, which represents the apsolute value. If this condition does not apply short-term, then the effect of J-curve appears – depreciacion of the national currency leads to the improvement of the trade balance in the long run bilansa (Pandey 2013; Altintaş and Türker 2014; Türkay 2014).

Pioneering papers, which referred to estimates of elasticity of trade, were dominated by the concept ofestimates of aggregate trade. The very concept of measuring the elasticity based on aggregate trade was characterized by certain disadvantages in terms of aggregate bias. Aggregate elasticity for a particular group of countries differs from bilateral elasticity for each country observed individually. Namely, the aggregate trade balance consists of heterogenous commercial balance sheets so that analyzing the aggregate balance calls into question bilateral trade balances. For example, the elasticity of the income or the exchange rate in case of the aggregate balance can be negative, while in the case of a bilateral balance it can be positive. Therefore, bilateral trade of the export and import demand function is more efficient in conducting international trade policy politike (Kreinin 1967; Houthakker and Magee 1969; Khan 1974; Andrew and Yellen 1989; Bahmani-Oskooee and Goswami 2003; Murad 2012; Mwito et al. 2015). In addition, the advantages of the bilateral trade concept are reflected in the a number of observed

variables, modeling the export and import demand function is more suitablewhen performing country-by-country analysis, and the results are less biased between the dependent variable and regressors (Jovanovic 2012).

The elasticity of trade represents an important indicator in assessing the benefits of trade (Simonovska and Waugh 2011; Lanati 2013). Trade policy, i.e. export and import play a significant role in the process of strengthening the economic prosperity of the country. The domestic market is not strong enough to support the economy of scale and and inevitably depends on exports to other countries. Consequently, import and export are determined by the policy of the exchange rate and income of the trading partners (Šimáková 2014). Depreciation of the exchange rate leads to a change in the prices of import and export, i.e. import becomes more expensive that export. The export of cheaper products inreases the demand of domestic products and has a positive effect on trade balance. The opposite situation is when foreign income increases, in that case export increases and has a positive effect on trade balance (Oğus Binatli and Sohrabji 2009; Altintaş and Türker 2014).

The relationship between the balance of payments and trade policy gives special importance to the assessment of trade elasticity in the creation of macroeconomic policy (Duarte et al. 2007). For macroeconomic policy makers, the knowledge of trade elasticity is important, because it is used to predict and adopt certain economic measures (Santos-Paulino 2001; Bobic 2009; Buzaushina 2015). In economic theory, testing based on trade elasticity measures the extent to which trade flows respond to changing income, price and currency depreciation (Caporale et al. 2012). Accordingly, bilateral trade elasticity in the long term is crucial for understanding the effects on the global level and the creation of trade policy, or for detecting the current situation and predicting future trade flows in response to the change in income and the devaluation of the exchange ratesin the world or within the main trading partners (Hooper et. al. 2000; Hatemi-J and Irandoust 2005; Uz 2010a).Currency elasticity of exports and imports is relevant in the case of transitional or developing countries. The higher elasticity of export demand, applying depreciation, means making income higher than price. On the other hand, income elasticity is more relevant for developed countries. The level of income and consumer preferences determine export and import of products. Therefore, the higher elasticity of income in export demand means greater ability to achieve exports.

Change in trade elasticity is used to explain the state of the economy of a certain country and how trade balance will react to external shocks of demand or changes in the exchange rate. The growth of demand elasticity of exports tells us about the change in the trade composition of a country, i.e. increased exports of sophisticated products and the growth of domestic content with the manufactured products (Aziz and Li 2007). Trade elasticity tells us about the relationship between the international prices and the value of real income; provides information to companies and marketers when planning the pricing policy, predicting income, supply and demand; explains the condition and behavior of the current account, consumer preferences regarding domestic and foreign products, the conduct of monetary policy, the determination of interest rates; shows resistance of exporters to the worsening of their position; shows the competitiveness between domestic and foreign producers; allows us to evaluate the relevance of the policies that we are implementing and the opportunity to choose better options. Finally, trade elasticity of exports and imports is essential in many ex-ante analyses of trade reforms (Uz 2010b, Imbs and Mejean 2010; LooiKee et al. 2004).

Within the former Yugoslavia, Bosnia and Herzegovina recorded a positive trade balance up to 1992. After the war ended in 1995, Bosnia and Herzegovina initiated the process of liberalizing

its trade system. The process took place in two directions: unilaterally and multilaterally. The economy of Bosnia and Herzegovina during the war from 1992 to 1995 was devastated causing a significant imbalance in the trade balance, that is, it had significantly more imported than exported products. For a little more than two decades, B&H has been facing the problem of foreign trade imbalance for a little over two decades, which is the result of the growth of the current account deficit. The cause of the current account deficit is a high trade deficit. The trade balance of B&H, observed from 1995 to 2015, recorded a permanent deficit. Total exports from B&H amounted to 5,019 billion dollars in 2015, while total imports amounted to 8,857 billion. dollars. The trade deficit in 2015 amounted to -3,748 billion. dollars. The export-import ratio in 2015 was 56.1%. By comparison, in 1998 the export-import ratio was only 20.4% (CBB&H 2015). Traditionally, B&H has the most intense trade relations with the EU and the countries of former Yugoslavia. The share of exports to the EU-28 in relation to total exports amounted to 84.8%, while the share of imports by B&H from the EU-28, in relation to total imports, amounted to 81.4% (European Commission 2015). The most important market for exports of B&H products is Croatia, where the total exports in the period from 2000 to 2015, amounted to 8,702 billion dollars, while imports amounted to 18,963 billion. dollars. Germany is second, with 8,207 billion dollars in exportsand 15,164 billion dollars in imports in the same period. Third place is taken by Italy with 7,569 billion dollars in exports and 12,315 billion dollars in imports. Serbia is fourth with 6,947 billion dollars in exported goods and as high as 26,856 billion dollars in imports. BiH exports to Slovenia amounted to goodsworth 5,127 billion dollars and importsworth 8,291 billion dollars. Finally, B&H exports to Austria are worth 3,939 billion dollars and imports 4,839 billion dollars. Table 1 represents the share of trade partners in the total trade of Bosnia and Herzegovina. BiH faces the problem of low competitiveness of an economyin the process of trade liberalization. According to the global competitiveness index, B&H ranked 140th in the worldin 2015. The relative openness of the economy, the existence of a high current account deficit of 9.5%, and the reduction of tariffs had a negative impact on the reduction of fiscal revenues and the growth of benefits for importers in relation to domestic consumers. Based on these facts it is important to point out that the evaluation of the bilateral elasticity of currency depreciation and income on the export and import function of demand is important so that B&H could predict a potential response of trading partners, and take correct and timely measures.

Table 1 The share of trade partners in total trade of BiH from 2000 to 2014.

Trading partner	Exports	Exports/total exports %	Import	Imports/total imports %
Cro	7,619	14.52	19,422	16.50
Srb	6,017	11.4	12,866	10.92
Slo	4,762	9.08	9,720	8.25
Cze	631	1.20	1,979	1.68
Hng	1,429	2.72	4,926	4.18
FYR Mac	573	1.09	942	0.80
Pol	635	1.21	1,729	1.47
Total trade	52,449	41.22	117,734	43.8

Source: Calculated by the author based on the information obtained from the Central Bank of B&H

The main objective of this paper is to explore the most important aspects of bilateral trade elasticity. First, investigate the presence of long-term co-integration between the measured variables. Second, to investigate the short-term effect of bilateral elasticity depreciation of the exchange rate and income of export and import demand functions. Third, investigate the long term effect of bilateral elasticity depreciation of the exchange rate and income of export and import demand functions. Fourth, explore the presence of M-L conditions and the J-curve in the short and long term. Fifth, to investigate whether diagnostic statistics and stability tests confirm the stability coefficients in most cases.
The paper consists of sections as follows: Section 2 provides an overview of literature or research closely related to this paper's research subject; Section 3 describes econometric techniques and databases used in the research; Section 4 provides the empirical results of the research and, finally, Section 5 contains the conclusion.

