

Modelling of Maastricht Convergence Criteria Influence on Economic Growth: an empirical study of Visegrad Group countries

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Abstract: - Since creation of the Euro Area the fulfillment of the Maastricht criteria is the exhaustively defined condition for the adoption of the euro. It is now largely accepted that the Maastricht norms reinforced by revised Stability and Growth Pact, Fiscal Compact, Six-pack, Euro Plus Pact have imposed serious macroeconomic constraints on economic performance by not taking into account specific problems of particular countries. In 2008, most of the European Union member states experienced significant growth deceleration and this systemic crisis has certainly affected the convergence process. Thus this paper aims to evaluate the Maastricht criteria influence on real convergence and to show how recent crisis affected the real convergence process in Visegrad Group countries to the Euro Area average economic level. The model is calculated using panel regression method with multiplicative dummy variables and the model parameters are estimated by GLS estimator. From this analysis and using panel data estimation techniques, it is possible to detect any significant influence of the Maastricht convergence criteria on real convergence.

Key-Words: - Economic convergence, Crisis, Euro Area, GLS estimator, Panel data analysis, Visegrad Group

1 Introduction

The eurozone, officially called Euro Area (EA or EA17), is a monetary union of 17 European member states, whose have adopted euro as their common currency. The rest of the member states of the European Union (EU) are obliged to join the EA at once but with existence of temporary (Sweden), but as well permanent (Denmark, the United Kingdom), exceptions – opt-outs. Taking this into account the rest of the EU countries without euro as a common currency, and without any opt-outs, are Bulgaria, Croatia, the Czech Republic, Hungary, Latvia, Lithuania, Poland and Romania, giving the total number of non-euro countries to eleven. Latvia is supposed to enter the EA in 2014 reducing the total number of non-EA countries to ten. Before joining the EA, a country must meet the Maastricht convergence criteria which are monitored through the convergence of economies according to the indicators in nominal terms. The indicators are monitored in inflation rates, long-term nominal interest rates, exchange rate stability, government debt ratio and government deficit/surplus ratio. When speaking about the fulfillment of the Maastricht convergence criteria after the country acceptance, it is important to point out the development in economic coordination within the

EA countries. Since the existence of Six-pack, Euro Plus Pact, revised Stability and Growth Pact and the Fiscal Compact the fulfillment of the Maastricht Criteria (the fiscal criteria) has been much more guarded. On the other hand the monetary criteria, such as inflation is being automatically guarded by the ECB, as well as nominal interest rates (indirectly through the price level development) after joining the EA.

When analyzing the convergence process and the preparedness of a country to join the EA, it is important to cover also real convergence (which is not exhaustively defined) and not only the fulfillment of Maastricht convergence criteria (nominal convergence). Evidence from recent crisis shows that merely fulfillment of a Maastricht convergence criteria is not sufficient condition to euro adoption. Thus this paper aims to evaluate the Maastricht criteria influence on real convergence and to show how recent crisis affected the real convergence process in Visegrad Group countries (V4) – the Czech Republic, Hungary, Poland and Slovakia to the Euro Area average economic level. As seen the sample contains the countries without euro as well as countries which already accepted euro as a national currency. Thanks to the presence of Slovakia, which has accepted the euro in 2009,

we are able to verify whether there is a difference in real convergence development in Slovakia and the rest of V4 countries. The reference time period from 2001 to 2012 was chosen to cover pre-crisis, crisis and post-crisis years. The model is calculated using linear regression method with dummy variables. The parameters are estimated by GLS estimator.

2 Theoretical Background of Economic Convergence

The study of economic convergence within the EU has become a phenomenon during the creation of the economic and monetary union project (see Brada and Kután, 2001; Gomez, 2008; Skott, 1999; Soukiazis and Castro, 2005; Taylor, 1999) and has become more vivid again in a past few years because of the global financial and economic crisis (Bruha and Podpiera, 2011; Dvoroková, 2012). According to the economic analysis the convergence is primarily divided by the analyzed variables to nominal and real convergence. Although the real convergence is related with nominal and it is necessary to assess these approaches as a parallel developing processes, it is important to point out that the very understanding of nominal and real convergence is not united among individual authors. Nominal convergence is defined as a process of economies approximation from the price perspective, or in another words as a tendency of economies to achieve the same level of nominal variables such as: inflation rate, interest rate, exchange rate or GDP per capita in common currency, see Frait and Komárek (2011). In a big picture, the nominal convergence can be understood to as a fulfillment of the Maastricht criteria.

