MACROECONOMIC SHOCKS ASYMMETRY: SEE AS AN OPTIMAL CURRENCY AREA

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Summary: *This paper has the goal to evaluate the existence of asymmetry of macroeconomic shocks between the SEE countries. It focuses on the Optimum Currency Area (OCA) theory to determine the readiness of any country to participate in a monetary union. The main goal of the study is to evaluate the OCA criteria for Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Greece, Macedonia, Montenegro, Kosovo, Serbia and Slovenia. The focus will be on the trade and financial links among these countries, the harmonization of business cycles and the similarities in the inflation movements. Going through often cited criteria for a successful currency union the paper will try to give conclusion for the possibilities to use the benefits of the OCA in the region.*

The paper will contribute with its assumptions that will be used in assessing the feasibility of a common currency area (CCA). That assumption will focus on the existence of the asymmetric shocks that will increase the costs of forming a CCA in SEE countries. In this paper, the comparative analysis of the key variables, policies and recommendations, gives profound basis for making conclusions related to the different macroeconomic policies behavior in terms of bad economic performance. Identification of the imbalances, national or international should give an answer for the dilemmas about the consistency of certain measure in terms of OCA.

Key words: *Macroeconomic shocks, Optimum Currency Area, foreign trade, inflation.*

JEL classification: *F33*

INTRODUCTION

The theory of the Optimal Currency Area has been subject to analysis for more than half century. In that period there was generated immense literature that deals with theoretical and practical implication of this theory. Many authors gave contribution in testing certain regions if they are fit for monetary union. Some of them used the traditional approach in testing the OCA criteria's and some the modern one.

Going thought the literature one can choose his favorable way to evaluate the possible benefits for certain county/region to join a monetary union. In this paper we will compare and analyse the key macroeconomic indicators in the SEE countries. It is well known that many of these countries once were in a monetary union. That union left them with different economic development and structure of the economy. As we can notice that after 20 years, today these countries again have intensified the relationship with each other, and with same group of countries (EU). The paper will try to define the macroeconomic ambient that has been created by the macroeconomic policies in this period. Going through all three often cited criteria for a successful currency union the paper will try to give conclusion for the possibilities to use the benefits of the OCA. In the paper we will test the assumptions that will be used in assessing the feasibility of a common currency area (CCA). That assumption will focus on the existence of the asymmetric shocks that could increase the costs of forming SEE countries. With the analysis of the macroeconomic ambient, the paper will determine the reasons for triggering the recent economic crises, and measure its intensity among different countries.

The first two parts of the paper are explaining the evolution of the OCA theory and the benefits and costs that this monetary union brings to the economy joining. Next two parts shows the results of the data analysis. In those terms, the third part deals with the trade integration among SEE countries. In the last, fourth part, we found the correlations and size of macroeconomic shocks in these countries.

EVOLUTION OF THE OCA THEORY – LITERATURE REVIEW

An optimum currency area (OCA) is defined as the optimal geographic domain of a single currency, or of several currencies, whose exchange rates are irrevocably pegged and might be unified. The single currency, or the pegged currencies, can fluctuate only in unison against the rest of the world. The *domain* of an OCA

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is given by the sovereign countries choosing to adopt a single currency or to irrevocably peg their exchange rates. *Optimality* is defined in terms of several *OCA properties*, including the (1) mobility of labour and other factors of production, (2) price and wage flexibility, (3) economic openness, (4) diversification in production and consumption, (5) inflation differentials, (6) financial markets integration, (7) fiscal integration and (8) political integration. The (9) similarity of shock and (10) correlation of incomes was added later. *Sharing* the above properties reduces the usefulness of nominal exchange rate adjustments within the currency area by fostering internal and external balance, reducing the impact of some types of shocks or facilitating the adjustment thereafter.

Countries would form a currency area in expectation that current and future benefits exceed costs. If, for example, potential members of a common currency area do have labour force that is mobile, sufficient price and wage flexibility, a high degree of openness, similar inflation rates and political will to abandon their own currency and adopt a new one, then the common monetary policy can be a benefit to all members and therefore the usefulness of nominal exchange rate adjustments within members is reduced. In addition, the OCA theory can be viewed as a tool for finding an answer to the question on how to choose the optimum exchange rate regime. It should be mentioned, however, that there is no widely accepted algorithm or index to indicate unambiguously should a country join a currency area or not. In fact, there is no standard theory of optimum currency areas, but rather several approaches that have been inspired by Mundell's (1961) seminal paper.

The start of the OCA theory are the seminal contributions by Mundell (1961), McKinnon (1963), and Kenen (1969) although some insights were present already in Friedman (1953) and Meade (1957). All literature on the optimum currency area (OCA) theory can be systematized into four main phases:

(1) The first is the "***pioneering phase***" from the early 1960s to the early 1970s where the *OCA properties* were established, the debate on the borders of a currency area was started and the analysis of the benefits and costs from monetary integration was initiated. The main drawback of the pioneering phase was that it was difficult to weigh and reconcile the diverse OCA properties as a unifying framework. Also most OCA properties had no clear empirical content yet. The first time that someone used the phrase optimum currency area was Mundell (1961), when he published his seminal paper entitled "A Theory of Optimum Currency Areas". This was also the first time someone had suggested that a cu-

rrency area should be a region, whose borders need not necessarily coincide with state borders. He emphasized the factor mobility, especially the labour mobility, as a crucial criterion in forming an OCA. High factor market integration within a group of partner countries can reduce the need to alter real factor prices and the nominal exchange rate between countries in response to disturbances Mundell, (1961). Mundell also emphasizes the importance of price and wage flexibility as mechanisms to cope with idiosyncratic demand shocks. Ingram (1962) noted that financial integration can reduce the need for exchange rate adjustments. McKinnon (1963), another important contributor to the OCA theory, emphasized the degree of openness as a crucial criterion in forming the OCA. He argues that the more the economy is open the more arguments there are for having a fixed exchange rate. The openness criterion is also emphasized by Whitman (1967) and Giersch (1970, 1973).