2. Literature Review

It is well known that there are numerous studies which are based on the traditional approach to the assessment of income and currency elasticity of export and import demand functions, or which are trying to confirm the presence of Marshall-Lener's conditions. The leading research includes: Kreinin (1967), Houthakker and Magee (1969), Magee, (1973); Khan (1974), Goldstein and Khan (1976, 1978, 1982), Wilson and Takacs (1979), Haynes and Stone (1983), Warner and Kreinin (1983), Gylfason and Risager (1984), Bahmani-Oskooee (1986), Krugman (1989), Caporale and Chui (1999), Thorbecke (2006), Bahmani-Oskooee and Goswani (2003), Mann and Plück (2005), Chinn (2005), Imbs and Mejean (2010).
There are several studies that estimate bilateral trade between developed and developing countries and a certain block of countries. For example, Bahmani-Oskooee and Brooks (1999) tested the J-curve phenomenon on the example of bilateral trade between the US and its trading partners. They applied the cointegration test and investigated the existence of a long-term link between imports and exports, i.e. a positive effect of dollar depreciation on the trade balance in the case of four of the six countries. Bahmani-Oskooee and Kantipong (2001) tested the J-curve phenomenon on the example of bilateral trade between Taiwan and its five trading partners. They investigated the phenomenon that J-curve works only in the case of bilateral trade between Taiwan and the United States and Taiwan and Japan. Bahmani-Oskooee and Goswami (2003) tested the J-curve phenomenon on the example of bilateral trade between Japan and its major trading partners. In the case of application of aggregate data the presence of the J-curvewas not observed, while in the case of bilateral data the effect of J-curve was investigated, or between Japan and Germany and Japan and Italy. They also noted the long-term effect of the depreciation of the yen on the trade balance of Japan, in the case of trade only with Canada, the UK and the US. Hacker and Hatem-j (2003) examined the presence of J-curve using as example north-European economies, i.e. that the depreciation of their national currencies had a positive effect on the trade balance. Hatem-J and Irandoust (2005) investigated the long-term elasticity of trade between Sweden and its six trading partners. Research has shown that changes in income have a strong impact on exports and imports, while changes in exchange rate have no effect on trade in Sweden. They also confirmed the existence of the Marshall-Lerner condition only in the case of Germany. Bahmani-Oskooee and Ratha (2007) tested the J-curve phenomenon on the example of bilateral trade between Sweden and its 17 trading partners, i.e. the short-term and long-term effect of the depreciation of the Swedish krona on the trade balance of Sweden. They

investigated whether the depreciation of the krona had a positive effect on the trade balance of Sweden with most of its trading partners, while the presence of J-curve was evident only in five countries.

Aftab and Khan (2008) investigated the presence of Marshall-Lerner's condition in the case of trade between Pakistan and its 12 major trading partners. They investigated whether currency depreciation had a positive effect on export growth. However, this effect was absent for the US and Great Britain, its largest trading partners. OğusBinatli and Sohrabji (2009) investigated the elasticity of exchange rate and income of export and import demand functions on the trade balance of Turkey. The elasticity of income in imports is greater than exports, which affects the growth of the trade deficit. In addition, the elasticity of the exchange rate of the export and import demand function is negative, which means that depreciation affects the growth of the trade deficit. Petrovic and Gligoric (2010) investigated the effect of exchange rates on the trade balance of Serbia. They applied the Johansen and ARDL modelsof econometric technique and investigated the presence of the J-curve, i.e. that real depreciation has a long-term positive effect on the trade balance of Serbia.

Ketenci and Uz (2011) investigated the trade elasticity of exports and imports between the EU and eight trading partners and regional trade associations. They applied the ARDL model. EU exports and imports did not significantly react to changes in exchange rates, while in the case of elasticity of income in the long term a reaction was present. Jovanovic (2012) investigated the elasticity of trade, applying a comparative analysis of aggregate and bilateral data for the ex-socialist countries, with special reference to Macedonia. The results of the research showed that the elasticity of income and the exchange rate of exports and imports for the ex-socialist countries and Macedonia are much more precise with bilateral data in relation to the aggregate data. Caporale et al. (2012) tested the presence of Marshall-Lerner's conditions for Kenya. They determined that there is a co-integration between the exchange rates, real income and the balance of payments. The depreciation of the Kenyan shilling has acted positively in the long term to reduce the trade deficit. Ketenci (2013) investigated the effect of the financial crisis on the elasticity of trade between the BRIC countries and Turkey. They applied the model of imperfect substitution and the co-integration test. The results showed that the depreciation of the exchange rates did not have a positive impact on exports and imports, while the elasticity of income had a positive influence. Pandey (2013) investigated the presence of Marshall-Lerner's conditions using Indiaas an example, i.e. that the depreciation of the Indian rupee had a positive effect on exports, while income growth affects stronger imports. Kun Sek and MunHar (2014) tested the J-curve phenomenon through bilateral trade of Malaysia and its trading partners. They investigated the presence of the Marshall-Lerner condition with all of its trading partners. Currency depreciation and income growth in trading partners had a positive impact on the trade balance of Malaysia. Buzaushina (2015) determined that there is no Marshall-Lerner's condition in the transition countries. Owing to the low elasticity of exports, i.e. perfect substitution between products, depreciation of such measures has not been successful. However, in the long-run elasticity of income has a positive effect on the trade balance. Türkay (2014) and Halicioglu (2007) investigated the presence of Marshall-Lerner's conditions using Turkey as an example, i.e. that the depreciation of the lira has a positive effect on exports and imports, which in the long run leads to a reduction in the current account deficit.

3. Data and Methodology

This research relates to the assessment of the bilateral exchange rate elasticity and income of export and import demand functions of BiH with seven leading trading partners in Central and Southeast Europe. Available data relates to the period from 2000 to 2014. Data is taken from the following databases: World Bank (WDI), Eurostat, the Agency for Statistics of Bosnia and Herzegovina, the Central Bank of Bosnia and Herzegovina, the National Bank of Serbia, the National Bank of Macedonia, the Polish National Bank and http://wits.worldbank.org/.
In the study we applied the bilateral data to estimate the elasticity of exchange rate and income of export and import demand functions. Accordingly, and based on the practices and current literature on bilateral imports and exports, we define the following demand functions:

$$ln\, X_{j,t} = \beta_0 + \beta_1\, lnY_{j,t} + \beta_2\, lnEXR_{ij,t} + e_{1,t} \quad (1)$$

$$ln\, M_{j,t} = \alpha_0 + \alpha_1\, lnY_{j,t} + \alpha_2\, lnEXR_{ij,t} + e_{2,t} \quad (2)$$

where $X_{j,t}$ - the value of exports to a foreign country at time t (Croatia, Serbia, Slovenia, Czech Republic, Hungary, Poland and FYR Macedonia); $Y_{j,t}$ - the real income of a foreign country in period t; $EXR_{ij,t}$ - the nominal bilateral exchange rate between the Bosnian mark and the currency of the trading partner in period t (nominal exchange rate represents the value of the national currency expressed in the unit of foreign currency); $M_{j,t}$ - the value of imports from foreign countries at time t; $Y_{j,t}$ - the real income of the local country at time t; ln - is the natural logarithm; β_0 and α_0 are parameters; $e_{1,t}$ and $e_{2,t}$ are the error terms. In equation (1) we expect that $\beta_1$will be a positive sign, i.e. that the growth of foreign income or GDP will affect the growth of imports, or exports from the domestic country. In the case of $\beta_2$we can expect a positive sign if appreciation of foreign currencies is relative to the local currency, which will lead to the growth of exports to trading partners. In equation (2) we can expect a negative sign in front of α_1. The minus sign in front of $\alpha_1$occurs owing to the decrease in domestic income which leads to a decrease in imports from trading partners. In the case of α_2, we can also expect a negative sign. The depreciation of the national currency against the foreign currencies of trading partners leads to lower importsof products.
The research is based on the application of the co-integration approach, better known as the Autoregressive Distributed Lag (ARDL). It is co-integration modelling which is widely accepted by researchers. The ARDL model was developed by Pesaran and Pesaran (1997), Pesaran and Shin (1999) and Pesaran et al. (2001). The ARDL model has the following characteristics: the model is statistically more efficient in the process of determining co-integration relationships in small samples; the model can be applied when the regressors are not of the same order, or when the regressors are I(1) and/or I(0), i.e. it is not necessary to perform pre-testingfor the existence of problems of the standard deviation; it is not necessary to operate a unit root test in the model, which means that it can be applied regardless of the fact of whether the regressors in the model are stationary, non-stationary or mutually co-integrated (Pessaran et al. 2001; Pahlavani et al. 2005; Ketenci and Uz 2011); the model allows variables to have more optimal lags, which means better tracking of data by generating the modelling process from the general to the specific; the model provides impartial long-term assessment and relevance of t-statistics even when theregressorsare endogenous (Bhatta 2011); a dynamic error correction model – ECM – can be