Mainly in the early analysis the case of real convergence was viewed as a reduction of economic disparities among countries or regions (Melecký, 2012). Formally written:

$$\frac{y_{1,t}}{y_{2,t}} < \frac{y_{1,t+1}}{y_{2,t+1}}, \quad (1)$$

where y_1 is the income per capita of unit 1 (the catching up economy) and 2 (the economy we are trying to catch up) at time t and $t + 1$.

Convergence is also strongly related with long term economic growth e.g. economic growth theory. This theory explores factors which can influence the economic growth pace in particular countries and also explains the differences between their real products per capita.

Chronologically speaking the beginnings of studying the convergence can be seen in a study of absolute convergence. The absolute convergence

assumes the convergence to a steady state, which is identical for all economies, and which is influenced by an individual characteristics and parameters of the researched economy (savings, population growth, depreciation degree of capital goods, etc.). All economies have the same steady state in this theoretical approach; however countries with lower GDP per capita have higher growth rates in real terms (Sala-i-Martin, 1996).

Next was developed the concept of conditional convergence. This concept is used only for group of states which indicates strong homogeneity. The convergence is conditioned by variables that affect different stable states (savings rate, parameters of the production function, government policies influencing the position of the production function, infrastructure, etc.). If the convergence is measured in the terms of homogenous group of economies with similar institutional characteristics, it can be described to as the conditional convergence. OECD countries are the typical block of countries for measuring the conditional convergence. On the other hand the convergence of Ethiopia and the USA can hardly be expected.

Since the paper is dealing with measurement of real convergence, we introduce two basic approaches to examine the real convergence. Among those countries where a negative relationship between the growth rate and initial level of per capita income can be observed, β -convergence can be recognized. We write:

$$\frac{1}{T} \log \left(\frac{Y_{i,T}}{Y_{i,0}} \right) = \alpha + \beta \log Y_{i,0} + \gamma Z_i + \varepsilon_i, \quad (2)$$

where the left side of the equation is the average growth of GDP per capita during time period from 0 to T , which is then dependent on the initial economic level $Y_{i,0}$ and exogenous factors Z_i . α is the level constant, β and γ are coefficients, ε_i is a random component. T stands for time and i for countries. Growth theories work with the term steady-state to define this. The β -convergence (Furceri, 2005; Michelacci and Zaffaroni, 2000; Pfaffermayr, 2009) basically says faster convergence for those countries whose did not reach their steady-state yet. The σ -convergence (Dalgaard and Vastrup, 2001; Lucke, 2008; Miller and Upadhyay, 2002), on the other hand, indicates whether the asymmetries in economic level between countries are declining through time (the catching up effect). The σ -convergence can be formally written:

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

where σ_t^2 and σ_{t+1}^2 means standard deviation of real GDP per capita logarithm in the group of countries in time t and $t + 1$.

2.1 Brief Literature on Convergence Overview

The literature on convergence is large and still expanding. It reached its peak during times of preparation for the biggest enlargement of the EU so far in 2004. After that there has been a downturn but the subject of convergence is getting yet up in front after the financial crisis in 2008. The complex literature has its advantages. It allows us to choose from collected studies only those which fulfill set criteria.

We utilize the following criteria for our chosen studies. First, we search the databases for studies focusing on empirical evaluation of real convergence using beta-convergence approach within the EU. We only take into account those published in journals or conferences proceedings in English. The sample was also reduced by excluding studies which use growth accounting method or price level as a dependent variable. The total number of studies left was 12.

For each regression result from particular study, we listed an estimate of the value of beta parameter (β). In addition we recorded used time period (T) and sample of analysis. For an overview of the studies, see Table 1.

Table 1: Studies on beta-convergence overview

Study	T	Sample	β
Borys, Polgár and Zlate (2008)	1993-2006	EU10	-0,066
Christodoulakis (2008)	1999-2007	EU15	-0,012
Dvorokova (2012)	1990-2009	EA17, CR	-0,011
Jelnikar and Murmayer (2006)	1995-2007	EU10	-0,047
Marelli and Signorelli (2010)	1990-2007	EU27	-0,026
Marques and Soukiazis (1998)	1985-1995	EU	-0,016
Novak (2009)	1996-2005	EU15, EU8	-0,018
Song, Sek and Har (2012)	1960-2009	EU	-0,012
Soukiazis and Castro (2005)	1980-2001	EU15	-0,026
Szeles and Marinescu (2010)	1998-2008	CEE, EMU	-0,013
Varblane and Vahter (2005)	1993-2004	EU15, CEE	-0,005
Vojinović et al. (2009)	1995-2006	EU10	-0,042

Notes: CEE=Central and Eastern European countries, EMU=European Monetary Union, EU10=newly joined countries in 2004.

