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Estimation of Albania Optimum Currency Area Index

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Abstract: The aspiration of Albania to be part of European Union is based on political purposes, but most of all should be based on strong macroeconomic views and theories. Albania is a European country with an open developing economy. The road of economic integration should be built on strong efforts to achieve the required criteria as candidate member for joining a monetary union. To estimate Albania readiness to approach a common currency, empirical indexes serve to estimate if the country meets the Optimum Currency Area criteria's. The model used by Horvath is seen favorable to estimate OCA index in Albania case. This approach helps to evaluate the conditions before a decision is made.

Key words: volatility; optimum currency area; variable; model; union; index; estimation
JEL codes: C390, C520, C580, E320, E390, E490, E610, E650

1. Introduction

Optimum currency area (OCA) theory is one of the main topics when it comes to analyze the benefits of unions, especially monetary unions. European Monetary Union (EMU) is a reality with many issues, which need to be evaluated in case of the union perspective. Based on historical consequences of the countries nowdays members of this union, and to the new approach for widening of EMU, empirical studies and researches helps to understand the country situation and criteria's fulfillment, to see the possibilities for being a member part. OCA index measures the readines a country has to join the common currency, and how OCA factors affect the bilateral exchange rate volatility.

Horvath studies the model based on a contemporary view, making Mundell model not relevant to estimate the index for Albania. Horvath model derives from Bayoumi and Eichengreen model. To research and evaluate all the key macroeconomic parameters to analyze the optimum currency area convergence, it is necessary to have a logical flow of methodology to not effectuate differences in results and stand around to one axis. Frankel and Rose argue that country suitability cannot be judged from an historical point of view, because the economic structures changes and the development progresses. OCA endogeinity is often observed in the empirical findings, supporting the "Lucas Critique".

Actual behaviors of exchange rate should give information about economic parameters which define the exchange rate. Developing countries like Albania are heterogeneous, making it difficult to evaluate the characteristic of the country and exchange rate volatility. The estimation of the OCA criteria's can be performed for every country which is not part of European Monetary Union (EMU), calculating the degree in which the

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volatility is explained by the criteria's. Even if some barriers for Albania have been removed for EMU and EU, country's fiscal policies and political direction differ deeply, mentioning the importance of political factor as the main condition to approach e monetary union.

2. A Historical Review of OCA Theory

The optimum currency area theory has evolved the last years. The aspects of OCA are considered a neo-Keynesian view. Many algorithms and indexes are used to develop empiric models and estimate if the country conditions are met before joining a monetary union. Theoretical approaches have been derived from the theory of optimum currency area presented for the first time by Mundell (1961). Mundell (1973 a/b) is based on "parity power purchase" concept. According to this parity two countries with a common currency will better absorb a shock spread in time, without affecting output. By presenting two models, the author remains still in the center of many debates of European Monetary Union. Kawai (1987) mention the trade integration. Shock asymmetry is diminished when trade integration is high. On the other side Mc Kinnon (1963) argues that an open economy does not benefit much from the flexible exchange rate, because the effect of the prices on both sides import-export does not change the total result. He emphasizes the economic openness to be taken in consideration in OCA criteria fulfillment. Kenen (1969) mentions that fiscal integration reduces shock's asymmetry. Mundell (1973) links the common currency with the increase of seingorage between the countries of the union. Ishiyama (1975) was one of the first who suggested to not looking only one factor, when defining the criterion of the optimum currency area. According to him, each interested country should evaluate the costs and benefits of joining a monetary union.