derived from ARDL through linear transformations. ECM has a task to link or integrate short-term dynamics with the long-term balance without loss of long-term information (Banerjee et al. 1993; Chaitip and Chaiboonsri 2009).
The ARDL model requires the following two steps (Pesaran et al. 2001). The first step relates to the process of determining any significant long-term relationship between the variables by using the F-test. The second step relates to the long-term relationship variables and determining their value, and assessment of the short-term elasticity of variables showing the error correction representation of the ARDL model. The result of the error correction model tells us about the speed of adjustment from the short-term shock to the long-term balance (Siddiqui, et al. 2008). The ARDL model is represented by the following equations:

$$\Delta ln\, X_{j,t} = \beta_0 + \sum_{i=1}^{m} \beta_{1,i} \Delta ln\, X_{j,t-1} + \sum_{i=0}^{m} \beta_{2,i}\, \Delta ln Y_{j,t-i} + \sum_{i=0}^{m} \beta_{3,i}\, \Delta ln EXR_{ij,t-1} + \alpha_1 ln\, X_{j,t-1} + \alpha_2 ln\, Y_{t-1} + \alpha_3 ln\, EXR_{t-1} + e_{1,t} \quad (3)$$

$$\Delta ln\, M_{j,t} = \alpha_0 + \sum_{i=1}^{m} \alpha_{1,i} \Delta ln\, X_{j,t-1} + \sum_{i=0}^{m} \alpha_{2,i}\, \Delta ln Y_{t-i} + \sum_{i=0}^{m} \alpha_{3,i}\, \Delta ln EXR_{ij,t-1} + \lambda_1 ln\, X_{j,t-1} + \lambda_2 ln\, Y_{t-1} + \lambda_3 ln\, EXR_{t-1} + e_{2,t} \quad (4)$$

where X and M represent the exports and imports of products; EXR- –is the nominal bilateral exchange rate, which expresses the value of the national currency unit of foreign currency; $Y$is the real GDP BiH and Y_j is the GDP of trade partner countries; β_2 and α_2 represent the short-term effect of the rising wages of trading partners on the export of products from Bosnia and Herzegovina; α_2 and λ_2 represent the long-term effect of falling income, or GDP, of BiH, which causes a decrease in imports from the trading countries; β_3 and $\alpha_3$represent the short-term effect of depreciation on exports and imports; α_3 and λ_3 represent the long-term effect of depreciation on exports and imports; $m$represents the number of lags, β_0 and α_0 represent movement or drifts, $e_{1,t}$ and $e_{2,t}$ representthe error terms.
It is expected that β_3 and α_3 will have a positive signin equation 3, because it explains the positive relationship of the depreciation of the domestic currency and export in the short and long term. On the other hand, it is expected that α_3 and $\lambda_3$will have a negative sign in equation 4 owing to depreciation of the domestic currency, which will lead to a reduction in imports in the short and long term. It is expected that β_2 and α_2 in Equation 3 will have a positive sign owing to the growth of income trading partners, which will have a short-term and long-term effect on the growth of exports from the domestic country. It is expected that α_2 and $\lambda_2$in Equation 4 will have a negative number, which will will have a short-term and long-term effect on the reduction of imports to the home country of the trading partners.
Testing of a long term relationship between the variables is done with the help of bounds testing. Bounds testing offers certain advantages. First, it allows one to avoid endogenous problems related to the Engle-Granger (1987) method, the inability to test the hypothesis on the assessment of the variables in the long run. Second, long-term and short-term parameters in the model are estimated simultaneously. Third, there is no need to determine the order of integration between variables and pre-testing unit roots test (Halicioglu 2007). The stepsin the bounds process are based on the F or Wald statistics and represent the first phase of ARDL co-integration method. The second phase relates to the F test of the null hypothesis of long-term variables with a time lag whose aggregate value equals zero, while in the case of the alternative hypothesis at least one

long-term variable does not equal zero. This relationship is represented by the following relation (Bernstein and Madlener 2011):

$Null\ Hypothesis\ or\ H_0{:}\beta_1 = \beta_2 = \beta_3\ and\ H_0'{:}\lambda_1 = \lambda_2 = \lambda_3 = 0$i.e. the long run relationship does not exist.
$Null\ Hypothesis\ or\ H_1{:}\beta_1 \neq \beta_2 \neq \beta_3\ and\ H_1'{:}\lambda_1 \neq \lambda_2 \neq \lambda_3 \neq 0$i.e. the long run relationship exist.

Pesaran et al. (2001) calculated two levels of critical value for a given level of significance. One level assumes that all variables are I(0), and the second level assumes that all the variables are I(1). If the calculated value of the F-statistic exceeds the upper critical limit, then the null hypothesis is rejected. If the calculated value of the F-statistic is within the established value, the test becomes inconclusive. Finally, if the calculated value of the F-statistics is below the established critical value, then we accept the null hypothesis, i.e. there is no co-integration (Halicioglu 2005; Halicioglu 2004).
Diagnostic and stability tests are used to assess the reliability of ARDL models. The diagnostic test examines the Lagrange Multiplier (LM) test for serial correlation, the Ramsey Reset test for functional form Misspecification, the Jarque-Berra test for normality and the KB test for heteroscedasticity (Siddiqui et al. 2008; Bhatta 2011). The test of short-term and long-term variablestability is implemented by applying the cumulative addition of recursive residuals (CUSUM) and cumulative sum of squared recursive residuals (CUSUMSQ). CUSUM and CUSUMSQ statistics are presented through diagrams. If these statistics are moving within a defined level of 5% of significance, the null hypothesis of all variables on the basis of regression cannot be discarded and is considered to be stable (Hasan and Nasir 2008).

4. **Empirical Results**

Based on the equations 3 and 4, we will present the results of the co-integration between the dependent and independent variables, i.e. between BiH and its seven main trading partners from Central and Southeast Europe. In the first stage, we will present the results of the F-test. Results of the F-test are very sensitive to the length of lags. The given problem can be solved by introducing a longer sequence of lagsfor each first differenced variable. F-test results are presented in Table 2.