Data source: self-elaboration

As seen from Table 1. the calculated beta parameters results are fairly homogeneous with no distant values. The values vary only a little implying the within-study distribution is not skewed, and the within-study variance of estimates is reasonably small. All of studies dealing with real convergence within the EU show convergence and no divergence (given by negative value of beta parameter). We are not aware of any study in which an influence of particular Maastricht convergence criteria on economic growth was researched.

3 Methodology and Goal

Since the main goal of the paper is to evaluate the Maastricht criteria influence on real convergence of V4 to average EA economic level a panel analysis is conducted and the time series are being divided into two periods to analyze conjuncture and recession effects separately.

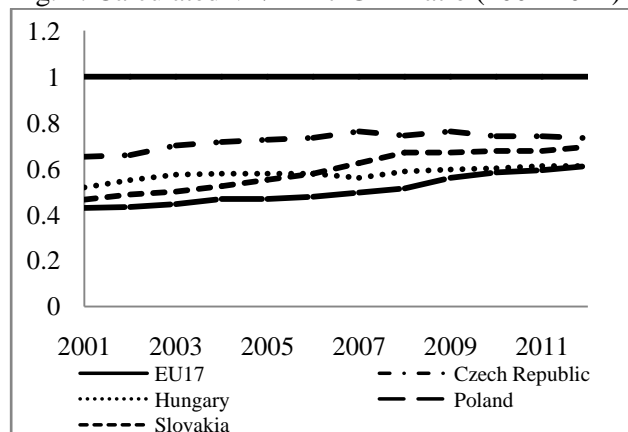
The panel approach to the analysis of convergence was introduced by Islam (1996), who brings together cross-sectional and time series analysis. The basic advantage of panel approach is the ability to study the relationship and correlation of data in two dimensions. First dimension deals with quantities in terms of time, and second one captures cross-sectional data of selected research objects. It is typical for panel data to capture observations in several time periods and using time series analysis together with elements of regression analysis.

Panel consists of data that are in a way similar (countries) and this set is continuously observed. Panel data for economic research have a few major advantages over more conventional cross-sectional or time-series data sets. Panel data analysis deals with large number of data points, which causes the increase of degrees of freedom and reduction of the collinearity among explanatory variables – by which it improves the efficiency of econometrics estimates. On contrary, panel has a few disadvantages. The problems are primarily a small length of time series, measurement errors deformation or data collection (Green, 2008).

Fig. 1 shows us the calculated ratio of Visegrad Group countries GDP per capita to the average GDP of EA17. This represents the initial analysis of economic level convergence in real terms among

chosen countries in the sample. It clearly indicates the convergence of V4 to EA17 and also a strong convergence among the countries itself. However the graph does not tell us the effects of particular Maastricht convergence criteria on GDP growth and real convergence. Hence the analysis follows.

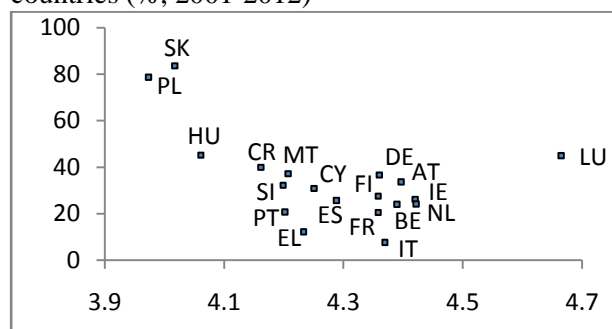
Fig. 1: Calculated V4/EA17 GDP ratio (2001-2012)



Notes: The V4/EA17 GDP per capita ratio is placed on vertical axis, horizontal axis represents reference years. Data source: Eurostat (2013), self-elaboration

Based on Fig. 1 a hypothesis is set up. The closing up effect seems to continue even in recession for Poland, Hungary and Slovakia. The Czech Republic convergence has slow down and we can observe a minor short term divergence from the EA average during crisis. Still, for the rest of the V4 countries, it is possible that a continuous recession does not cause any harmful effects when dealing with real convergence.

