MACROECONOMIC IMBALANCES IN ECONOMICALLY INTEGRATED EUROPE AND ITS DEVELOPMENT

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Abstract

The paper tries to evaluate the development of the macroeconomic imbalances that exposed the EU member states before, during and after the outbreak of European debt crises, for the time period 2006–2016. For researching the macroeconomic imbalances, we have opted four representative indicators: *Current account balance*, *GDP per capita in PPS, Unit labor cost, Government deficit/surplus % of GDP*. As a researching methods we have opted for cluster analysis, beta-convergence and sigma-convergence. The cluster analysis has shown great differences in terms of Current account balance and also in Government deficit/surplus between the "North" and „South" EU member states plus countries of Central and Eastern Europe. Beta convergence and sigma convergence model applied to each observed variable separately have shown mixed results in terms different converging and diverging trajectories of the EU member states achieved during the observed time period.Still prevailing imbalances might further hamper the effort of the EU policymakers for gaining more balanced traction of growth on the sustainable basis.

Keywords

Macroeconomic Imbalances, Beta-Convergence, Sigma-Convergence, Cluster Analysis, Development, Economic Growth

I. Introduction

Macroeconomic imbalances have long attracted attention of the academia and policymakers. Their external dimension, which manifests itself through current account (CA) figures and real effective exchange rates (REER) movements, usually requires internationally coordinated policy responses. This is especially the case in highly integrated economic areas, such as the European Union (EU), and even more so in currency unions, such as the euro area, where imbalances can develop relatively easily. Potential reasons range from asymmetric transmission of common monetary policy shocks to output, through many other dimensions of structural heterogeneity, to the level of development[2].

However, what do we mean by macroeconomic imbalances? Thomas Wieser , former President of the EU´s Economic and Financial Committee (EFC) suggests, that "A macroeconomic imbalance is the (negative or positive) position of domestic, external or financial variable…[which] may – if uncorrected over time – make the national savings/investment balance so untenable that is self-corrects abruptly, thereby causing significant adjustment shocks […]"[3] .

Sometimes, the Globalization is referred as one of a reason why macroeconomic imbalances likely overflow between the states and continents.

The 20th century might be divided into two distinct periods. First one, defined by 1914–1945, became two world wars and the interwar period. This period is typical for its destructive waging competition, weak international trade, financial isolation, tense trade wars, military conflicts, despotic regimes and economic crisis. In second one, the most of the world countries had been

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[2] Bobeva (2013) in Torój (2017).

[3] Weiser (2011).

exploiting economic cooperation, deepening the economic ties, integration of financial markets, democratic expansion and fast economic growth. However, economic integration brings victims. In the last decades, we became witnesses of several financial crises, crisis of confidence in the European Exchange Rate Mechanism in 1991–1992, the fall of Mexican currency in 1994–1995, banking and currency crisis in Southeast Asia in 1997, financial insolvency of Russia in 1998 and finally the series of the currency crises in the Latin America, which had culminated by the fall or Argentina economics in 2002, Samuelson (2005)[4].

Dornbusch[5], (2011) points of exchange rate system as one of the reasons of macroeconomic imbalances. Western Europe has gone through five decades of increasing economic integration, from inconvertible currencies, trade quotas, and prohibitive tariffs at the end of World War II to unrestricted free trade within borders, along with common passport, a European Parliament, and a central economic authority in Brussels. This process of economic and political integration has led to the European Union (EU). A controversial crowning piece of that economic agenda has been the creation of a monetary union, the Economic and Monetary Union (EMU), with common central banking authority (ECB) and its new common currency, the euro. Even though the European Central Bank (ECB) and the euro are up and running, questions remain about whether it was a really good idea to give up national monies and exchange rates. The key question is: Can the various European economies adjust to shocks by movements in wages and prices? If not, exchange rates should be doing job, but they are now gone.