Table 2 Results of the F-test

Partner country	Lag length						
	0	1	2	3	4	5	6
Panel B: Bilateral export demand equation							
Croatia	0.96	1.32	6.52	11.05	10.07	11.18	12.14
Serbia	2.02	2.02	3.35	12.86	12.89	13.18	12.67
Slovenia	0.91	0.91	0.91	6.34	7.32	7.89	8.34
Hungary	1.23	1.27	1.89	2.04	2.34	2.89	3.04
Czech Republic	1.80	1.33	0.73	6.79	6.98	7.24	8.61
Poland	1.36	4.45	12.80	10.30	9.76	10.34	9.65
FYR Macedonia	2.28	2.28	2.28	18.49	14.34	12.76	13.74
Panel A: Bilateral import demand equation							

Croatia	1.27	7.37	9.75	5.66	7.81	8.67	9.54
Serbia	1.70	1.70	15.23	4.12	4.95	5.12	6.78
Slovenia	2.13	2.13	6.94	7.02	8.09	9.03	10.71
Hungary	6.42	4.19	3.88	7.21	8.35	9.29	9.67
Czech Republic	1.78	1.33	1.94	2.09	2.98	3.02	3.15
Poland	0.60	0.60	0.60	0.92	1.23	1.45	1.78
FYR Macedonia	0.47	0.47	4.78	4.45	4.89	5.12	5.47

Note: The relevant critical value bounds for F-statistics are taken from tables C1.iii case III in Pesaran et al. (2001).Unrestricted intercept and no trend (4.29–5.61) at 90% significance level, (3.23–4.35) at 95% significance level.

Based on the results of the F-test we note that, in the case of the equation forbilateral export demand function, Croatia realises a long-term co-integration relationship on another lag. Countries like Serbia, Slovenia, the Czech Republic and FYR Macedonia achieve a long-term co-integration relationship on the third lag, while Poland achieves it on the first lag. In the case of those countries that have made a long-term co-integration relationship, we strongly reject the null hypothesis that there is no co-integration between the variables at the 1% level of significance. Only in the case of the equation forbilateral export demand functions for Hungary was a co-integration relationship to the length of three lags not recorded. On the other hand, in the case of bilateral import demand functions, Croatia, Serbia, Slovenia and FYR Macedoniaachieve long-term co-integration relationship to another lag, while Hungary achieves it to zero lag. These countries have a long-term co-integration relationship on a strict level of 1% significance, and therefore we reject the null hypothesis that there is no co-integration between variables. However, in the case of the Czech Republic and Poland, as a function of the bilateral import demand function, there was evidence of a long-term co-integration at the level of three lags. Based on the negative results, in terms of functions, bilateral export demand functions for Hungary, and bilateral import demand functions for the Czech Republic and Poland, we consider it to be reasonable that these countriesshould be excluded from further assessment of bilateral export and import demand functions.

In the equations 3 and 4, we applied the Akaike Information Criterion in order to find the optimal length of lags. In studying the presence of M-L conditions, the effect of the J-curve and income, we use short-term coefficients of the first differenced bilateral elasticity of the real exchange rate of the export and import function of demand, in Table 3, panel A and B.

Table 3 Short-term coefficient estimates of depreciation of the currency exchange rate

Partner country	Lag length							
	0	1	2	3	4	5	6	EC(-1)
Panel A: Bilateral export demand equation								
Croatia	-0.26 (0.59)	-4.01 (0.76)	-7.04 (0.26)	-4.09 (0.11)	-3.56 (0.24)	-6.78 (0.89)	-7.24 (0.79)	(-0.63) 0.01∗
Serbia	-0.67 (0.51)	-0.23 (0.82)	-0.27 (0.71)	-9.18 (0.86)	-8.4 (0.78)	-9.48 (0.45)	-10.1 (0.34)	(-0.05) 0.55
Slovenia	-4.44 (0.95)	-6.34 (0.45)	-7.67 (0.06)	3.89 (0.04) ∗∗	4.46 (0.03)∗∗	5.9 (0.02)∗	6.12 (0.05)∗∗	(-0.23) 0.01∗
Czech Republic	-1.69 (0.27)	2.76 (0.87)	-2.09 (0.21)	-6.88 (0.04)∗	-5.35 (0.06)	-7.76 (0.07)	-8.27 (0.08)	(-0.33) 0.54
Poland	5.6 (0.73)	-4.03 (0.43)	6.07 (0.03)∗	5.06 (0.04)∗	6.98 (0.34)	7.18 (0.46)	8.38 (0.37)	(-0.01) 0.96

FRY Macedonia	4.24 (0.80)	5.67 0.78)	6.87 (0.56)	12.3 (0.88)	11.2 (0.79)	12.52 (0.67)	11.4 (0.57)	(-0.22) 0.52
Panel B: Bilateral import demand equation								
Croatia	3.23 (0.09)	-5.16 (0.18)	-7.25 (0.20)	-3.35 (0.89)	-4.56 (0.65)	-5.82 (0.23)	4.73 (0.43)	(-0.75) 0.05*
Serbia	-1.07 (0.31)	-2.49 (0.03)**	-2.01 (0.07)	-6.81 (0.45)	-7.19 (0.09)	-6.35 (0.76)	-7.14 (0.46)	(-0.07) 0.38
Slovenia	-9.61 (0.18)	-6.89 (0.23)	-5.78 (0.46)	2.67 (0.02) **	4.76 (0.03)**	3.81 (0.04)**	5.72 (0.03)**	(-0.34) 0.00*
Hungary	4.10 (0.39)	1.69 (0.68)	1.11 (0.98)	-3.19 (0.01)*	-4.27 (0.06)	5.88 (0.77)	4.23 (0.63)	(0.07) 0.85
FRY Macedonia	5.10 (0.83)	3.56 (0.98)	4.34 (0.57)	8.43 (0.68)	6.48 (0.56)	5.36 (0.83)	7.71 (0.49)	(-1.23) 0.03*

Note: *, **Show significant at 1 and 5% respectively.

Table 3, in panels A and B, presents the results of the coefficients of short-term effect of the depreciation of the real exchange rate on the bilateral export and import function of demand. The findings, in panel A, show the presence of M-L conditions in the case of Croatia and FYR Macedonia. The M-L condition is satisfied, i.e. that the sum of the absolute value of the elasticity of the real exchange rate of the import and export functions demand is greater than 1 only in the case of Croatia and FYR Macedonia, while it is not the case for Serbia, the Czech Republic, Poland and Hungary. Accordingly, the real depreciation of the Bosnian mark has a favourable short-term effect on trade with Croatia and FYR Macedonia. In the case of Slovenia there is evidence of a J-curve bilateral export demand function, while in the case of Serbia, the Czech Republic, Poland and Hungaryits presence is not noticed. The presence of the J-curve means that the appreciation of the Slovenian currency has a short-term effect on the growth of BiH exports to Slovenia. On the other hand, the coefficients of the short-term bilateral currency depreciation import demand functions also confirm the existence of a J-curve in the case of Slovenia, while in the case of Serbia and Hungary its presence was not observed (see panel B). The existence of a J-curve means that the real depreciation of the Bosnian mark has a short-term effect on the reduction of imports from Slovenia. The low value of the coefficient of exports and imports suggests that currency depreciation or the presence of J-curve has little effect on reducing the current account deficit of BiH in the short term. Therefore, Table 3 presents the results of coefficients based on the error correction model (the coefficients of EC (-1) of the error-correction model). Based on the expected high negative coefficients EC (-1) for all countries, we conclude the existence of co-integration relationships between variables. However, only in the case of Hungary does the error-correction coefficient of bilateral import demand function have a positive value, which confirms the absence of co-integration between variables. The speed of the equilibrium adjustment is relatively high in all countries, which is in line with previously conducted research. The largest error-correction coefficient is recorded in the case of the bilateral export demand functionfor Croatia and is 63%, which means that the imbalance of bilateral export demand function corrects for the year based on the appreciation of the real exchange rate of the Croatian kuna. On the other hand, the error-correction coefficient, in the case of bilateral import demand functions, is the largest forFYR Macedonia and is 123%, meaning that the imbalance in bilateral trade between BiH and FYR Macedonia corrected in less than a year, and the depreciation of the Bosnian mark leads to a decrease in imports.

Table 4 presents the long-term effect of elasticity of exchange rates and income on the export and import function of demand. The M-L condition is satisfied, i.e. that the sum of absolute values of elasticity of the exchange rate of the import and export demand was higher than one only in the case of Slovenia, while that is not the case for Serbia, Croatia, the Czech Republic, Hungary and FYR Macedonia.