Fig. 2: Real beta-convergence in V4 and EA17 countries (% , 2001-2012)



Notes: Average GDP per capita growth 2001-2012 is located on the vertical axis. The horizontal axis represents log (GDP), 2001. Countries codes are as follows: AT – Austria, BE – Belgium, CR – the Czech Republic, CY – Cyprus, DE – Germany, EL – Greece, ES – Spain, FI – Finland, FR – France, HU – Hungary, IE – Ireland, IT – Italy, LU – Luxemburg, MT – Malta, PL – Poland, PT – Portugal, SI – Slovenia, SK – Slovakia.

Data source: Eurostat (2013), self-elaboration

As seen from the Fig. 2 a case of beta convergence among V4 and EA17 countries can be observed. When moving from the upper left hand part of the graph (Poland, Slovakia, Hungary and the Czech Republic) to the bottom, the linear line would have a negative slope. The initially richer countries (Luxemburg, Germany, France etc.) grew significantly slower as initially poorer countries.

3.1 Input Data

Statistical input data for measuring real convergence among V4 countries to the average economic level of Euro Area is made up of particular national data from Eurostat (2013) database. For the analyzed economies were used quarterly time series of six indicators: gross domestic product (GDP per capita in purchasing power standard, index EA17), harmonized indices of consumer prices (HICP, average index and rate of change, constant prices 2005), government deficit/surplus (BDG in percentage of nominal GDP), general government gross debt (DBT in percentage of nominal GDP), long term government bond yields (IR) and EURO exchange rates (ER). The data were transferred to a common base by conversion according to the natural logarithm to ensure their comparability and stationarity of time series. The subject of the analysis are data for the Visegrad Group countries: the Czech Republic, Hungary, Poland and Slovakia in time period 2001-2012. As stated the timeline is divided into times of conjuncture Q1/2001-Q2/2008 and recession Q3/2008-Q4/2012.

3.2 Specification of the Linear Panel Data Model

The aim of a panel regression is not to try to predict a future development of the convergence process. It is supposed to show regression dependence among explanatory variables (HICP, BDG, DBT, IR and ER) and the explained variable (change of GDP per capita) and to estimate for each of chosen countries (V4) whether they converge or diverge to average economic level of the Euro Area. The use of panel data approach and dummy variables makes up for the fact that the model works with relatively small number of observations. Panel data regressions permit the use of quarterly data instead of averages over time, as it is often done in the cross-country empirical literature. The dummy variable technique is then used to examine the possible convergence or

divergence effect among the studied economies. The mathematical estimation of the model can be written as follows:

$$\Delta(\ln y_{i,t}) = \sum_{i=0}^n \beta_i \cdot y_{i,t-1} \cdot D_{i,t} + \alpha_1 BDG_{i,t} + \alpha_2 DBT_{i,t} + \alpha_3 HICP_{i,t} + \alpha_4 IR_{i,t} + \alpha_5 ER_{i,t} + \varepsilon_{i,t}, \tag{4}$$

where:

- $\Delta(\ln y_{i,t})$ natural logarithm of gross domestic product per capita quarterly change,
- $BDG_{i,t}$ government deficit/surplus,
- $DBT_{i,t}$ government debt,
- $HICP_{i,t}$ harmonized indices of consumer prices,
- $IR_{i,t}$ long term government bond yields,
- $ER_{i,t}$ EURO exchange rates,
- β_i slope parameters,
- α_i level constant,
- D_i binary dummy variable to identify the country (the value 1 for country data in time t, otherwise the value 0),
- $\varepsilon_{i,t}$ random component,
- i index indicating the country (base country is Euro Area average),
- t index indicating the time.

Gross domestic product per capita was chosen as a dependent variable. This basic macroeconomic indicator is normally used in studies to analyze convergence. The explanatory variables represent Maastricht convergence criteria which are exhaustively set up in the Treaty of Lisbon (2007). It was necessary to establish dummy variable (see Table 1) for each analyzed country. The model works with four countries which are compared to Euro Area average.