The important contributor to the OCA theory is Kenen (1969), who introduced product diversification as an important criterion. He argues that diversification reduces the need for changes in the terms of trade via the nominal exchange rate and provides "insulation" against a variety of disturbances. Also, he emphasized the need of fiscal integration between regions in order to facilitate the impact of adverse asymmetric shocks (through fiscal transfers between regions). Fleming (1971) put the similarities of inflation rates as another important OCA criterion noted that when inflation rates between countries are low and similar over time, terms of trade will also remain fairly stable. The political will to integrate is regarded by Mintz (1970) as among the most important condition for sharing a single currency. Haberler (1970) stressed the importance of a similarity of policy attitudes among partner countries for a successful currency area. Tower and Willett (1976) added the trade-off between objectives as a important criterion for a successful OCA.

(2) The "*reconciliation phase*" during the 1970s, a second set of contributions jointly examined the OCA properties. This represented an important advancement as properties started to be analyzed and weighed with one another to gauge their relative importance. This phase also provided several new insights, a new "meta-property" (i.e., the similarity of shocks), and gave more structure to the analysis of the costs and benefits. However, most OCA properties continued to lack an empirical content. The debate on the OCA properties and the benefits and costs received an impetus from a second wave of contributions including Corden (1972), Mundell (1973), Ishiyama (1975), and Tower and Willet (1976). The merit of these authors was to jointly interpret the diverse properties.

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This reconciliation strengthened the interpretation of some properties and led to diverse new insights such as the role of similarity in shocks. McKinnon (2001) analyses in depth the implications of a second seminal contribution by Mundell (1973). This contribution discusses the role of financial integration, in the form of cross-country asset holding, for international risk sharing. Countries sharing a single currency can mitigate the effects of asymmetric shocks among them through the diversification of their income sources, by adjusting its wealth portfolio, and by pooling their foreign exchange reserves.

After these two phases, the development of the OCA theory lost some momentum. In particular, there was a problem of inconclusiveness, as OCA properties may point in different directions, a weakening of the analytical framework behind the OCA theory thus far. However, gradually several theoretical and empirical advancements lead to a reassessment of the OCA theory and of the main benefits and costs from monetary unification;

(3) The *"reassessment phase"* during the 1980s and early 1990s led to the "new theory of optimum currency area". In the second half of the 1980s interest in monetary integration was rekindled and the members of the European Union faced an "EMU question," concerning the timing and modalities of implementing a currency union, once the political decisions to create one has been taken. This question was brought out forcefully by the "One Market, One Money" Report Emerson et all (1992). The authors of the report looked at the OCA theory but could not find clear answers. They proceeded instead by using, but also extending, the elements of the "new theory of OCA", De Grauwe (1992), Tavlas (1993). The difference between traditional and modern view is that traditionalists emphasized more potential costs, while the modern view is more prone point to the benefits of common currency areas;

(4) The fourth phase is the "*empirical phase*" that spans over the last 15-20 years. All OCA properties are reviewed in great detail to find out how their interpretation has changed. This discussion shows that the pioneering intuitions of the OCA theory were remarkably strong. In fact, the discussion on all OCA properties was continued. There is still no simple OCA-test with a clear-cut scoring card although several authors have "operationalized" several OCA properties. In this context, European Union is in some sense, providing a "laboratory" to assess each OCA property and monitor the effects of deepening economic, financial and monetary integration.

COSTS AND BENEFITS OF MONETARY UNION

The membership in the monetary union causes certain costs and benefits. The costs of a monetary union derive from the fact that when a country relinquishes its national currency, it also relinquishes an instrument of economic policy, i.e. it loses the ability to conduct a national monetary policy. This implies that a nation joining a monetary union will not be able any more to change the price of its currency (by devaluations and revaluations), to determine the quantity of the national money in circulation, or to change the short-term interest rate. In other words, if you are not an optimal currency area, joining a monetary union can lead to (1) larger economic fluctuations, (2) budget deficits (in the case of negative asymmetric shock) and (3) monetary policy not suited to the individual county's needs. A currency union is therefore relatively less costly for countries that feature high level of labor mobility and high co-movement of economic shocks vis-à-vis other countries in the union. Synchronization of shocks increases the consensus over the direction of monetary policy, whereas high mobility facilitates full employment, reducing the need for active policy. Additional costs of giving up a national currency include the loss of seignorage revenues and, arguably, the loss of a national symbol, Tenreyro (2001).

While the costs of a monetary union accrue mostly at a macroeconomic level, the benefits are to be found in microeconomic relations. The case for joining a currency union rests on two important benefits: one is the elimination of currency conversion costs and the disturbances in relative prices coming from nominal exchange rate fluctuations. There is greater price transparency, smaller transaction costs in doing business across borders and no exchange rate uncertainty leading to greater competition, lower prices and more international trade and investment. The second is its potential to discipline policies, in particular to combat inflation, insofar as the union's monetary authority is better able to commit to monetary rules. This leads to greater price and exchange rate stability. Lower transaction costs and greater predictability encourage deeper integration in financial and non-financial markets, Grabner 2003, Barro and Alesina (2001).