Based on the calculated coefficients of long-term elasticity of exchange rates of the export demand function, a statistical significance that is entirely consistent with previously conducted research was not observed. In the case of long-term elasticity of exchange rates of the import function, an expected negative sign was observed in the case of Serbia, which is also significant. The real depreciation of the Bosnian mark against the Serbian dinar has led to a reduction of imports from Serbia. On the other hand, in case of long-term elasticity of the exchange rate of the import function, a positive sign was observed in the case of FYR Macedonia, which means that the depreciation of the Bosnian mark against the Macedoniandenar has not led to a reduction of imports from Macedonia. Based on the low value of elasticity of real exchange rates, we conclude that the currency depreciation has a negligible effect on trade flows, i.e. that exports and imports depend little on the movements of exchange rates.

Table 4 Long-term coefficient of bilateral elasticity of BiH and its trade partners

Partner country	Constant	Log EXR	LogY
Panel A: Bilateral export demand equation			
Croatia	-1.06 (0.01)	-0.00 (0.88)	15.7 (0.00)*
Serbia	-1.54 (0.01)	0.02 (0.70)	13.6 (0.00)*
Slovenia	8.09 (0.02)	-7.09 (0.95)	7.02 (0.02)*
Czech Republic	2.53 (0.12)	2.54 (0.53)	-2.80 (0.58)
Poland	-2.33 (0.00)	0.09 (0.09)	0.14 (0.00)*
FYR Macedonia	-2.32 (0.05)	0.00 (0.80)	9.07 (0.00)*
Panel B: Bilateral import demand equation			
Croatia	-1.81 (0.04)	0.00 (0.89)	8.52 (0.00)*
Serbia	1.15 (0.00)	-0.25 (0.00)*	4.99 (0.00)*
Slovenia	1.26 (0.00)	-8.03 (0.24)	6.05 (0.16)
Hungary	9.97 (0.03)	-9.13 (0.98)	1.70 (0.00)*
FYR Macedonia	1.08 (0.00)	0.16 (0.00)*	5.42 (0.00)*

Note: *, ** Show significance at 1% and 5% respectively.

Bilateral long-term income elasticity of export and import demand functions is significantly higher than the elasticity of the exchange rate of the export and import demand functions. In the case of long-term bilateral income elasticities of export and import demand functions, a positive sign is expected. However, in the case of the Czech Republic, we have a negative sign. In most cases of bilateral income elasticities of export and import demand functions, a high significance and elasticity was investigated except in the case of Poland, as a function of export demand, and in the case of Slovenia, as a function of import demand. The research results show that the income elasticity of export and import demand functions is significantly greater than 1. Therefore, Macedonia, Croatia, Slovenia and Serbia have a higher elasticity of income with respect to the bilateral exports of Bosnia and Herzegovina. Consequently, Bosnian exportsare very sensitive to demand from the given countries. On the other hand, BiH income was elastic in the bilateral trade imports from Slovenia. In the end, we can conclude that demand is the

dominant factor determining the bilateral export and import function of the demand of BiH and its trading partners in relation to the depreciation of exchange rates.
Table 5 presents the diagnostic statistics. Therefore AdjR^2 has an optimum value in all tested cases. The LM test tells us that in most cases there is no autocorrelation in the disturbance of the error term, except in the case of the bilateral export demand functions of Croatia, Serbia and the bilateral import demand functions of Slovenia. The Jarque-Bera normality test shows that the model errors are normally distributed except in the case of the FYR Macedonia. The tests of heteroscedasticity are also significant at the level of 5% in all cases. The RESET test tells us that the models are correctly specified except in the case of Poland. Finally, we can conclude that our models meet all the diagnostic tests.

Table 5 Diagnostic statistics

Partner country	**AdjR^2**	**LM**	**Normality**	**Heteroscedasticity**	**RESET**
Panel A: Bilateral export demand equation					
Croatia	0.95	0.02 (11.71)	0.65 (0.84)*	0.22 (9.45)*	0.69 (0.17)*
Serbia	0.86	0.00 (9.61)	0.89 (0.21)*	0.30 (9.02)*	0.35 (1.10)*
Slovenia	0.86	0.31 (2.32)*	0.29 (2.43)*	0.94 (0.36)*	0.45 (0.61)*
Czech Republic	0.90	0.79 (0.46)*	0.90 (0.19)*	0.50 (6.27)*	0.11 (4.15)*
Poland	0.90	0.08 (4.96)*	0.78 (0.47)*	0.40 (8.27)*	0.03 (65.46)
FYR Macedonia	0.82	0.34 (2.10)*	0.00 (21.03)	0.57 (1.97)*	0.52 (0.48)*
Panel B: Bilateral import demand equation					
Croatia	0.93	0.11 (4.32)*	0.89 (0.29)*	0.20 (8.50)*	0.70 (0.15)*
Serbia	0.98	0.052 (5.64)*	0.80 (0.43)*	0.18 (8.78)*	0.16 (2.68)*
Slovenia	0.83	0.02 (12.71)	0.87 (0.26)*	0.87 (0.26)*	0.76 (4.96)*
Hungary	0.65	0.44 (1.61)*	0.32 (2.32)*	0.16 (5.13)*	0.29 (1.22)*
FYR Macedonia	0.92	0.054 (5.90)*	0.77 (0.52)*	0.92 (5.27)*	0.32 (1.35)*

Note: *, **Show significance at 1 and 5% respectively.

In Table 6 we examined whether our models can meet the models of stability, and therefore we applied the CUSUM and CUSUMSQ tests. In the case of the CUSUM test the stability of our model was confirmed in all cases, while in the case of tests CUSUMSQ stability is somewhat less than what is considered acceptable, because the given model provides less stable results. Namely, CUSUM and CUSUMSQ tests indicate stability in 16 of 22 cases. Stability tests are less reliable or inconclusive in the case of Slovenia, the Czech Republic, Croatia and FYR Macedonia.

Table 6 Stability tests results

Partner country	CUSUM	CUSUMSQ	Partner country	CUSUM	CUSUMSQ
Panel A: Bilateral export demand equation			**Panel B: Bilateral import demand equation**		
Croatia	Stable	Stable	Croatia	Stable	Unstable
Serbia	Stable	Stable	Serbia	Stable	Stable
Slovenia	Stable	Unstable	Slovenia	Stable	Unstable
Czech Republic	Stable	Unstable	Hungary	Stable	Stable
Poland	Stable	Stable	FYR Macedonia	Stable	Unstable
FYR Macedonia	Stable	Unstable			

Note: ** Show significance at 5% respectively.

5. Conclusion

Trade elasticity is very important in the process of establishing macroeconomic policies, i.e. it represents the basis for the policy of pricing, exchange rate, supply and demand in international trade flows, etc. We have based our research on the bilateral data which provide high enough quality of evidence to the long-term impact of the depreciation of the exchange rate on the export and import function of demand between BiH and its seven trading partners from Central and Southeast Europe. We used an econometric technique called the ARDL model in our research.

The research has shown, in most cases, the presence of long-term co-integration relationships between variables. However, in the case of bilateral elasticity of export demand function for Hungary and bilateral import demand functions for the Czech Republic and Poland the presence of co-integration relationshipswas not investigated. The special contribution of this research is that it has managed to prove the existence of M-L conditions in the elasticity of bilateral exchange rate in the short term, in the case of Croatia and FYR Macedonia. This means that the real depreciation of the Bosnianmark, the Croatian kuna and the Macedonian denar has a favourable short-term effect on the reduction of imports. In addition, the existence of the J-curve in the export and import function of demandwas noted for Slovenia, while the same was not observed in the case of Serbia, the Czech Republic, Poland and Hungary.

In the case of long-term coefficients of elasticity export demand function of exchange rates, the presence of M-L conditions was investigated in the case of Slovenia. The real depreciation of the Bosnian currency has a favourable long-term effect on trade with Slovenia. In the case of long-term bilateral elasticity of exchange rates of import demand functions, the expected negative sign for Serbia, which is also significant, was investigated. The real depreciation of the Bosnian mark to the Serbian dinar has led to a reduction in imports from Serbia. On the other hand, in the case of long-term elasticity of depreciation of the exchange rate of import demand function,a positive sign for the FYR Macedoniawas observed, which means that the real depreciation of the Bosnian mark to Macedonian denar has not led to a reduction in imports from Macedonia.