Table 2: List of Dummy Variables for the Czech Republic, Hungary, Poland and Slovakia

Dummy variable	Country
D1	Czech Republic
D2	Hungary
D3	Poland
D4	Slovakia

Source: self-elaboration

By this model specification it is possible to determine whether the chosen countries are converging or diverging to average economic level of Euro Area for each of Maastricht’s indicators. The average values were obtained using an arithmetic average of 17 Euro Area member states.

The average economic level is considered to be in permanent state, to which the chosen countries converge (or diverge). The dynamization of model is ensured by the fact that the Euro Area expanded through the time and the new coming member states has changed the average value of a whole.

4 Estimation of the Econometric Model and Interpretation of Results

Parameters of linear regression model of panel data are estimated using generalized least-squares method (GLS). The use of GLS estimator to calculate model parameters benefits when testing heteroskedasticity. Model is calculated using eViews (7.0).

Before introducing analysis results it is good to present here discussion that runs in some literature as to which estimator is most suitable in the presence of endogenous sample (which is characteristic to the EU). Seemingly unrelated regression (SUR) estimation solves the problems with correlated error terms, the minimum distance and individual constants. Correlation is an issue for models which use random effects (REM), for instance, the growth rates and savings. The fixed effects model (FEM) is not appropriate because the estimator is not consistent when the sample is endogenous. The most used are therefore models with seemingly unrelated regression (SUR) estimator or general method of moments (GMM). Another issue is raised when using panel or cross-sectional data. Panel data captures short-run effects because their observation samples are typically five-year or close to ten-year averages whereas cross-sectional data are round 25-year averages.

4.1 Statistical and Econometric Verification of Used Model

The analysis is verified statistically at 5% ($\alpha = 0.05$) significance level using generalized least-squares method (GLS). Model significance as a whole is verified by $F - test$. As seen from Table 2 the model as a whole is statistically significant at 5% significance level because $F_{df_{ESS}df_{RSS}}^{vyp} > F_{\alpha,df_{ESS}df_{RSS}}^{krit}$. Next, it is essential to test the significance of beta parameter via $T - test$. Since $|t_{df}^{cal}| > t_{\alpha/2,df}^{crit}$ the beta parameter is significant for both time series. After the statistical verification it is essential to perform the econometric verification, which means to analyze autocorrelation and multicollinearity.

Autocorrelation can be tested via the Durbin-Watson (D-W) test, which tests the residuals to determine if there is any significant correlation based on the order in which they occur in the data file. The results suggest no serial dependence among residuals. To test multicollinearity was used Pearson correlation coefficient in absolute values, which is not supposed to cross admitted value. Mutual linear dependence of explanatory variables was not present in the model.

Jarque – Berra test was used to check for normality of residuals. Based on results of J. - B. we cannot reject null hypothesis that residuals are normality distributed.

4.2 Results on Maastricht Convergence Criteria Influence Modelling

The final results of the panel data analysis are show in Table 2. Model which uses time series from Q1-2011 to Q2/2008 works with 149 observations and model with time series from Q3/2008 to Q4/2012 works with 90 providing us with large sample to analyze. The second column provides the results of the beta convergence estimation by using generalized least squares technique for the boom and third column for recession. The estimated results are satisfactory and give some interesting insides for the convergence process within V4 countries as well as allow us to measure the impact of particular Maastricht convergence criteria on GDP growth.