Obstfeld and Rogoff[6] (2009) began pointing to the potential risks of the "global imbalances" in a series of papers beginning in 2001, they recall; until the outbreak of the financial crisis in August 2007, the mid-2000s were a period of strong economic performance throughout the world. Economic growth was generally robust; inflation generally low; international trade and especially financial flows expanded; and the emerging and developing world experienced widespread progress and notable absence of crises. This apparently favorable equilibrium was underpinned, however by three trends that appeared increasingly unsustainable as time went by. First, real estate values were rising at a high rate in many countries, including the world´s largest economy, the Unites States. Second, a number of countries were simultaneously running high and rising current account deficits, including the world´s largest economy, the Unites States. Third, leverage had built up to extraordinary levels in many sectors across the globe, notably among consumers in the United States and Britain and financial entities in many countries.

Portes, (2009) argues that global macroeconomic imbalances – in particular, large current account deficits and surpluses – were the major underlying cause of the crisis. The specific feature of this crisis is that major saving-investment imbalances and consequent huge cross-border financial flows put great stress on the financial intermediation process. The dispersion of current account balances, positive and negative, increased greatly over the past decade. Gross capital flows have risen even more than the net flows implied by current accounts. Portes rejects various arguments justifying the global imbalances, or at least suggesting they were a sustainable equilibrium – „Bretton Woods II", „global asset shortage", „saving glut". Even more important than their flaws, they ignore the role of global imbalances in feeding financial market excesses[7].

The European Union and especially European Monetary Union is especially in this topic in a very delicate situation.

Highlighting the EMU, macroeconomic imbalances are at the heart of the crisis in the European Monetary Union (EMU). Before 2008/09 EMU member states embarked on different growth paths:

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[4] Samuelson, (2005).
[5] Dornbusch et al. (2011).
[6] Obstfeld and Rogoff (2009).
[7] Dewatripont, Portes (2009).

Germany and other countries in the "North featured strong exports and weak domestic demand, and consequently accumulated large current account surpluses. By contrast,the economies in the "South" were characterized by weaker exports and a boom in domestic demand, and built up high external deficits. These developments were not sustainable and made the EMU highly vulnerable during the financial and economic crisis[8].

Following the height of the European debt crisis from 2012 onward, concerns have arisen about the global nature of these crises. Rather than focusing on debt ratio and fiscal balance alone, the European Commission has set up a scoreboard of indicators that defines the "Macroeconomic Imbalance Procedure" (MIP). This is conceived as an early warning system that alerts policymakers on the buildup of macroeconomic imbalances. The variables defining the MIP are designed to provide an early detection of fiscal stress in the euro area countries. Policymakers considering that the debt crises in European countries have been brought by the vulnerabilities associated with the current account imbalances, lack of price competitiveness, over-indebtedness in the private sector, weak economic growths[9].

Toroj (2017) adds, that the escalation in the euro area stemmed partly from internal and external macroeconomic imbalances that had built up before in individual countries. Sharp external imbalances crystallized themselves along the border between Northern and Southern Europe (Zemanek et al., 2010 in Toroj, 2017), It was the "core" or "North" of the euro area (Germany, Netherlands, Austria, Luxembourg, Finland) that were depreciating and lending and the "GIIPS" (Southern countries plus Ireland) that were appreciating and borrowing. Over the period 2008–2013, the GIIPS countries have undergone some corrections, which again temporarily aligned their external indicators at the opposite pole to the "core" of the EA.

Marzinotto[10] (2016) agrees, that the period following the introduction of the single currency left the Euro Area (EA) divided into a periphery with significant current account deficits and a core with equally substantial current account surpluses. Further she argues, that while the former started reversing as of 2011 in the midst of the Euro crisis, the latter did not go through a symmetric adjustment.