In most cases the coefficients of long-term bilateral income elasticity of export and import demand functions are considerably significant for all countries except for the Czech Republic, in the case of export demand function of income, and for Slovenia, in the case of functions income import demand. Most countries have a higher income elasticity of export demand function in relation to the import function of demand. Bilateral incomeof Macedonia, Croatia, Slovenia and Serbia is elasticin relation to the BiH bilateral exports. Thus, BiH exports are highly dependent on the demand fromgiven countries. On the other hand, BiH income was elastic in the bilateral trade imports to Slovenia. Therefore, demand is the more dominant factor in determining bilateral elasticity of export and import demand functions of BiH with its trading partners in relation to a real depreciation of exchange rates. Finally, based on the application of diagnostic statistics and stability tests, the stability coefficients in most cases wereconfirmed.

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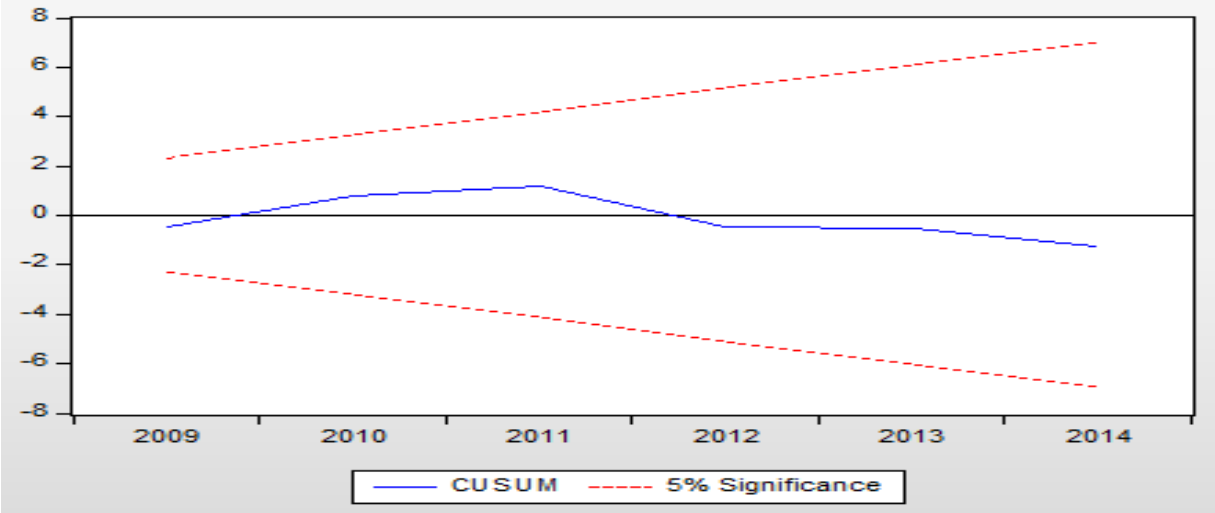
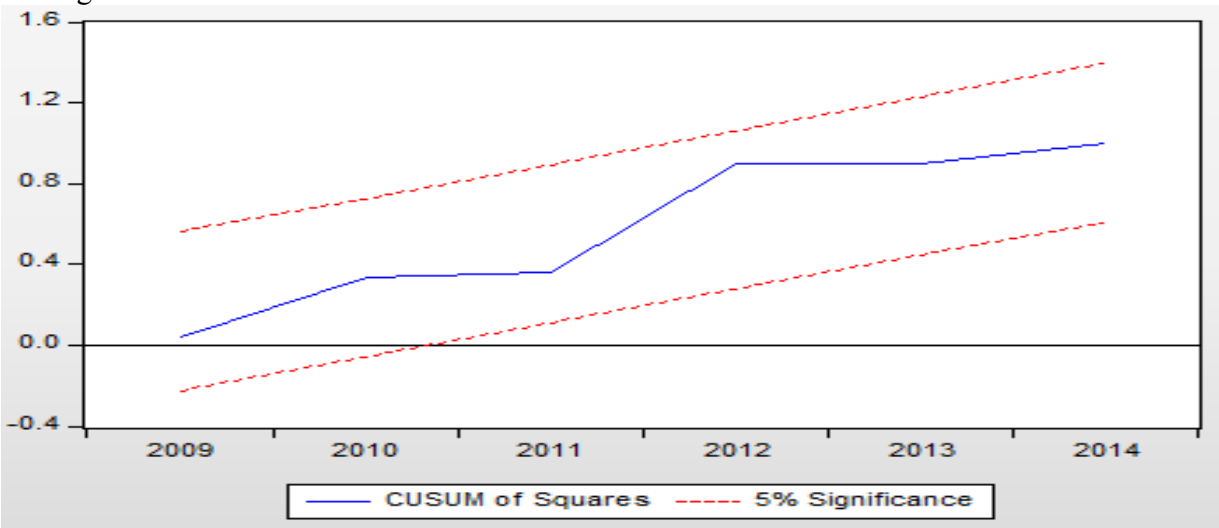
Appendix 1

Figure 1. The stability of exports to Croatia as the largest trade partner of Bosnia and Herzegovina.



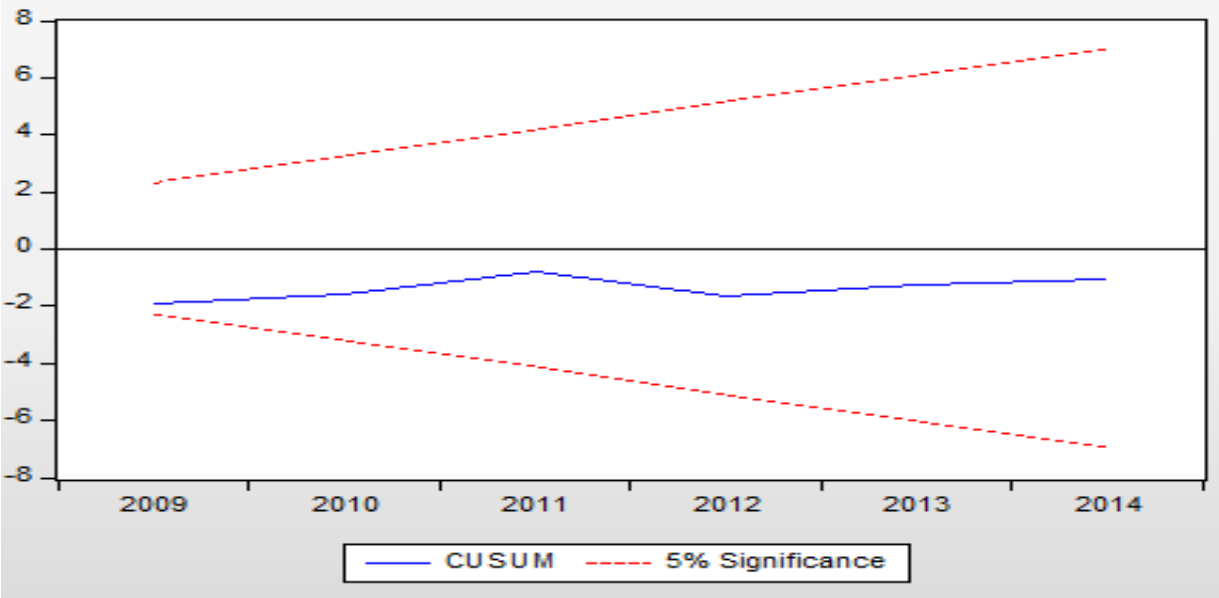
Source: The Authors

Figure 2 The stability of exports to Croatia as the largest trade partner of Bosnia and Herzegovina.