Table 2: GLS analysis results

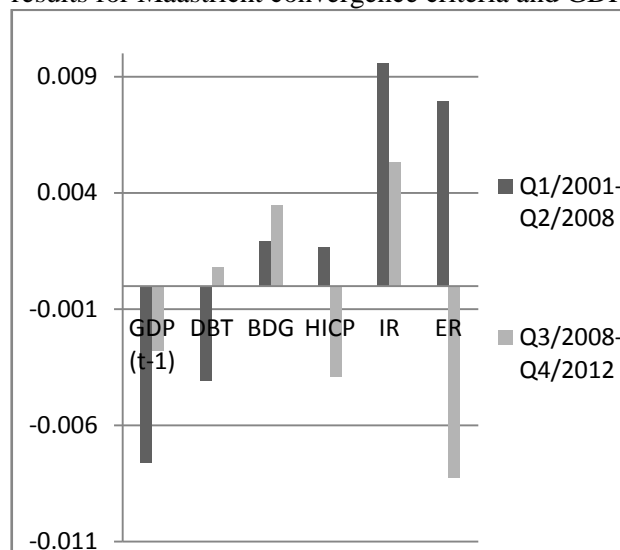
Variable/ Period	Q1/2001- Q2/2008	Q3/2008- Q4/2012
C	0.373472 (2,74)	0.562098 (2,75)
GDP (t-1)	-0,007599 (-2,29)	-0,002778 (-1,99)
DBT	-0,004081 (-2,98)	0,000776 (1,49) ^a
BDG	0,001921 (3,32)	0,003471 (2,09)
HICP	0,001657 (3,06)	-0,003891 (-2,55)
IR	0,009576 (3,29)	0,00531 (2,71)
ER	0,007953 (11,1)	-0,008261 (-20,3)
D1	-0.056208 (-2,19)	-0.010293 (-2,36)
D2	-0.034358 (-1,97)	-0.024784 (-2,67)
D3	-0.057601 (-2,06)	-0.022705 (-2,50)
D4	-0.030849 (-2,11)	-0.004194 (-2,12)
R ²	0,623704	0,890647
F	22,87326	64,34311
Obs.	149	90
D. – W.	2,207067	2,316776
J. – B.	0,82 (0,66)	1,11 (0,57)

Notes:^a indicates that the estimated coefficient is not statistically significant at 5% or 10 % significance level. Numbers in brackets are t-ratios. D. – W. the Durbin Watson statistic and J. – B. the Jarque – Berra statistics.

Source: self-elaboration

The coefficient of the per capita output variable is negative for both time periods, as expected. Our evidence shows that convergence between V4 and EA average runs at very slow annual rate. The results are however in compliance with theory and also it confirmed our hypothesis that even after a recession there is a convergence observed. Interesting is the fact that it runs of around two times slower than in conjuncture (when comparing the values of beta parameters). The results for Maastricht criteria effects are shown in Fig. 3.

Fig. 3: Graphical projection of the model parameters results for Maastricht convergence criteria and GDP



Notes: The dark column represents the time period 2001-2007; the light column 2008-2012. Estimated slope parameters are placed on the vertical axis.

Source: self-elaboration

Regarding public policy, the effect of the public debt (DBT) is opposite in conjuncture and recession. In times of GDP growth the sign is negative meaning as the DBT rises, the growth slows down. It indicates the fact that EU countries are supposed to reduce their public debt in conjuncture so they can react properly when crisis strikes. This is the main reason for the positive effect of debt rise on GDP growth in recession. However, the quantitative effect is not very strong and the result is not significant. The budget ratio (BDG) seems to have no important effect on the growth of per capita income in conjuncture. In recession the effect is rather strong and positive suggesting that as the

deficit rises, the GDP growth rises as well. According to Keynesian theory, often cited to support the idea of public debt reduction, the countries are trying to replace the inadequate demand in times of recession to support the GDP growth.

As seen the inflation indicator (HICP) has again opposite effects when facing conjuncture/recession. In boom the effect was positive, meaning as the HICP rises, the GDP rises as well. This is in compliance with economic theory as well as negative sign in recession. This would reflect a reduction in purchasing power and a lower income performance.

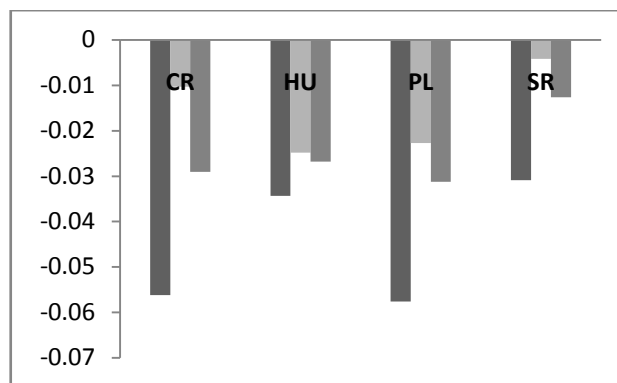
Interest rate policy has the most positive effect on GDP per capita growth suggesting that this policy was growth inducting. Especially in conjuncture the effect was very strong, in recession it was not statistically significant. The IR is directly connected to the level of FDI (foreign direct investments).

Probably most interesting is the case of exchange rate effect on GDP per capita annual growth. The results suggest very strong and opposite effects in analyzed time periods. Between the years Q1/2001-Q2/2008 the effect was positive (as the ER rises, the GDP growth rises as well) and in Q3/2008-Q4/2012 the effect was negative. This is again in compliance with economic theory. The long term GDP growth is causing the exchange rate to go up and is supposed to be working as a natural stabilizer. In recession the central banks are trying to support exporters by reducing their exchange rate.