The debate on the origins of EA imbalances and the mechanism through which they have been unwinding in the periphery and not in the core is not fully settled. Some support the competitiveness hypothesis, according to which imbalances relate to differences in cost competitiveness between the core and periphery that have come to light following the loss of the exchange rate as a policy instrument (Zemanek et al. 2009 in Marzinotto, 2016). Other stress the role played capital flows. In this case, imbalances reflect the fact that excess savings in the high income core of Europe moved to the low-income periphery following the abolition of capital controls in the European Single Market (ESM) as of 1990 and the subsequent elimination fo Exchange rate risks starting with 1999.

II. Material and Methods

The main objective of the paper is to assess the development of the macroeconomic imbalances based on choosing macroeconomic variables observed on cross sectional data. This objective in general should be filled by through the combined use of the empirical and logical methods. Among the empirical methods, we opted for the use of quantitative measures and indirect observing method. In terms of logical methods, we opted for an induction – deduction method for evaluating the results, which are approximated to the reality.Methods of analysis, synthesis and comparison are used as well.

[8] Ederer (2015)
[9] Dufrénot et al. (2016)
[10] Marzinotto (2016)

The research sample consists all member states of the EU including United Kingdom, thus $N = 28$. The object of the research is macroeconomic imbalances and their respective development, through an observed time period of 2006–2016. The subject of the research is EU member states, on whose the macroeconomic variables are observing and measuring.

The starting point of the research is the selection of the chosen macroeconomic variables, which became the base for imbalances observing. We have opted for four types of macroeconomic indicators: *Current account balance (as percentage of GDP), GDP per capita in PPS (current prices),Unit labor cost (compensation of employees per capita in current prices, Government deficit/surplus % of GDP*.

All macroeconomic indicators are from the European statistical database (Eurostat) for the time period of 2006–2016. Indicator of GDP per capita in PPS generally describes economic living conditions of the population of the state, Government deficit/surplus generally describes the management of public finances of the state and the local governments. In recent years there was also public pressure on responsible budgetary management and general lowering the public deficit and debt. The last two of these indicators (Unit labor cost, Current account balance) are also included in so-called "Macroeconomic imbalance procedure indicators" which was introduced together with the so-called scoreboard indicators in 2011.

The European Union, aiming to establish an early warning mechanism when a crisis in one of its members builds up which could threaten the stability of the Euro, introduced the surveillance of macroeconomic imbalances with EU regulation 1176/2011 in November 2011 (Lukmanova, 2017)[11].

The selection of these macroeconomic indicators, we consider as adequate for performing of the macroeconomic imbalances analysis.

Primarily, we begin our analysis of the macroeconomic imbalances based on underlying indicators with the use of the cluster analysis in order to array examined set of objects (EU member states) to the system of categories, which primary intercept the similarity of objects belonging to the same category and secondary the dissimilarity of objects belonging to another category.

For these purposes we use the agglomerative hierarchical clustering method applied to a set of examining objects – member states, based on examining variables (Current account balance, GDP per capita in PPS, Unit labor cost, Government deficit/surplus). For measuring the chosen macroeconomic variables we use secondary data for the time period 2006–2016, commonly indexed based on th common median of each variable in order to perform the cluster analysis. For intercepting of the dissimilarity (or similarity) of objects we use Euclidean distance – the square root of sum of square distances, generally defined as

$$V_{YZ} = \sqrt{\sum_{i=1}^{k}(y_i - z_i)^2} \qquad (1)$$

Where Y, Z are vectors (observations) and k is examined variable (Hendl, 2012)[12]. We combine the result of the hierarchical clustering (dendogram) with the heat map, which is a way of arranging items in a hierarchy based on the distance or similarity between them. The result of a clustering calculation is presented either as the distance or the similarity between the clustered items depending on the selected distance measure.

Further in next step we use the analysis of the *convergence* process of EU member states during he examined time period. Traditionally, the concept of the convergence is used in a measuring of the

[11] Lukmanova (2017)
[12] Hendl (2012)

process of equalization or converging process of equalization of the countries based on searching macroeconomic variables.