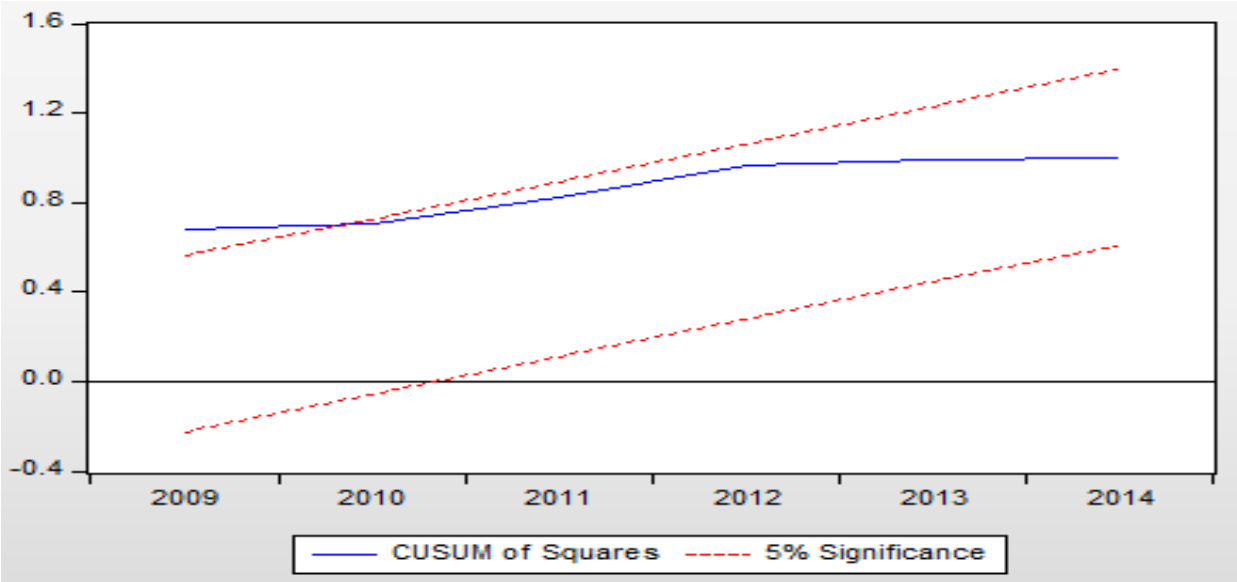
Source: The Authors

Figure 3 The stability of imports from Croatia as the largest trade partner of Bosnia and Herzegovina.



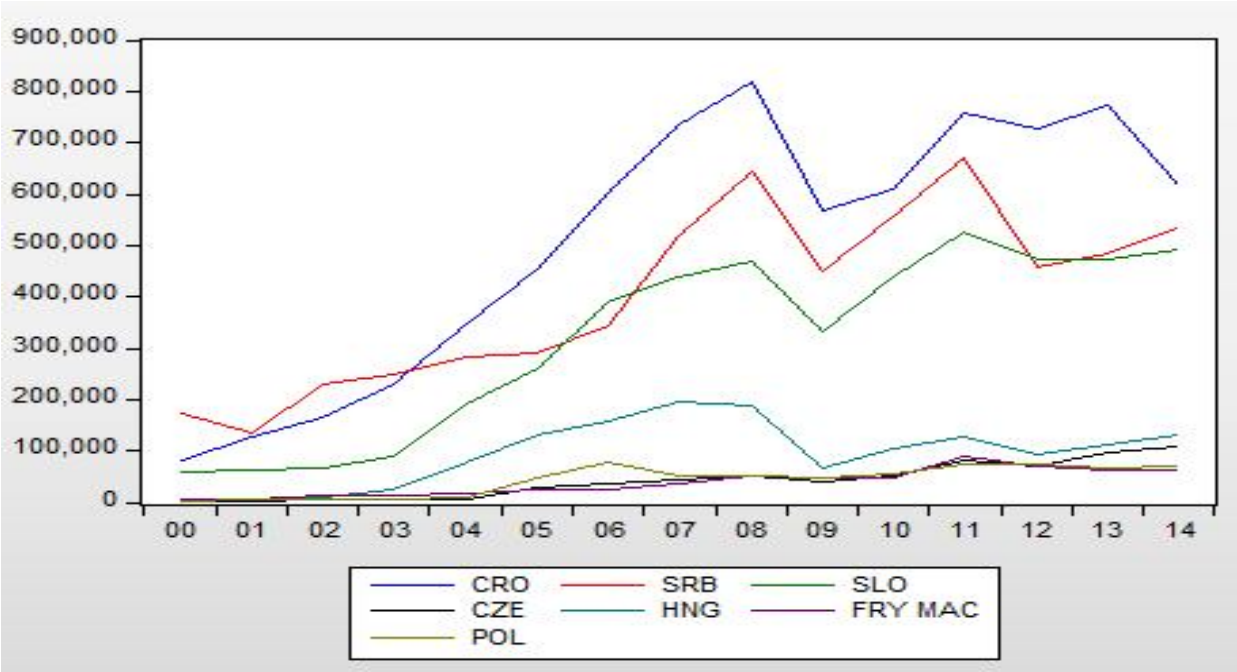
Source: The Authors

Figure 4 The stability of imports from Croatia as the largest trading partner of Bosnia and Herzegovina.



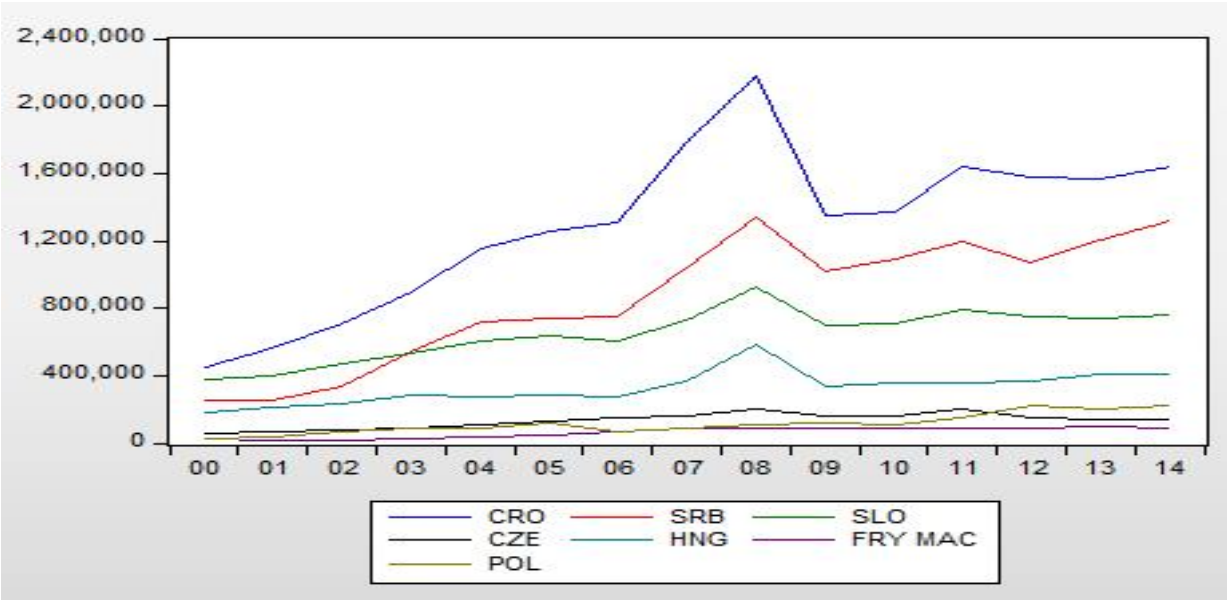
Source: The Authors

Figure 5 Aggregate exports of Bosnia and Herzegovina to trade partners from 2000 to 2014.