It is important to note that the joint significance of all variables related to Maastricht criteria is accepted in all regressions so they cannot be ignored when explaining the performance of GDP per capita annual growth or a real convergence.

The next Fig. 4 shows us the graphical projection of results of dummy variables for particular countries of V4 and their convergence to each other.

Fig. 4: Graphical projection of the model dummy variables results



Notes: The dark column represents the time period 2001-2007; the light column 2008-2012; the medium dark column represents the whole analyzed period 2001-2012. Estimated parameters for individual dummies are located on vertical axis.

Source: self-elaboration

The results for dummy variables show a convergence among all V4 countries. The highest value can be observed by Poland suggesting the worst starting position in 2001 of all V4 countries. The negative sign is present by all observation, so the countries were converging. The convergence was also shown in Fig. 1. When look at the differences between conjuncture and recession, it is clear that the convergence was stronger in times of economic growth. However, even in recession there is still convergence and no divergence. Again the results were significant. The highest value between 2008 and 2012 was observed by Poland which is also one of the few EU countries which does not experienced negative growth.

Table 3 shows calculated distance of Visegrad Group countries from EA17 average economic level. The distance was obtained by calculating the difference between level constant and calculated dummies parameters for each country.

Table 3: Calculation of countries distance from EA average

Q1/2001-Q2/2008 average			Q3/2008-Q4/2012 average		
Rank	D	Value	Rank	D	Value
1	SR	0,404321	1 (1)	SR	0,566292
2	HU	0,40783	2 (3)	CR	0,572391
3	CR	0,42968	3 (4)	PL	0,584803
4	PL	0,431073	4 (2)	HU	0,586882

Source: self-elaboration

A development and change is evident from the results shown in Table 3. Initially Slovakia was ranked closest of V4 countries to the EA17 average in real convergence evaluation followed by the Hungary, the Czech Republic and Poland. This is

also clear from results in Fig. 4. This ranking however changed during the time and the whole process of real convergence was weakened as proved by the model. Slovakia remained closest in real convergence terms but during crisis the Hungary lost its position. Because of declination in exports, reduced domestic consumption and fixed assets accumulation the country went through a severe recession. Uncertainty of crisis has also damaged Hungary banking system which led to a decrease in investments and rise of interest rates. The fact that most of Hungarian mortgages were denominated in foreign currency (euro and Swiss franc) made recovery more difficult. The Czech Republic and Poland was not hit by the crisis as hard as Hungary in nominal and also real terms.

5 Conclusion

The main purpose of the paper was to show the effects of Maastricht criteria on real convergence for selected group of countries within the EU. The sample contained Visegrad Group countries: the Czech Republic, Hungary, Poland and Slovakia and we study their real convergence or divergence to the EA17 average economic level.

Generally we found that the Maastricht criteria influence cannot be ignored. To cover times of economic growth as well as economic slowdown, we divided analyzed data in two periods. Q1/2001-Q2/2008 represents times of economic growth – a conjuncture. The years Q3/2008-Q4/2012 represent recession. It is important to stress out that the joint effect of the Maastricht criteria settings is significant on 5 % and 10 % level of significance in all cases.

The separate estimations showed that convergence in GDP per capita growth runs at slower rate in recession. However, we observed no divergence and therefore confirmed our original hypothesis. This particular result is consistent with work of Soukiazis and Castro (2005) and also with continuous criticism of Stability and Growth Pact existing within the EA17.

The influence of particular Maastricht convergence criteria was mixed. For example the interest rate and exchange rate have the most significant influence on GDP per capita growth. Interesting was the deviation in the case of exchange rate which effects were opposite in conjuncture and recession. The same opposite effect was observed by the inflation rate and public debt. The effects of public deficits were more significant in recession

confirming the Keynesian approach taken in the last few years by European governments.

In conclusion, this study shows that the Maastricht rules and the Stability and Growth Pact have not been as significant in the time period 2001-2012 as the European authorities would expect and even incases where the Maastricht criteria had positive effects, these were modest. In this context, the European monetary authorities have to allow for a more flexible fiscal policy that takes into account countries specification and the economic cycle position in order to national countries achieve a higher real convergence.

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