However, some authors had used the β-convergence model for another type of convergence analysis, like the public debt, under the assumption that debt-to-GDP ratio is a function of the development gap and the institutional characteristics of a country (Petrakos, 2015) [13], or measuring the convergence patterns in financial development (bank deposits to GDP, bank credit do bank deposits, etc…)[14] .

In our paper we use β-convergence and σ-sigma convergence model to evaluate, potential „convergence" or „divergence") processes in terms of our searched macroeconomic variables, and thus suggests shrinking or widening the imbalance gap between the member states.

In general, there are two well-known concepts of convergence. Unconditional (absolute convergence) follows from the neoclassical growth model and states, that the countries with initial lower GDP per capita show a higher rate of the growth without other preconditioned features. This conclusion follows from higher growth rates of initially poorer countries toward to richer ones to the common state. The concept of the conditional convergence has abandoned the assumption of the common state from various economies. Richer countries could rise faster than poorer, thus it suggests the divergence (Nevima, 2011)[15]. Absolute or conditional convergence can be verified by β-convergence and σ-convergence.

The convergence coefficient, β, depends on the productivity of capital and willingness to save. In particular, the source of convergence in the neoclassical growth model is the assumed diminishing returns to capital. If the ratio of capital (and hence output) to effective labor declines relative to the steady-state , then the marginal product of capital rises. Therefore, for a given saving behavior, an economy grows faster the further it is below the steady state (Barro, 1991)[16].

Methodology to study β-convergence comes from original Baumol (1986) [17] study of real convergence between economies. For the purpose of the paper the Baumol equation, we modify as follows:

$$\frac{1}{T} log\left(\frac{y_{i,T}}{y_{i,0}}\right) = \alpha + \beta log\left(y_{i,0}\right) + \varepsilon_i \qquad (2)$$

Where T is the end of the time period , y_t is ith-macroeconomic variable at the end of time period (2016), t_0 is the initial time period, y_{t_0} is ith-macroeconomic variable at the beginning of time period (2006), α is level constant, β is slope parameter and ε is statistical error.

The concept of σ-convergence also comes from neoclassical growth theory. The σ-convergence is defined as lowering of variance of ith-macroeconomic variable logarithm among economies in time. Sigma convergence is then described as catching up effect. If the variance or i th-macroeconomic variable logarithm is denoted as σ_t^2 in group of countries in time t then σ-convergence among t and $t+1$ means:

$$\sigma_t^2 > \sigma_{t+1}^2 \qquad (3)$$

The sample data include y_t is ith-macroeconomic, calculated in euro for all countries of EU for two time periods 2006 and 2016, respectively.

[13] Petrakos (2015)
[14] Apergis (2012)
[15] Nevima (2011)
[16] Barro (1991)
[17] Baumol (1986)

Hypothesis about the σ-convergence we analyze via using F test, the test of concordance of the two variances of the two samples. If the zero hypothesis is true, the test statistic $\frac{\sigma_t^2}{\sigma_{t+1}^2}$ (where $\sigma_t^2 > \sigma_{t+1}^2$) (4)

has $F_{n_t-1,n_{t+1}-1}$ distribution; n_i is the number of the observations in time period i(Slavík, 2007). The alternative hypothesis is the higher variance in time period $t+1$ as in t.

If the one-tailed test is used, that is the zero hypothesis is tested against the alternative hypothesis ($\sigma_t^2 < \sigma_{t+1}^2$), we fail to reject the zero hypothesis, when $F < F_{\alpha(k_1,k_2)}$.

Practical side of the model we evaluate via using the coefficient of determination, R^2 ,based on the residual analysis:

$$R^2 = 1 - \frac{\sum_{i=1}^{n} e_i^2}{\sum_{n=1}^{n}(y_i - \bar{y})^2} \tag{5}$$

Where e_i^2 means the residual sums of squares, as a difference between observed and estimated values.