The modern theory of OCA is focused on benefits rather than costs represented from many authors, as De Grauwe (1992), or Tavlas (1993) ecct. The modern theory speaks about the effectiveness and credibility of monetary policy, the endogeinity rather than specialization, shocks correlation, business cycles synchronization, exchange rate adjustment efficiency ect. Alesina, Barro and Terreyero (2002) explain the costs of giving up the monetary independency which became lower, the higher shock's similarity is. Calvo and Reinhart (2002) present the fear of floating, even though the occurrence has decreased during the last years. Frankel and Rose (1997) analyze the trade linkages, emphasizing the endogeinity of business cycles synchronization. Even Mogelli and De Gauwe (2004) emphasize the OCA endogeinity. Buiter (1995) distinguish the shock character expressing that if shocks are real, a floating exchange rate is favorable. According to Frankel, the strong need for stability in imports, missing of public institutions credibility, the wiliness of more integration, an economy where the foreign currency is widely used, an adjusted financial system, the rule of low ecct, compose the main reasons which attract a country to be part of unions. Krugman (1995) emphasize the large concentration of many literatures on payment balance adjustment through a flexible exchange rate. Business cycle synchronization and hypothesis of endogeinety remain the two main contributors of optimal currency area theory, where a country fulfills its criteria *ex post* then *ex ante*. Krugman (1993) argues that large trade integration leads to the increase of specialization due to economies of scale, with a consequence of additional cost inside union, because of shock asymmetry and deficiency in product diversification. Frankel and Rose (1998a/b) affirm that a high trade integration increases cycle's correlation. Shocks similarity is an important element to test a candidate country characteristic to join monetary union. Exchange rate regime decision is a complex issue, which become more difficult if a country is in transition. In Hovarth (2002) study, exchange rate regime of a developing country should have the necessary space of a natural RER trend, and in the same time to save the international competitiveness. High volatility and

consistency cause large macroeconomic losses in small economies. In such case intensive deliberations help in finding the closing euro rate called the social rate (economical + political). The OCA theory takes in consideration the fix and floating rate, but there is not always a clean division of regimes by policy makers, depending on economic structure of the country. Horvath and Joanes (1998) studying the Case of Chezc Republic, found a strong asymmetry versus Deutschland as a reference country, suggesting to better keep a flexible regime. On the other side a large degree of openness and small trade integration consist an argument to fix the rate, thus eliminating its volatility. It is for this reason that OCA theory is presented clearer on long term, and is not easily adapted in short term decisions.

Bayoumi and Eichengreen argue that trade linkages, domestic transactions and shock's asymmetry are considered as the most defining criteria's. There exists a positive effect between shock asymmetry and pressures toward exchange rate. Shock's asymmetry increase exchange rate volatility, while the small size of a country and the trade linkages decrease it. OCA factors which induce costs tend to create volatility, different from OCA factors which induce benefits and lead to interventions. Except Euro currency, Albania can be affected by US Dollar, as part of the whole financial and industrial system. Countries with floating exchange rate are more probable towards asymmetric shocks. Schweickert (2001) show that the approach to euro currency will bring larger benefits for transition economies then the economies of reference group, despite the developing economy have a low performance.

3. Horvath Index for Albania

Bayoumi and Eichengreen used an index to estimate OCA criteria's. The variables observed are bilateral exchange rate movement, the difference in output between countries, total trade, export volume versus GDP of each country and the economy size. Horvath (2002) argues that shocks between CEEC and EU are largely spread, thus the adaption with the common currency can be relatively expensive. Horvath was based on new data during his research, adding or removing the countries included in a later period. Every empirical study should contain the time interval on interest which should be the most actual possible. Albanian economic indicators are not the same as 10-20 years ago. The estimation of OCA criterions of a later period is always needed. The more criterions are fulfilled, the lower the volatility of exchange rate between Eurozone and Albania. The equation given by Horvath is:

$$\mathrm{SD}\left(\mathrm{e_{ij}}\right) = \mathrm{a} + \mathrm{b_1}\mathrm{SD}\left(\Delta\mathrm{Y_i} - \Delta\mathrm{Y_j}\right) + \mathrm{b_2}\mathrm{DISSIM_{ij}} + \mathrm{b_3}\mathrm{TRADE_{ij}} + \mathrm{b_4}\mathrm{SIZE_{ij}} \quad (1)$$

$SD(e_{ij})$ measures the volatility of bilateral exchange rate, $SD(\Delta Y_i - \Delta Y_j)$captures the asymmetric shocks at national level, $TRADE_{ij}$ is the proxy for trade linkage, while $DISSIM_{ij}$ assesses shock asymmetry at industrial level, $SIZE_{ij}$ measures economic size and assesses the utility of maintaining the national currency.