## TRADE INTEGRATION AMONG SEE COUNTRIES

Before we analyze the trade integration between the SEE countries, the degree of openness of the countries will be first explored. By this, we want to emphasize the importance of external trade in the economic development of each country we analyzed. The degree of trade openness is calculated as a ratio of exports and imports of goods and GDP and it represents one of the traditional indicators/

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conditions necessary for achieving the optimal currency area. The following figure presents the degrees of openness of the countries that are subject of this analysis.

Figure 1: Trade openness (export and import of goods as a % of GDP)

(2003-2012)   (average 2003-2012)
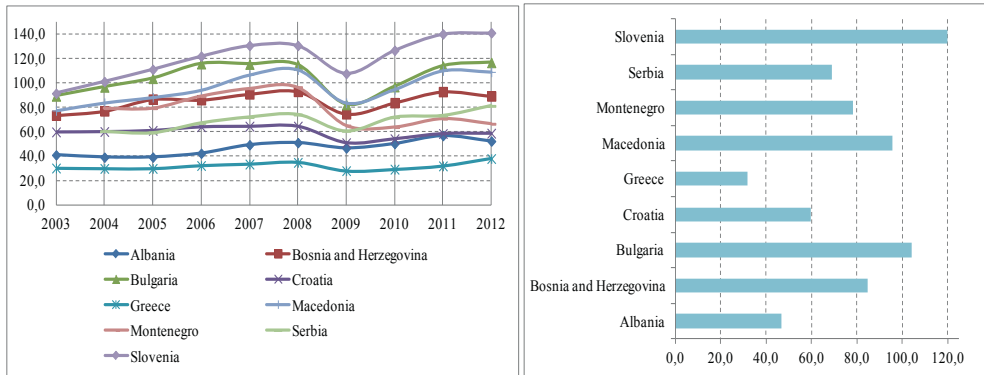
Source: World Bank, IMF, Statistical offices of the countries

The analyses of trade openness of the countries have shown that the trade channel plays different role in the countries that are subject of this analysis. The degree of openness, calculated as a ratio of exports and imports of goods to GDP, is the highest in Slovenia, Bulgaria and Macedonia - on average in the period 2003-2012 this ratio was 140.7, 104.3 and 95.6% of GDP, respectively. On the other hand, the lowest level of trade openness is registered in Greece (31.8% of GDP), Albania (46.7% of GDP) and Croatia (59.6% of GDP). Despite the relatively significant differences in the degree of trade openness, the general conclusion is that almost all countries in this analysis are characterized by a relatively high degree of trade openness.

In the period 2003-2012, with the exception of Montenegro and to a lower extent in Croatia, all other countries have experienced a trend of increasing the degree of trade openness. The largest increase in the degree of trade openness is observed in Slovenia (an increase of 49.5 percentage points), Macedonia (an increase of 31.6 percentage points) and Bulgaria (27.4 percentage points). On the other hand, the degree of trade openness in Montenegro has decreased by 12.7 percentage points. As a result of the impact of the global economic crisis (through trade channel), in 2009 the degree of trade openness declined in all these countries. The decline in the degree of trade openness in 2009 indicates a

relatively larger decrease in the foreign trade of these countries in terms of their GDP fall. The reduction is greatest in those countries that have a higher degree of trade openness (Bulgaria - decline of 32.3 percentage points, Montenegro - 31.2 percentage points, Macedonia - 27 percentage points). On the other hand, relatively closed economies had smaller reductions (Albania - a drop of 4.4 percentage points, Greece - 6.8 percentage points).

In the following part, we analyze the trade cooperation between the SEE countries, through the quantifying and analyzing the volume of trade between these countries. By this, we want to determine the degree of trade integration among these countries, which is an important element in OCA analysis of these countries.

Figure 2: Export of goods among the SEE* countries (in %)
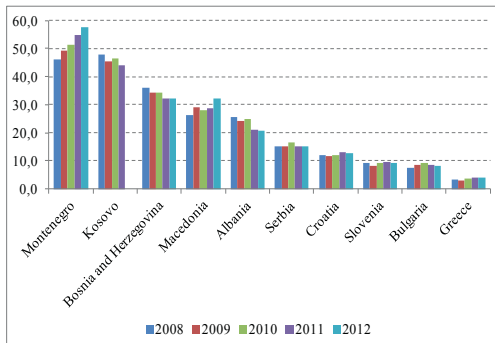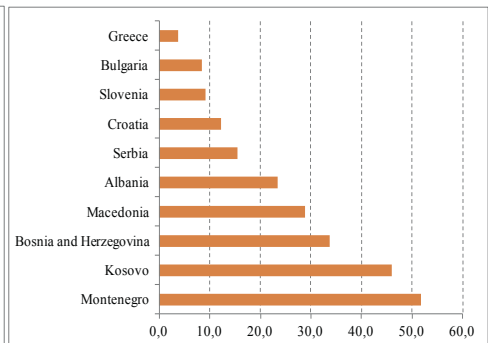
Source: World Bank, IMF, Statistical offices of the countries
* SEE countries include in the analysis: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Greece, Kosovo, Macedonia, Montenegro, Serbia and Slovenia.

In terms of trade cooperation between SEE countries, these analyzes confirmed that the intra-export of goods by individual countries varies from 14.2% in Greece to more than 60% in Montenegro and Kosovo. In the period 2008-2012 the countries that export the most with the other SEE countries are Montenegro (on average around 62% of its total exports), Kosovo (60%) and Macedonia (50%), while countries exporting at least are Greece (only 14% of its total export), Bulgaria (16%) and Slovenia (17%). The latest are the EU member states that trade mostly with the other EU member states.