The statistical significance of the model we submit to test of the associated hypothesis, whereby as a ground we use table data of Fisher distribution with k and $(n-k-1)$ degrees of freedom. If, the computed value is greater than the critical value of Fisher distribution (based on chosen significance level α), we fail to reject the alternative hypothesis.

$$F = \frac{\frac{R^2}{k}}{\frac{1-R^2}{n-k-1}} \tag{6}$$

For checking the possible autocorrelation between the residuals, we apply Durbin-Watson test

$$d = \frac{\sum_{t=2}^{n}(e_t - e_{t-1})^2}{\sum_{t=1}^{n} e_t^2} \tag{7}$$

If,

$$d_L < d < 4 - d_U \tag{8}$$

Where d_L means lower bound interval and d_U means upper bound interval

We accept zero hypothesis, there is an absence of the autocorrelation. Furthemore we use Breusch-Pagan test based on the squared residuals, $\hat{u}^2$ for detecting possible heteroscedasticity. After adjustments, the test statistic is

$$\lambda_{BP} = \frac{ESS}{2\tilde{\sigma}^4} \tag{9}$$

Where ESS are explained sum of squares from model (2). If the $\lambda_{BP} > \chi^2$, we might fail to accept the zero hypothesis and residuals we should consider as heteroscedastic. Finally for checking the normality of residuals we use Jarque-Bera test of normality.

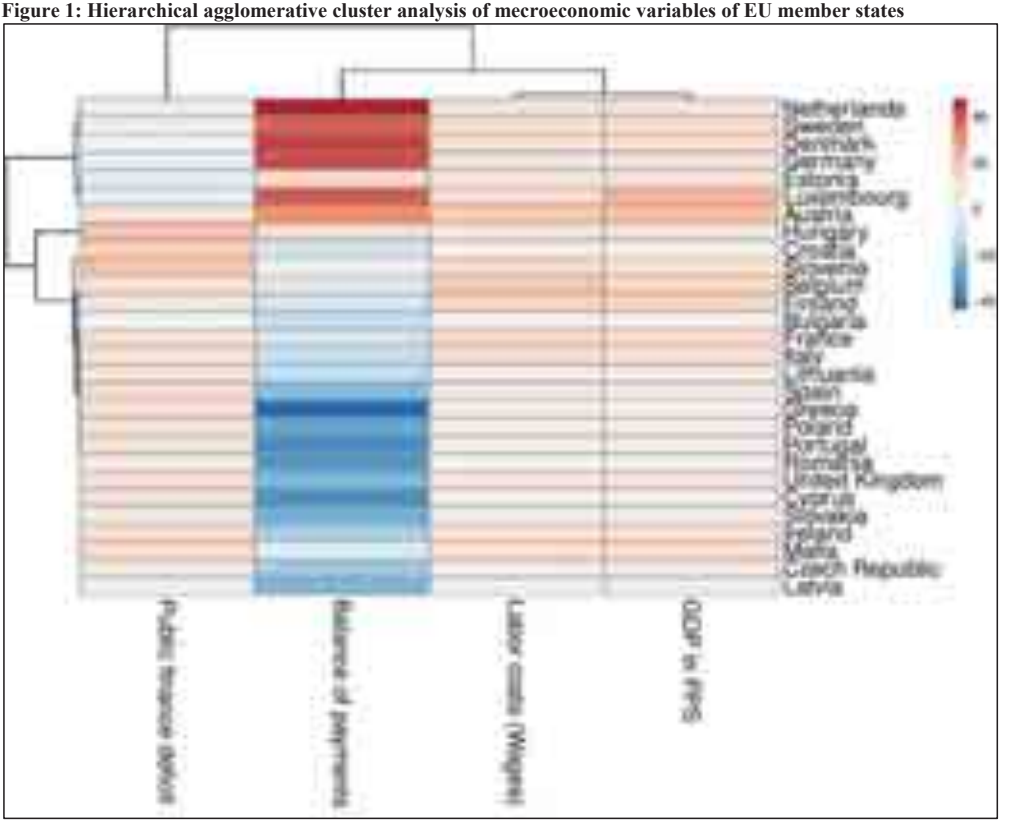
$$JB = n\left[\frac{S^2}{6} + \frac{(K-3)^2}{24}\right] \tag{10}$$

Where S stands for skewness and K for kurtosis. Under the null hypothesis of normality, JB is distributed as a chi-square statistic with 2 df.