The index is the standard deviation of the change in logarithm of the bilateral exchange rate between countries *i* and *j* on monthly basis, $SD(\Delta Y_i - \Delta Y_j)$ is the standard deviation of the difference in the logarithm of real output between *i* and *j*, $DISSIM_{ij}$ is the sum of the absolute differences in the shares of agricultural, mineral and manufacturing trade in total merchandise trade, $TRADE_{ij}$ is the mean of the ratio of bilateral exports to domestic GDP for the given two countries, and $SIZE_{ij}$ is the mean of the logarithm of the two GDPs measured in U.S. dollars.

Horvath considers economic openness as a key factor, which is why he derives an updated index from Bayoumi and Eichengren index including openness scale. The model is useful to analyze a European eastern country which

has not joined the euro, making it adaptable to estimate Albanian case. The reference country is chosen Eurozone as a group, without increasing the risk to distort result by using as a reference country one of the most powerful of the EMU.

In the second model, the inclusion of openness as another variable is seen as an improvement in index results. The variables having more effect in Albania are believed to be openness, trade linkages and the change in output. Another important exchange currency is US. Dollar, but this has to be decided if served to be included in the regression. Data source can restrict calculations, tests and results. After providing the results it can be clearer if Albania differ much or not from the other European countries regarding the trade structure. If no evident difference is presented and criteria are fulfilled, Euro stability will create the proper conditions for a common currency approach. According to Horvath (2003) the most convenient question to be raised is the research of optimal exchange rate volatility. It is expected the exchange rate volatility to have a positive dependency from business cycles and exports structure, and a negative dependency from trade linkage. Openness sign cannot be clearly defined, because in this case it is of most importance the statistical value an economic significance. In case of shocks symmetry, the question raised is if symmetry equal to zero will correspond to a complete synchronization.

In order the model to be considered statistical significant, all the coefficients should be significant. For example: $R^2$is compared if it increases or decreases after another variable inclusion. If all the variables are statistical significant, this means that OCA criterions explain mostly or partially the volatility of exchange rate. A lowR^2 implicates a small explanation of optimal currency area criterions to exchange rate volatility. If variables are different from zero and result with not such a low value, it means they are together significant affecting volatility. Does economic openness define strongly the exchange rate volatility? Open economies tend to have a stable rate with countries which have more interaction, like for example euro. Openness is considered a good proxy of volatility. The significance of the variable is a better indicator than the country size, which is why the substitution of size with openness helps to clear the results. The above regression is presented again after the substitution, implying the improvement effect onR^2. The equation is:

$$\mathrm{SD}\left(\mathrm{e_{ij}}\right) = \mathrm{a} + \mathrm{b_1}\mathrm{SD}\left(\Delta \mathrm{Y_i} - \Delta \mathrm{Y_j}\right) + \mathrm{b_2}\mathrm{DISSIM_{ij}} + \mathrm{b_3}\mathrm{TRADE_{ij}} + \mathrm{b_4}\mathrm{OPEN_{ij}} \qquad (2)$$

3.1 Alternative Model

Other financial indicators signalize the linkages between group countries or region countries. The correlation of stock market explains some of the aspects. The development and trading in CEEC and SEE countries is not similar as EU countries. A large part of these countries have experienced structural and economical change due to political factor. Economy development requires its own phases until it reaches an appropriate state and easy adaption with the EMU and EU economy. Most of CEEC and SEE countries have more a banking market then investment market or stock market; but many indicators play a good role in forecasting economic activities.

Inflation and monetary policy have effect on all the macroeconomic variables. In small open countries, Central Bank should decide between a fix exchange rate and inflation targeting rate. Real time data are very important on decision making. After a monetary shock, the effects on output are seen later, same like prices, while are more visible and reflected further in time on exchange rates. The exchange rate change period is longer than prices and output change period. Many statistical studies show that GPD does not visibly react to a monetary shock, therefore the usage of this parameter in analysis is considered regular. Model specification should interpret misunderstandings. The model built can contain endogenous and exogenous factors. A lot of endogenous reasons define the neutral inflation rate policy. In recent years the inflation rate has become to decrease in CEEC and SEE countries, approaching to Eurozone levels. The movements of interest rate change in dependency to the Euro zone

rates. There is a lag time difference between a monetary policy and its transmission to other variables.