In the period 2008-2012, with the exception of Montenegro, intra trade among the SEE countries has decreased. The largest reduction of the intra-regional

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export is observed in Macedonia, where the share of exports to these countries in total exports decreased by 19 percentage points. It is also registered significant reductions in the share of intra-regional exports in Bosnia and Herzegovina (by 8 percentage points) and Bulgaria (about 6 percentage points). These trends indicate orientation of export activities of these countries to the EU countries in the recent years. Also, the last economic crisis had an impact on these movements in the intra trade among SEE countries.

On the import side, intra-regional imports among the SEE countries are relatively lower compared with the intra-regional exports. In the period 2008-2012, the share of intra-regional imports by individual SEE countries varies from 3.7% in Greece to 52% in Montenegro, on average. In the period 2008-2012 the countries that import the most from the other SEE countries were Montenegro (around 52% of total import of goods coming from countries analyzed), Kosovo (about 46%) and Bosnia and Herzegovina (about 34%), while countries importing at least were Greece (only about 4 % of import of goods coming from the SEE countries), Bulgaria (about 8%) and Slovenia (9%). From dynamic point of view, in the period 2008-2012 intra-regional imports of goods has registered significant increase in Montenegro (around 12 percentage points) and Macedonia (by about 6 percentage points), while significant decrease was observed in Albania (around 5 percentage points) and Bosnia and Herzegovina (by about 4 percentage points).

Figure 3: Import of goods among the SEE* countries (in %)

(2008-2012)
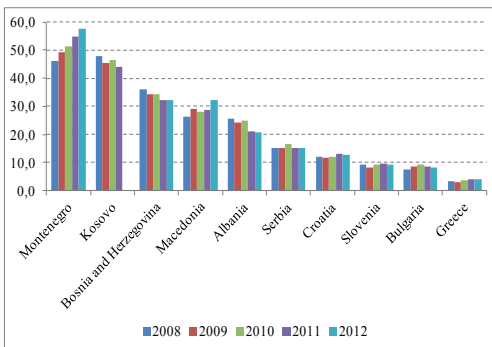
(average 2008-2012)
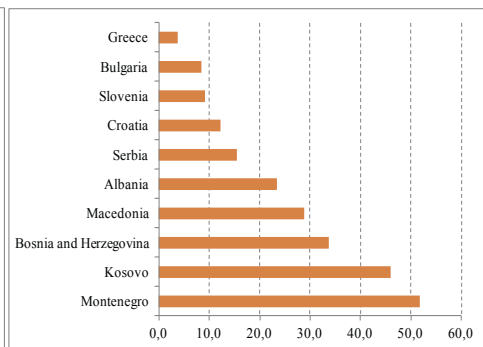
Source: World Bank, IMF, Statistical offices of the countries

It can be concluded that intra-regional trade among the SEE countries is moderate and relatively smaller compared to the other groups of countries, especially

in relation to the EU (Figure 4). The share of intra-regional exports of goods within the EU in 2011 was 65% of total exports that is more than twice higher compared with intra-regional exports in SEE countries (the share is around 31%). Relatively higher share can be obtained if the countries with the lowest share are excluded - the share of intra-regional exports of Montenegro, Kosovo, Macedonia, Bosnia and Herzegovina and Serbia in 2011 was about 44% of total exports of these countries.

Figure 4: Share of intra-regional exports in total exports for selected world regions

(2011, in %)
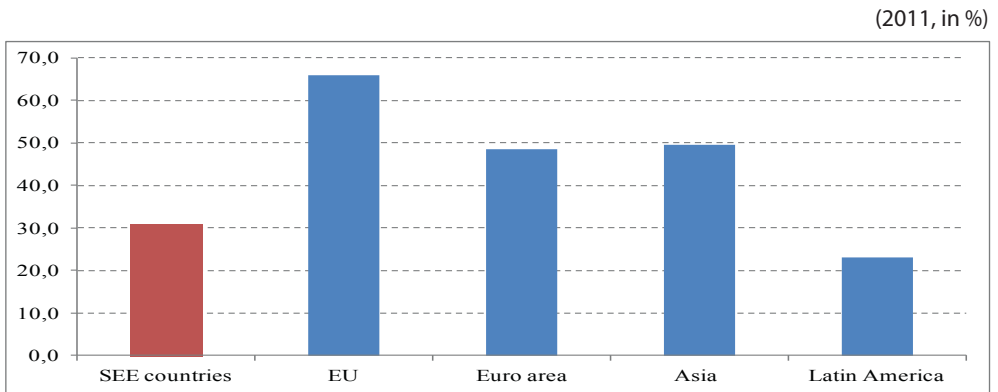
Source: Eurostat, IMF, ECB and own calculations
SEE countries: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Greece, Kosovo, Macedonia, Montenegro, Serbia and Slovenia.

CORRELATIONS AND SIZE OF MACROECONOMIC SHOCKS

As we have seen in the first part of this paper, the theory of optimal currency area can be divided into two main groups. First, applying to the traditional contributions to this theory, and the second, where the modern views on the optimum currency areas theory are explained. Even though there are new criteria that have been introduced in to the modern literature, traditional contributions can still be relevant.

In this paper we are investigating three of the above mentioned criteria. In the previous part we have shown the degree of openness of the economy of the selected countries. That degree in some extends shows as the preliminary results of the adoption of a single currency in SEE. Low openness index as well as the low intra-regional trade cooperation is should lead to low qualification results of

the OCA criteria. Thus, in the next parts we will evaluate the inflation differentials, differences in the monetary policy, and the correlation of macroeconomic shocks, as key indicators for gaining the benefits of the single monetary policy.