III. Results

Primarily, we begin our analysis with the use of the cluster analysis. For these purpose we use the agglomerative hierarchical clustering method applied to a set of examining objects – member states, based on examining variables (Current account balance, GDP per capita in PPS, Unit labor cost, Government deficit/surplus).

Figure 1: Hierarchical agglomerative cluster analysis of mecroeconomic variables of EU member states



Source: Own processing, self-computed data

Figure 1 shows the arrangement of EU member states via use the cluster analysis (Pareto scaling) based on selected macroecnomic variables. From figure 1 we can observe (from the lateral side) at least two distinct clusters. In this case the decisive factor is Balance of payments. The first cluster (upper high) is formed by countries, sometimes dubbed "core" or "North" including Austria and Estonia. The Second cluster (central and bottom) includes the "South" plus most of new member states of the EU, since 2004. Balance of payments (second column) represents a major difference between this group of countries.North EU countries have high current account balance surpluses compared to the rest of the EU. Also there are some differences in terms of public finance deficit (first column). Northern EU countries in general have lower levels of public finance deficit in average during the examined period, however Southern EU countries plus new member states have higher, marked by graduating color scheme.

Labor costs (column 3) and GDP in PPS (column 4), show moderate differences between the North Euro countries and the rest of the EU countries. The main differences are most visible between the "old" and "new" member states of the EU. In some individual cases, countries like Malta, Ireland and also Italy and France, they also record similar values in terms of labor costs and GDP in PPS like the North EU countries. However, despite of mild differences between the labor costs and GDP in PPS between the South and the North EU countries, there is a lack of evidence for explanation of competition lagging of these countries.

Next, we measure the convergence process of EU member states based on our examined macroeconomic variables. The linearized regression model shows this separate result for each examined macroeconomic variable.

Table 1: Summary of β-convergence model and subsequent parameters

Variable	A	$\widehat{\boldsymbol{\beta}}$	R^2	$F_{(1,26)}$	DW	BP	JB
Public finance deficit	0.007755 Se(0.008131)	−0.07898 Se(0.016215) $t_{\alpha=0.05}$ (−4.871) p-value 4.73e-05	0.47711	23.72366	1.590355	0.8034<6.6349	13.4078>5.99
Balance of payments	0.0278941 Se(0.0199811)	−0.0926891 Se(0.0241243) $t_{\alpha=0.05}$ (−3.842) p-value 0.0007	0.362153	14.76210	1.1564	0.4257<6.6349	18.10049>5.99
Labor costs	0.08433 Se(0.0147207)	−0.01718 Se(0.003480) $t_{\alpha=0.05}$ (−4.937) p-value 3.97e-05	0.483841	24.37212	2.1413	3.6124<6.6349	19.3216>5.99
GDP in PPS	−0.180281 Se(0.03244)	0.0426854 Se(0.007504) $t_{\alpha=0.05}$ (5.688) p-value 5.52e-06	0.554454	32.35536	2.0885	0.4114<6.6349	15.2024>5.99

Source: Author´s calculations

Table 1 shows the results of the econometric model for each macroeconomic variable in 28 studied economies in the period covering the years 2006–2016. The main focus of the analysis is to evaluate possible converging or diverging processes among the EU member states, suggested by the chosen macroeconomic variables. Macroeconomic variables have been chosen due to their explanation proximity regarding the macroeconomic imbalances prevailing in the EU or Eurozone.