Horvath (2007) never eliminates the role of output and inflation endogeinety. According to his study, an open economy of a new member or candidate member to the European Union experienced a decrease of exchange risk. Taking in consideration a widen approach of OCA; the regression includes the financial development and inflation differential as variables. OCA theory focuses in optimal exchange rate choice. National currency usage becomes lower when country's shocks are similar to Eurozone. Large trade integration and cycles synchronization creates higher exchange rate stability. An open economy tends always to stabilize its exchange regime. Maintaining a low volatility reduces national currency utility, especially when the country is small. The alternative model ensures the inclusion of dummy variables if a country is European or is part of periphery or center. The empiric alternative equation is presented as below:

$$VOL_{ij} = \alpha + \beta X_{ij} + \chi FIN_{ij} + \delta Europe_{ij} + \varphi Dolvar_{ij} + \rho Eucore_{ij} + \gamma INFL_{ij} + e_{ij} \quad (3)$$

The dependent variable in equation stands for the bilateral exchange rate variability. X_{ij} is a vector of OCA variables (focused on both the probability of an asymmetric shock and the ability to withstand the shock), specifically asymmetry of business cycles, trade linkages, dissimilarity of export commodity structure, openness and economic size, all between country *i* and *j*. FIN_{ij} captures the level of financial development and $Europe_{ij}$ is a dummy variable that takes a value of 1 if countries *i* and *j* are both European $Dolvar_{ij}$ captures the variability of the U.S. dollar. The $Eucore_{ij}$ dummy assesses the hypothesis of significantly higher real convergence with the most developed countries of Eurozone. $INFL_{ij}$ represents the inflation rate differential.

If the first model and the alternative model are putted logically in a system view, it can be derived an adapted equation with the most necessary variables to be analyzed. If each variable is decomposed in its elements, it is observed that the larger part is composed by the GDP, foreign trade, monetary aggregates, inflation and exchange rate. First dummy is valued 1 and is not included because Albania is part of Europe. The second variable dummy also is not included. The regression must not have a large number of variables if there are not a large number of observations. Many data of the recent years are found on group level. The estimations on quarterly and monthly basis are calculated annually between Albania and Eurozone, without taking vis-à-vis each EMU country with Albania. This way narrows the number of combinations and observations, but it presents a specific summary of the optimal currency area theory of the Albanian case. The performed Huasman test, divulges TRADE, OPENESS, INFL ecct, as endogenous factors, which find difficulty in interpretation and the effect they have on exchange rate volatility. To achieve an estimation of Albania optimal criteria's, based on the two equations, are selected the necessary variables excluding others not important, without creating a loaded model. The combined equation is provided to estimate OCA index for Albania, which mostly serves as a proxy evaluation of the coefficients. The combined equation of the model is:

$$\mathrm{SD}\left(\mathrm{e_{ij}}\right) = VOL_{ij} = \alpha + \beta \mathrm{TRADE_{ij}} + \delta \mathrm{OPEN_{ij}} + \chi \mathrm{FIN}_{ij} + \gamma \mathrm{INFL}_{ij} \quad (4)$$

The period of study is between 2002 and 2016. Data are on monthly basis, expect GDP which in on quarterly basis. For each variable is taken in consideration the availability of information and data source, before transforming them annually. It should be emphasized the problem of multi-relations between countries and product activity shares, even though dissimilarity of exports between Albanian and Eurozone can give a quiet good information.

County *i* presents Albania and country *j* presents Eurozone. By using group data of the whole Eurozone, the correlation of variables and the number of observations is restricted. Horvath presents and additional variable to be included in the regression *Dolvar*, which captures the effect of US dollar exchange rate to Euro and Albanian

Lek. This indicator is calculated but is not considered in the regression for Albania. The Horvath model used for countries similar to Albania, even is very helpful in this case, cannot explain totally how the economic parameters behave. The value and sign of coefficients provide an approximation of the effects and impacts of OCA criteria toward the exchange rate volatility. The equation (4) is executed using OLS regression. The restriction in data has minimized the model accuracy. Even the low number of observations reduces significance and may have negative impacts on results. Variables may show multicollinearity with each other, affecting not only the results but leading to misinterpretations.