Before we go through other criteria of the OCA theory, we thing that it is crucial first to identify if there is any patterns of trade, similar size and correlations of macroeconomic shocks, and similar economic development and financial systems among those countries involved in the currency area, Bayoumi and Mauro (2001). In that sense, here we will try to identify if the group of countries have certain symmetry of their macroeconomics shocks. Excising symmetry in the business cycles means that the countries in the future currency area should face similar shocks, resulting in proper policy answer appropriate for every economy in the area, and thus gaining benefits from joining the area.

The rationales for this approach are as follows. *First*, a group of countries that face symmetric shocks will favor similar policy responses and thus, make them better candidates for a common currency area. *Second*, if shocks that a group of countries face are small-sized, these countries will incur small costs from abandoning policy autonomy for a common currency area. *Third*, if the initial equilibrium is restored quickly, macroeconomic shocks will impose relatively small costs on a country, Bayoumi and Eichengreen (1996).

One direct way to look at the symmetry of shocks is to compare the correlation of a state's GDP annual growth rate with the annual growth GDP of the entire zone. Paul de Grauwe (2003) calculated these correlations for the EU and the U.S. states. In his results most EU countries compare quite favorably with the U.S. states where the average correlation with the entire zone's GDP growth rate was close to 0.5[1]. This situation in these countries is not a surprise at all, having in mind that there was strong consensus that in the EU countries are more exposed to local shocks than the region of the US. However, as it can be seen, one potential problem for the EU was what happens in the future.
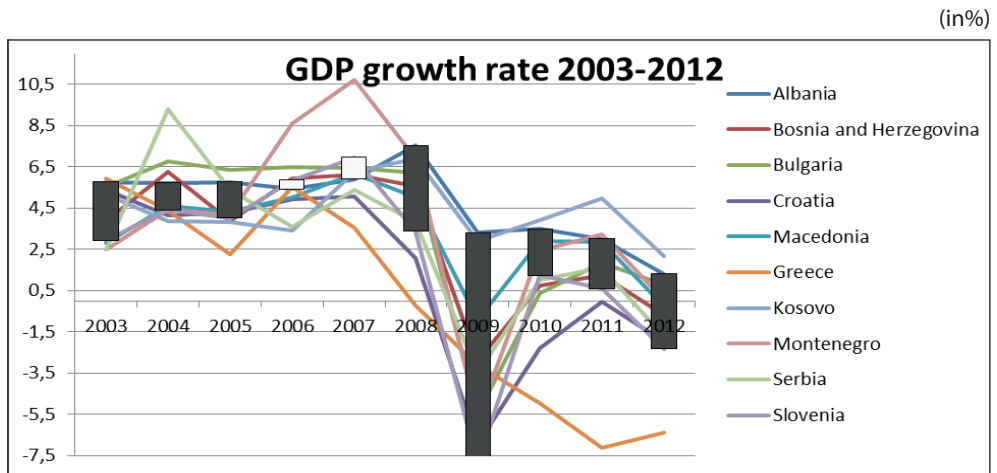
As the Grauwe (2003) analyzes these results in 2003, we can argue that one effect of deeper EU goods market integration could be that EU countries start to specialize more. In that case, the risk of asymmetric shocks will increase and

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1 Although there were some distinct outliners in the EU case, for example Latvia, Slovakia, Estonia, Greece and Lithuania, which are small countries).

the EU will be less likely to satisfy the OCA criteria. Today, living in the new[2] financial crises, it is very questionable for the existence of the symmetry in the macroeconomic shock in EU countries, and its relationship with the evolution of the goods market.

In the previous analysis we have noticed that there is certain economic relationship either between the countries or with the countries and one major same partner. Also, we have concluded that not every country has so strong relationship with another one in the group that we can emphasize the pattern of economic activity among them. Therefore, in our analysis we are comparing the GDP growth rates among the countries for the period of 2003 till 2012 year. Here, as we have expected, it is clear that one cannot be comfortable to argue that it can be seen as a similar pattern. Rather than the ambient for the period of 2003-2007 year, where every country developed individually, the effects of the global economic crises led to similar macroeconomic movements. Even thou this similarity can be explained with the raise in the intra-regional trade between the SEE countries in the period after 2008, there is no doubt that the recession in the world economy left significant impact on the growth of the countries' economies.

Figure 5: GDP Growth rate 2003-2012

(in%)

Source: World Bank database, own calculations.

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2   New in comparison to year 2003.

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Since we have dilemmas for the strength of the impact of the global recession, we wanted to separate the movements in the world with ones in the region. This is also one of the criteria of the OCA theory. Therefore we did further calculation of the correlation of a country GDP annual growth rate with the annual GDP growth of the entire region. With that coefficient we want to question the symmetry of macroeconomic shocks, and test the picture above. The analysis was made for three cases. *First,* we calculated the correlation of the GDP growth rate of the country with the GDP of the region for the period of 2003-2007 year. *Second*, the same was made for the period of 2008-2012 year. And, in the end we calculated the correlation for the whole period of nine years.

As we can see in the Figure 6, for the first case there is no relation between macroeconomic movements in the countries of the region, which was previously shown by simple data presentation. Opposite form this period, in the next four years we can see that there is convergence in the macroeconomic movement. In this period there is strong positive correlation in average of 0.88 that is higher form one of the EU in 2003 year. Trying to explain these massive divergences between these two phases, we found much literature on the structural reforms, international trade agreements and fast development of the collaboration of the countries in the region. Also, again we want to stress the connection with each country with same partners (EU countries). This gives us basis for further research.