According to results, all $\widehat{\boldsymbol{\beta}}$ coefficients (slope parameters) are statistically significant on chosen significance level $\boldsymbol{\alpha = 0.05}$. Moreover all parameters, except the parameter for GDP in PPS became negative, which suggests convergence among the EU member states, thus macroeconomic imbalances represented by selected variables might shrunk during the examined time period according to results.

According the subsequent parameters, the coefficient of determination R^2 is for all variables moderate, which suggests relatively high unexplained variability of the model, however the table data of $\boldsymbol{F_{(1,26)} = 7,72}$ statistic suggests, that the model is adequate. Autocorrelation between the residuals, according the Durbin – Watson statistics is not present, or might be neglected. Heteroscedasticity was tested using the Breusch-Pagan test. On the selected level of significance

($\alpha = 0.01$) the heteroscedasticity was not detected. Residuals normality was tested using the Jarque-Bera test. In this case the normality of residuals of all examined variables we might reject[18].

Table 2: Summary of computed sample variance in respective time periods 2006–2016

Variable	σ_t^2	σ_{t+1}^2
Public finance deficit	0.159	0.1007
Balance of payments	0.112	0.174
Labor costs	0.106	0.076
GDP in PPS	0.033	0.074

Source: Author´s calculations

Table 2 shows the results of the variances of i th-macroeconomic variable logarithm in the respective time period 2006–2016 of the EU member states. In case of the macroeconomic variables, Balance of payments and GDP in PPS, (sample) variance at the end of the time period (2016) is higher, than in the beginning (2006), what suggest divergence. In case of the Public finance deficit and Labor costs, the case is opposite, the variance at the end of the time period is lower, than at the beginning, what suggest the convergence.

Table 3: Summary of σ-convergence for examined macroeconomic variables

Variable	F stat	$F_{0.05(27,27)}$	Conclusion
Public finance deficit	1.5789	1.88	Convergence
Balance of payments	1.5535	1.88	Divergence
Labor costs	1.3947	1.88	Convergence
GDP in PPS	2.2424	1.88	Unclear

Source: Author´s calculations

Table 2 shows the results of one-tailed test of the zero hypothesis H_0: $\sigma_t^2 > \sigma_{t+1}^2$ against alternative hypothesis H_1: $\sigma_t^2 < \sigma_{t+1}^2$. According to the proposed methodology (Slavík, 2007)[19] in the variables (Balance of payments and GDP in PPS), where there is a variance higher at the end of the period, so we put this to the *numerator* of the formula (4) and the variance at the beginning period, we put into *the denominator*. In case of the Public finance deficit and the Labor cost we will do inverse process. The computed ratio of its respective variances is compared with the table value of F distribution on given df and we made a conclusion on preliminary results.

IV. Discussion

The object of the research of the paper of was partly clarified reasons and causes of the macroeconomic imbalances still grappling the EU member state and to evaluate the development of these imbalances based on underlying indicators along the purposefully chosen time period 2006 to 2016.

Results, based on cluster analysis has shown still prevailing vast differences in case of Current account balance of payments between the “North” or “Core” Europe countries (Sweden , Denmark, Germany, Estonia, Austria, Luxembourg) and “South” or “Peripheral” Europe countries (Greece,

[18] Note: However, for instance Gauss-Markow Theorem states that the ordinary least square estimate is the best linear ubniased estimator (BLUE) of the regression coefficients even if there is no normality of residuals.
[19] Slavik (2007).

Portugal, Spain, Cyprus) also some new member states (Romania, Slovakia, Poland, Latvia, others.), however in some countries like Italy or France situation is improving.

Public finance deficit remains still the problem of the South Europe countries and also "new member states". Although in recent years the countries most exposed to the public finance deficit adopted strict prevention rules (Italy, Portugal, Spain, Greece, France,etc...) they still suffer by public shortfalls and over indebtedness. Moreover, also new member states show public shortfalls (Slovakia, Poland, Lithuania, etc...), however their overall debt-to-gdp ratio is still „lower" comparing to South Europe states.