4. Data

The above criterias of optimal currency area are assumed to affect volatility. Trade linkages and inflation differential are expected to have negative relation with exchange rate volatility, while financial development is expected to have a positive relation. Despite abstract openness sign, it is expected to be positive in this case.

The variables together tend to be significant, with a trend toward statistical significance. The small number of observations and the multicollinearity between each other show a higher value than the significance level at 10% confidence interval. The variable in equation are valuable and are linked to exchange rate volatility. The regression serves to generate the values and signs of the coefficients. Regression square explain 48% of variables, nearly 50% of the model and data, showing that volatility of bilateral exchange rate is dependent from trade linkages, economic openness, financial development and inflation differential. The table presented below contains the results. As it was mentioned the adapted model for Albania was applied through the selection of the weighted economic parameters, which mostly impact the exchange rate fluctuations. The trade linkages have negative relationship with volatility. The inflation has negative sign too. The openness is with a positive sign according to the assumptions. The positive relation between openness and volatility is a good sign. Financial development is presented also with a positive relationship with volatility. All the coefficients give a clear idea of the relationship between variables and volatility.

Table 1 OCA Index Coefficients Generated from Regression OCA

Dependent Variable: VOLATILITY				
Methods: OLS				
Period: 2005 2016				
No of observations: 12				
Variables	Coefficient	Stan. error	t-statistic	Prob.
C	0.000913	0.012251	0.074554	0.9427
TRADE LINKAGE	-0.026337	0.014107	-1.866903	0.1042
OPNENNESS	0.004865	0.010313	0.471719	0.6515
FINANCIAL DEVELOPMENT	0.003625	0.003810	0.951421	0.3731
INFLATION DIFFERENTIAL	-6.25E-05	7.50E-05	-0.833887	0.4319
R-squared	0.483142			
S.E. regression	0.003124			

Dependent variable Volatility

Substituting the coefficients value, the equation to be used in Albanian case is presented below:

$$SD\left(e_{ij}\right)=VOL_{ij}=0.000913-0.026337\ TRADE_{ij}+0.004865OPEN_{ij}+0.003625FIN_{ij}-0.0000625INFL_{ij}$$

Optimal currency area theory aims the fulfillment of criteria's. The index estimates this. The value of

0.007025 for the volatility index results low. This is lower than many of European countries or the candidate members waiting to be part of the monetary union. The bilateral exchange rate volatility Euro-Lek has become decreasing, showing a monetary stability increase. Shock's asymmetry is presented relatively low compared to Eurozone and the average. This reveals that shocks of Eurozone are transmitted and absorbed in our country, even with not the same speed, size and magnitude. According to VAR models evaluated for Albania, the country did not show a good symmetry to Eurozone, anyway the business cycle synchronized between each other in specific time intervals. The dissimilarity in export results high, meaning a difference in Albanian structure versus Eurozone structure, which creates difficulty in the case of fixing rate. Trade linkages have resulted with a high value compared to other similar countries. Albania has a considerable foreign trade with some of the Eurozone countries. Economic openness results high due to large imports of goods from Eurozone and the exports increase to Europe. Albania is considered a small open economy. The foreign trade is more intensive with a part of Eurozone states and with the others Albania exports a little or nothing. Albania is classified as an open developing country. Dolvar has a high value, emphasizing the effect of fluctuations this currency has to Euro and Lek. Besides shock absorption and the impact from European economies, it is impacted also from the world economy. US dollar plays a role in Albanian trade and European trade.

The high financial development implicates an increase in money turnover, banking services and credit sector, resulting in a good money flow composing 30% of GDP, which has increased by 40% the last years. Each indicator explains the meaning it has in the analyzed case. Not only have the OCA factors explained the exchange rate volatility; there are other factors which may impact the bilateral exchange rate. A square regression of 50% is explanatory for the relationships between Albania and Eurozone. Though the volatility resulted very low, index value gives a more complete conclusion of criteria's fulfillment.