Figure 6: OCA symmetry criterion, correlation of country GDP with region GDP
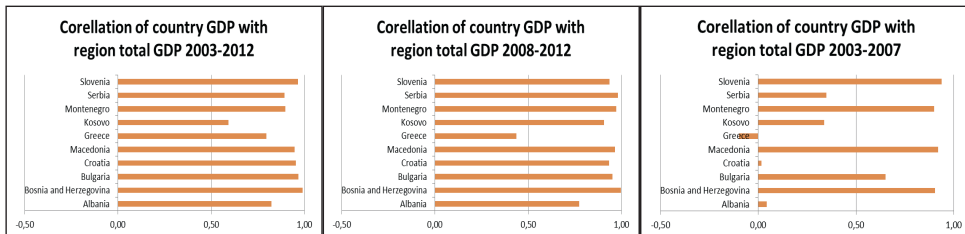
Source: World Bank database, own calculations.

The conclusion in the previous paragraph gives one very interesting point. In order to eliminate the impact on the SEE countries of the EU macroeconomic conditions, we made one further analysis of the symmetry of the macroeconomics movements. Table 1 shows the individual pair correlation of the GDP (measured with constant prices) for these two periods. Here, for better view, we divided the

correlation coefficient in three groups: correlation below 0.5, correlation below 0.9 and correlation bigger than 0.9. If we look at the data for the first period we can notice that the conclusion is same as the previous one, looking at the figure 6. There is no relation between GDP movements in 2003-2007 year. As for the next period, 2008-2012 year, we can confirm that there is strong positive relationship even if we exclude the EU. However, this conclusion cannot be given for Greece and to some extend for Albania, which cases should be subject to further analysis.

Table 1: Pair correlation of the Gross domestic product, constant prices 2003-2012

country/country		2003-2007									
		Albania	Bosnia and Herzegovina	Bulgaria	Croatia	Macedonia	Greece	Kosovo	Montenegro	Serbia	Slovenia
2008-2012	Albania	1,00	-0,22	-0,24	0,06	0,07	-0,46	0,79	-0,06	0,18	-0,04
	Bosnia and Herzegovina	0,80	1,00	0,95	-0,17	0,75	0,10	0,02	0,69	0,52	0,76
	Bulgaria	0,59	0,95	1,00	-0,71	0,76	-0,44	-0,36	0,49	0,75	0,10
	Croatia	0,52	0,93	0,99	1,00	-0,18	0,61	0,58	0,22	-0,83	0,10
	Macedonia	0,77	0,94	0,85	0,85	1,00	-0,44	0,22	0,91	0,37	-0,20
	Greece	0,88	0,49	0,26	0,15	0,39	1,00	-0,04	-0,13	-0,43	-0,20
	Kosovo	0,90	0,91	0,76	0,76	0,92	0,58	1,00	0,33	-0,20	0,29
	Montenegro	0,60	0,95	0,97	0,97	0,93	0,22	0,80	1,00	-0,02	0,99
	Serbia	0,71	0,96	0,91	0,92	0,99	0,32	0,90	0,97	1,00	0,12
	Slovenia	0,53	0,90	0,93	0,93	0,93	0,14	0,74	0,99	0,96	1,00

Source: World Bank database, own calculations.

Going further with the analysis we want to pause, and make one point. The countries that are put in the sample have different exchange rate regimes. This should be analyzed especially when the policy reactions to external shocks are evaluated. Every country chose the most proper regime, and it can be seen as an obstacle for the creation of the currency area. That means that beside the instruments they are using the similarities in the macroeconomic movements can be interpret as a similar long run policy strategies. Furthermore, we saw that these countries have certain integration among them. In the end in the period of 2008-2012 we have experienced global economies crises that hit every country, including the major trade partner outside the analyzed countries.

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Table 2: Current exchange rates arrangements

Country	Exchange rate regime
Albania	Floating-inflation targeting
Bosnia and Herzegovina	Currecy board
Bulgaria	Currecy board
Croatia	Crow-like arragement
Greece	EURO zone
Kosovo	Eurozation-no legal tender
Macedonia	Stabilized arragement
Montenegro	Eurozation-no legal tender
Serbia	Floating - inflation targeting
Slovenia	EURO zone

Source: Annual report on exchange arrangements and exchange restrictions

The differences in the exchange rate regimes mean that every country has different instruments for fighting to achieve its goals. Those differences can be seen in the next Figure 7. The Figure for the movement of the nominal deposit interest rate in a certain manner shows the reflections of the policy answer to the shock the country had faced. Having different monetary policy instrument, due to different exchange rate arrangements, it is understandable why we cannot find pattern in this rate movements. For example, Slovenia's deposit interest rate converges to the one in the euro zone, reaching its minimum in the year of the joining to the zone. On the other hand in the countries where the foreign exchange is set by the market we can notice higher volatility in the interest rate (see Serbia or Croatia). This is also one argument for the investigation of the financial integration among the countries.

On the other hand, due to the Fisher effect, with the movement of the real interest rate we can identify the effects of the external shocks and the strategy of the macroeconomic policies. We have shown that the countries in the region are open economies with high import dependence, resulting in similar inflation rate changes as the supply shock occurs. Here we can see that all countries are hit and adjust from the shock at a similar time and speed. This conclusion can be even stronger for the period of 2008-2012, except for the case of Kosovo where the intensity in much stronger.