In terms of Labor costs and GDP in PPS, „new" member states lagging behind the „old ones" what is not very surprising. Another topic is that, there were not recorded significant differences in terms of Labor costs and GDP in PPS between the North and South European states. Some authors (including in literature overview) suggest that eventually prices and wages, because of Monetary Union, cannot be adjusted or adapted on sudden shocks, because of absence individual monetary policies of EMU member states and due to the absence of exchange rates.

If we imagine and highly approximate the GDP in PPS of each state as some "proxy" or reflection of general price level of any particular country (because prices are related to the purchasing power of residents), there are not significant differences between the Labor costs (wages) and GDP in PPS (prices) between the North and South Europe countries. Even though this was not the subject of the study, we cannot rule out this hypothesis, but it is necessary to make a deeper insight in to this topic, possibly taking into account other factors like (national savings, tax codes, labor codes of individual countries, etc...) which could influence the competitiveness of their economics.

In the second part of the paper we evaluated the potential process of convergence in selected macroeconomic variables between the member states. The results of the beta convergence showed, according the estimated parameters of regression model, that between the examined period 2006 to 2016, it became to convergence in all examined variables except of the GDP in PPS, which suggest that macroeconomic imbalances, represented by selected variables had shrunk. Additional parameter evaluates the adequacy of the model which became positive, except for the test of the normality of the residuals, however in some cases this factor could be neglected.

Additional part was the estimation of the sigma convergence.The concept of the sigma convergence is closely connected with the beta convergence. Often is being cited[20] that beta-convergence is necessary but insufficient condition for the sigma convergence. Thus, for instance negative parameter of the beta convergence suggests the convergence process, but this does not mean declining variance of examining variable, due to various shocks. However this concept is being often criticized , because of rather descriptive approach of the sigma convergence and often due to the presence of the autocorrelation, which might distort the results [21] (Rey, 2006 in Kovac 2011)[22].

Results for sigma convergence and its statistical tests in tab.3 showed mixed results in terms of examining macroeconomic variables. In at least two variables (*Public finance deficit and Labor costs*) sigma coefficient showed convergence, what also resulted as statistically significant. In case of *Balance of payments* sigma coefficient showed divergence, also acknowledged as a statistically significant. However in the case of *GDP in PPS* computed sample variance suggests divergence, which however failed in the *F* test of concordance of two samples. So the result remains unclear.

[20] Kováč (2011).
[21] Note: Problem could be also non-normality of residuals, it might distort the test of the variance.
[22] Kovac (2011).

V. Conclusion

The objective of the paper was to examine the development of the prospective macroeconomic imbalances prevailing over the member states of the EU. For this purpose, we have taken metrics of four macroeconomic variables as a proxy of the macroeconomic imbalances prevailing between the member states of the EU. The results of the cluster analysis showed the biggest differences in terms of the *Balance of payments of the current account* among the member states, which indicates the major issue. Significant differences between the *Labor costs* and *GDP in PPS* among the, respective group of "old" and "new" member states itself and also themselves have not been found.

For assessment of the convergence process in terms of researched macroeconomic variables concepts of beta- and sigma- convergence was selected. In reference period 2006–2012 beta-convergence in terms of *Current account balance*, *Unit labor costs, Government deficit/surplus % of GDP* was confirmed, however in case of balance of payments, sigma- convergence was not confirmed. In case of the GDP in PPS, through the reference period, beta- convergence was not confirmed. This suggests that the income differences among the member states still widen, what was also confirmed by the sigma- convergence, however the result was not statistically significant. The EU should more focus on crucial roots and causes of the macroeconomic imbalances prevailing within the EU. Responsibly public finance management, national savings build-up and investments should become good ground for more profound structural reforms. Member states of the EU should take more effort and approach to reform, remedying the structural imbalances itself and between themselves in order to get more balanced growth and the development.

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