Table 2 Presentation of the Value of Indicators in the OCA Criteria Model

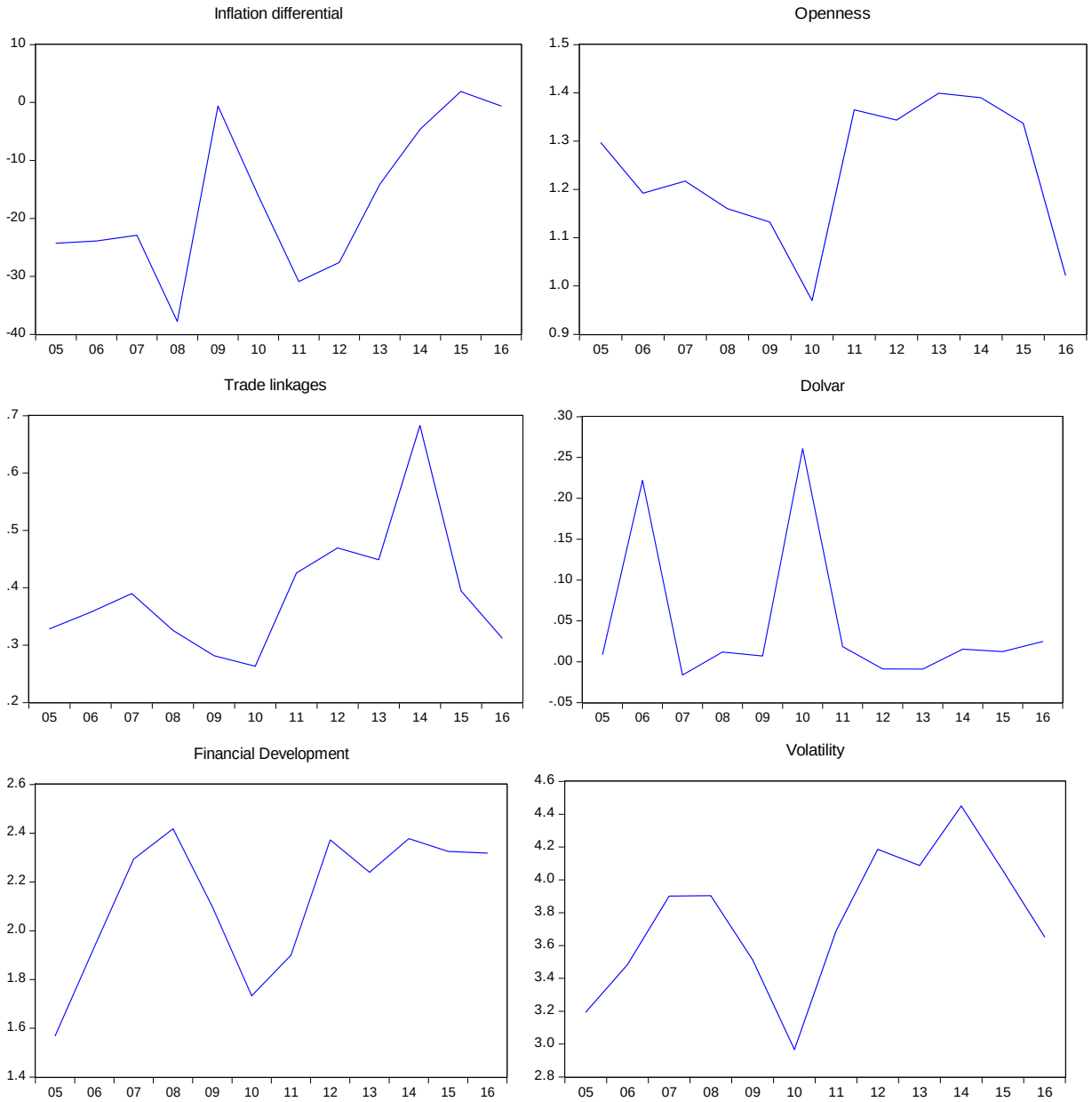
Indicator	Value
Exchange rate volatility	0.007025
Shocks simmetry/Cicles synchronization	0.07574
Dissimilarity of exports	3.355386
Trade linkages	4.680295
Economic openness	14.82649
Financial development	24.42051
Dolvar	0.940559
Inflation differential	-18.2