**Figure 7:** Nominal and real interest rate 2003-2012
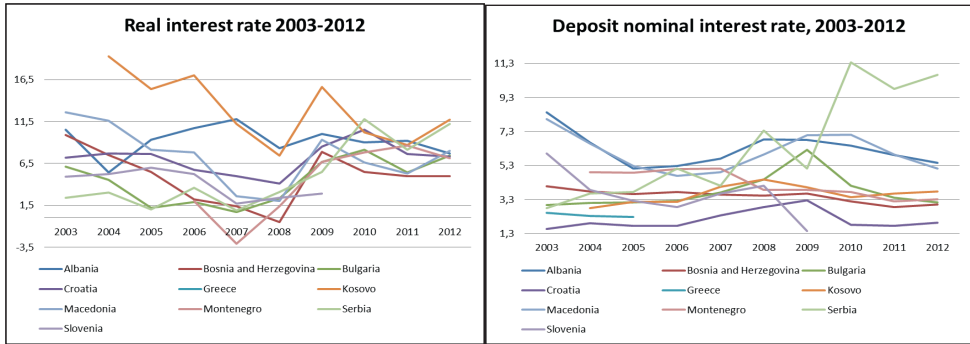
Source: World Bank database.

Previous Figure gives conclusion that we wanted to test further. Movements on the graph gave profound basis for the expectations on the similarity in the time and speed of the adjustments of the external shock in the countries in the region. We think that it is not enough especially because of the strength of the shock implications. Here we want to stress that we are aware that both the nominal interest rate and inflation rate can be influenced by the macroeconomic policy measures. But, what we want to find out is whether there is any relationship between the shocks among the group of the countries. In the next part we will test that channel.

Here we will analyze the inflation rate of the countries. Inflation persistence and the relation with the business cycle are also important for the possible foundation of an OCA. Convergence exerts a much greater effect on traded goods inflation but does not matter for non-traded inflation, which is much more attributable to inflation inactivity and the business cycle. We can also find tentative evidence in support of the Balassa-Samuelson effect, as productivity growth rate differentials between the manufacturing and nontraded sectors exerts upward pressure on services prices, but that should be deeper analysis after we find basis in the preliminary one. Thus, as we will see in the following analysis, despite the strong relationship in the GDP movements, there is no such evidence for the correlation of the inflation areas in the analyzed SEE countries.

The presentation of the data for the movement of the inflation rate in the period of 2003-2012 did not give strong evidence of the relationship between the countries. In the following Graph we can see that the countries have stable inflation rates during the period with average rate of 3.8%. In this group only two countries have bigger inflation rates than the average, Bulgaria and Serbia. Despite that, roughly spoken we cannot say that the response and the intensity are toughly correlated.

Figure 8: Inflation rate movements 2003-2012
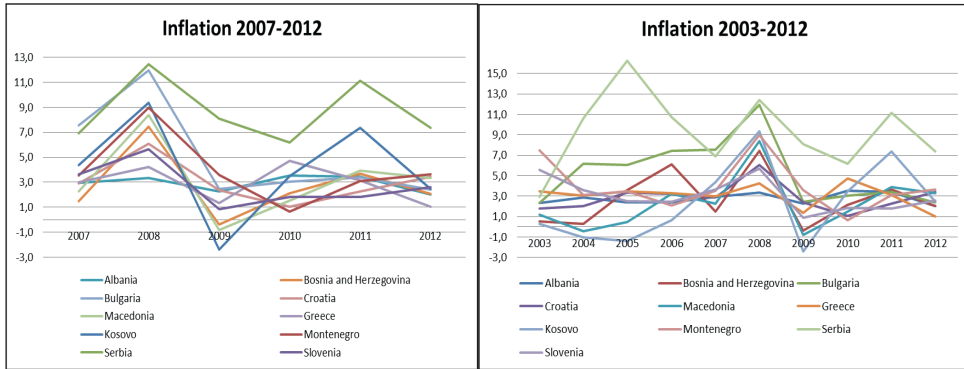
Source: World Bank database, own calculations.

There is certain pattern, that must be expected having in mind that countries are each other's trade partners, but it is not clear enough to be sure on the conclusion of strong correlation. This goes more with the fact that every country has its own and specific monetary policy that gives different response to the same supply or demand shock and that there is certain individual characteristics on the trade partners away from the group. This can be also seen as an existence of different transmission canals of the monetary policy measures. Together with that we can doubt the relation between the price movements due to the interactions of the tradable goods and the non-tradable goods in the countries. Further analysis should be done for evaluating the price stickiness in every country or even the sectors beyond countries, but only if we are sure of the overall correlation of the inflation rates.

This skepticism was again approved by calculating the correlation of the inflation rate among the group of countries and the inflation rate differentials. The results of the correlation coefficients, as with the case of GDP with constant prices, were interpreted in three groups (below 0.5, below 0.9 and above 0.9 correlation coefficient).