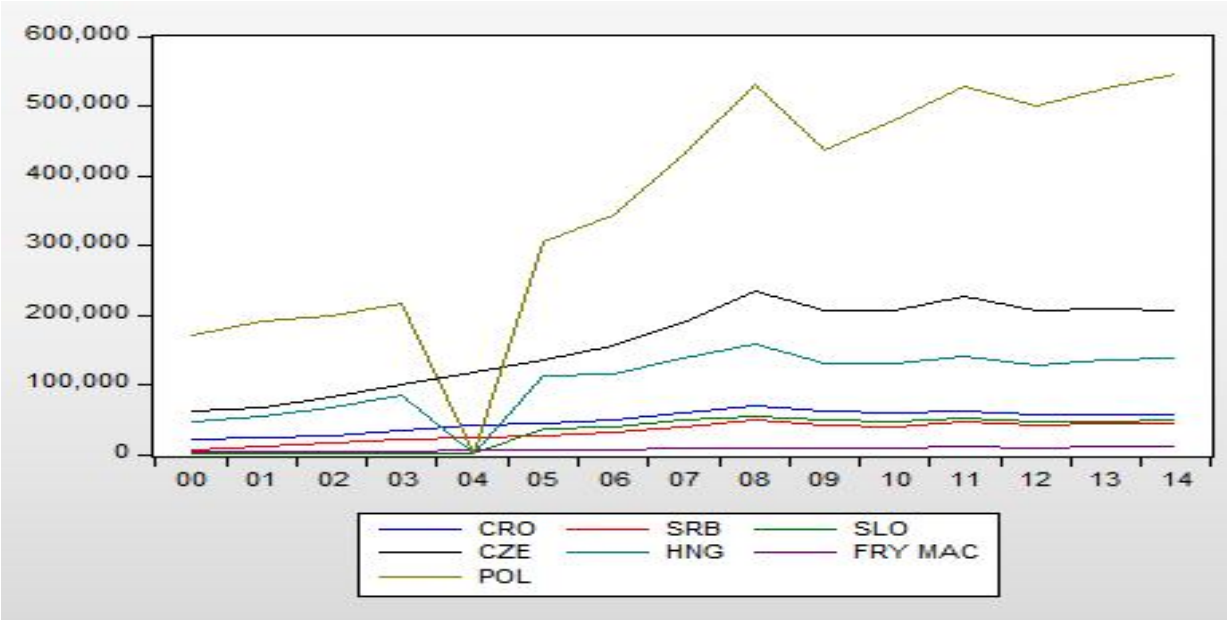
Source: The Authors

Figure 6 Aggregate imports of Bosnia and Herzegovina from trade partners from 2000 to 2014.



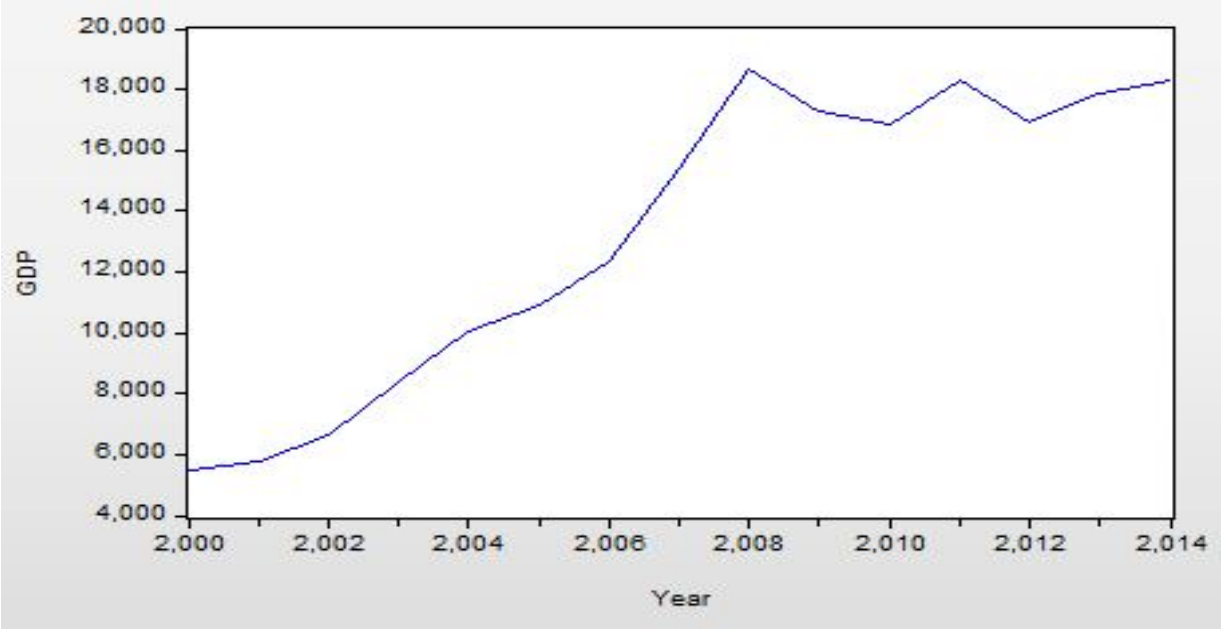
Source: The Authors

Figure 7 GDP of trade partners of Bosnia and Herzegovina from 2000 to2014.



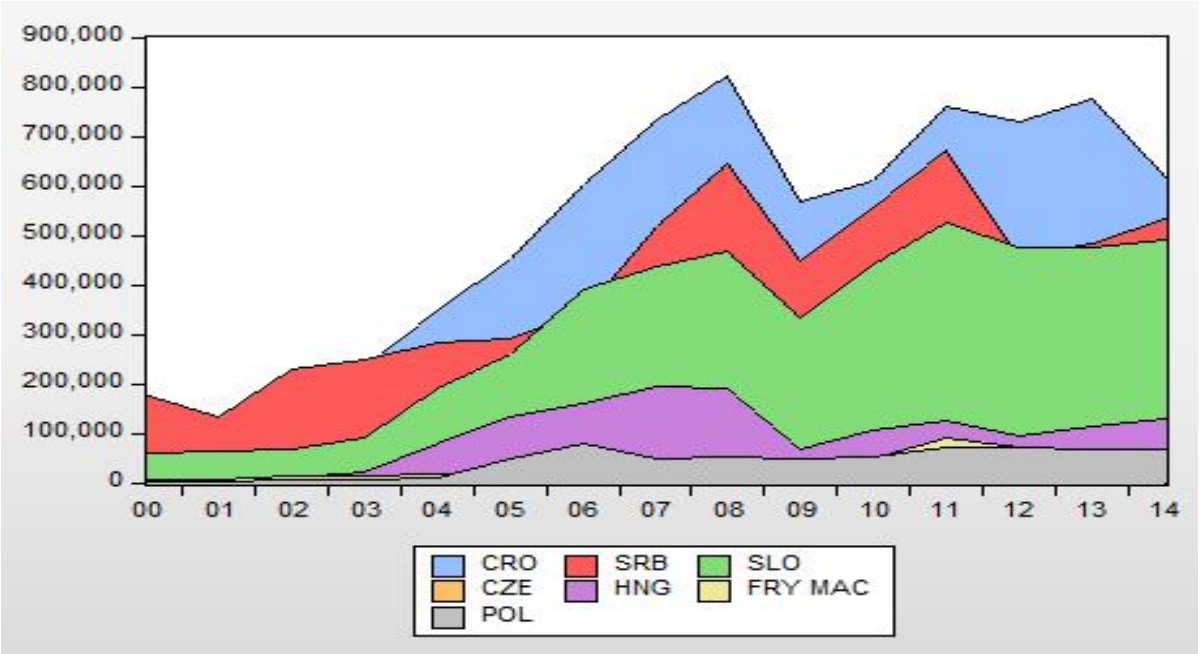
Source: The Authors

Figure 8 GDP of Bosnia and Herzegovina from 2000 to 2014.



Source: The Authors

Figure 9 The real exchange rate of Bosnian mark to exchange rates of trade partners from 2000 to 2014.



Source: The Authors