OCA index will be estimated according to the above equation extracted to the specific calculation for Albania.

$$VOL_{ij}=0.000913-0.026337\ TRADE_{ij}+\ 0.004865OPEN_{ij}+0.003625FIN_{ij}-0.0625INFL_{ij}$$

The OCA index value is 0.03944, which is not very low. This is caused by the dissimilarity in exports together with the inflation negative impact. The OCA theory criteria's chosen for Albania are fulfilled at somehow, assuming a good country adoption with Eurozone. Albania can be ready to fix the currency and leave the floating rate, but other financial and political factors should be evaluated carefully. For example, cycles synchronization and shocks asymmetry do not support it totally. Dissimilarity of exports means still work to do with the foreign trade. The low exchange rate volatility facilitates currency fixing, as the first phase after a political decision. There are additional factors impacting the exchange rate volatility. Anyway Albania fulfills partially the criteria's. The

bilateral exchange rate volatility does not differ much from the volatility of similar countries, which are candidates for EMU, and from the volatility the actual members had before joining EU and EMU. It is observed that during the period of study, trade linkages and openness are presented in downward trend, while inflation differential is presented in an upward trend. One of the factors which is properly analyzed as a pre-condition to join euro, is the inflation and how it changes from country to country. Dolvar after a few strong fluctuations has become stable. Financial development is increased during last year's. After 2010, bilateral exchange rate volatility is increased. The fluctuations may be caused by many factors. In the next years the volatility has decreased, accompanied by the inflation target policy to remain inside the band. If the two monetary instruments do not show a stationary within a certain level, the common currency approach is still far.



Figures 1 Graphical Presentation of the Variables in Regression

5. Conclusions

It was seen that openness composes a key factor to volatility expressed in the main equation. The alternative model shows the considerable weight the financial development has. Looking carefully to the main model and in the same time the alternative model, the variables have been selected putting as a view the two equations in a system (despite it is estimated the same unknown variable: the volatility). The new equation is created as a function of an approximated estimation of coefficients. The specific analysis for Albania compares the Eurozone as a whole, as a group, without correlating countries with each other. The variables together tend to be significant, with a trend toward statistical significance. The small number of observations and the multicollinearity between shows a higher value than the significance level at 10% confidence interval. Regression square explain 48% of variablese, nearly 50% of the model and data, showing that volatility of bilateral exchange rate is dependent from trade linkages, economic openness, financial development and inflation differential. The trade linkages have negative relationship with volatility. The inflation has negative sign too. The openness is with a positive sign according to the assumptions. The positive relation between openness and volatility is a good sign. Financial development is presented also with a positive relationship with volatility. Albania has a considerable foreign trade with some of the Eurozone countries. Economic openness results high due to large imports of goods from Eurozone and the exports increase to Europe. Albania is considered an open developing country, thus the foreign trade is more intensive with a part of Eurozone states and with the others Albania exports a little or nothing. Dolvar has a high value, emphasizing the effect of fluctuations this currency has to Euro and Lek. A square regression of 50% is explanatory for the relationships between Albania and Eurozone. Not only have the OCA factors explained the exchange rate volatility, but other ones may impact the bilateral exchange rate. Though the volatility resulted very low, index value gives a more complete conclusion of criteria's fulfillment. The OCA index value is 0.03944, which is not very low. This is cause by the dissimilarity in exports together with the inflation negative impact. The OCA theory criteria's chosen for Albania are fulfilled at somehow, assuming a good country adoption with Eurozone. The bilateral exchange rate volatility does not differ much from the volatility of similar countries, which are candidates for EMU, and from the volatility the actual members had before joining EU and EMU.

Albania can be ready to fix the currency and leave the floating rate, but other financial and political factors should be evaluated carefully.

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