The correlation coefficients show that there is no relation between country inflation movements. That conclusion is true not only for the period of 2003-2007 year, but also for the period of 2008-2012 year where there is no strong relation between the countries. We can find that there are some pairs of countries that have correlation bigger than 0.9, but it is not the case for majority pairs in the group.
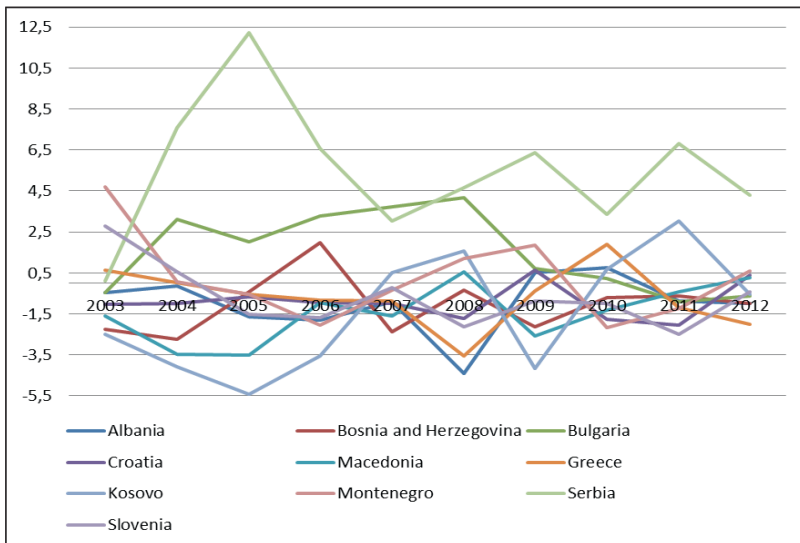
Table 2: Pair correlation of the inflation rate 2003-2012

country/country		2003-2007									
		Albania	Bosnia and Herzegovina	Bulgaria	Croatia	Macedonia	Greece	Kosovo	Montenegro	Serbia	Slovenia
2008-2012	Albania	1,00	-0,52	0,46	-0,19	-0,21	-0,97	0,50	-0,30	-0,13	0,01
	Bosnia and Herzegovina	0,58	1,00	0,95	0,81	0,65	0,38	-0,07	-0,58	0,51	-0,74
	Bulgaria	0,42	0,95	1,00	0,72	0,36	-0,53	0,35	-0,94	0,53	-0,87
	Croatia	-0,04	0,76	0,86	1,00	0,47	0,17	0,12	-0,69	0,70	-0,87
	Macedonia	0,41	0,98	0,86	0,82	1,00	0,04	0,62	-0,20	-0,24	0,03
	Greece	0,95	0,60	0,52	0,05	0,45	1,00	-0,54	0,39	0,18	0,03
	Kosovo	0,70	0,94	0,71	0,53	0,91	0,65	1,00	-0,02	-0,51	0,15
	Montenegro	0,02	0,74	0,89	0,98	0,78	0,08	0,51	1,00	-0,70	0,92
	Serbia	0,38	0,78	0,75	0,72	0,76	0,25	0,73	0,79	1,00	-0,88
	Slovenia	0,30	0,92	0,94	0,90	0,94	0,43	0,75	0,86	0,64	1,00

Source: World Bank database, own calculations.

Furthermore, looking at the results of the inflation rate differentials we can state similar conclusions. Calculated, the differences between average country inflation rate and average inflation rate for the group of countries are shown on the Figure 9. Here we can identify smaller group of countries that have convergence in the price stability, but still there are differences that should be eliminated due to explore the OCA benefits.

Figure 9: Inflation differentials with respect to the region average, 2003-2012

Source: World Bank database, own calculations.

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The results of the analysis in a certain manner confirmed the results that were expected before the calculations. It was intuitive that among this group of countries the analysis will show high trade openness, and intra trade cooperation. In that sense, it was expected that the macroeconomic movements will be similar too. What was found is that there is correlation between the GDP growth rates for the period of 2008 -2012 year, meaning that there is similarity in the business cycles. That is one of the criteria for joining the future monetary union. Even more, the country will gain benefits from adopting different monetary policy if their reaction to external shock is similar. This was not confirmed in the case of SEE countries, as we don't have any correlation in the inflation rate and inflation rate differentials.

CONCLUSION

An optimum currency area (OCA) is defined as the optimal geographic domain of a single currency, or of several currencies, whose exchange rates are irrevocably pegged and might be unified. The single currency, or the pegged currencies, can fluctuate only in unison against the rest of the world. In any way countries would form a currency area in expectation that current and future benefits exceed costs.

In the paper we analyze three OCA Criteria. First one shows that the degree of openness is the highest in Slovenia, Bulgaria and Macedonia - on average in the period 2003-2012 this ratio was 140.7, 104.3 and 95.6% of GDP, respectively. Here lowest level of trade openness is registered in Greece (31.8% of GDP), Albania (46.7% of GDP) and Croatia (59.6% of GDP). Despite the relatively significant differences in the degree of trade openness, the general conclusion is that almost all countries in this analysis are characterized by a relatively high degree of trade openness. Further analysis of the relationship between the countries in the group shows that intra-regional trade among the SEE countries is moderate and relatively smaller compared to the other groups of countries, especially in relation to the EU.

Second criteria measure the correlations and size of macroeconomic shocks. The analysis shows that there is no relation between macroeconomic movements in the countries of the region in the period of 2003-2007. Opposite form this period, in the next four years (2008-2012) there is convergence in the macroeconomic movement. In this period there is strong positive correlation in average of 0.88 that is higher form one of the EU in 2003 year (around 0.5). This should be subject to further analysis due to existing differences in the exchange rate arrangements and high dependence on the EU economic activity.

Having such high correlation coefficients on the GDP growth rates we calculated the same coefficient for the inflation rate. This can be approved if we know that the inflation persistence and the relation with the business cycle are also important for the possible foundation of an OCA. The correlation coefficients show that there is no relation between country inflation movements. That conclusion is true not only for the period of 2003-2007 year, but also for the period of 2008-2012 year where there is no strong relation between the countries. This conclusion is the same if we analyze the results of the inflation rate differentials. Such absence of similarity in the speed, strength and timing of the external shocks could be strong evidence for adolescence of the OCA idea in the SEE countries.

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