Real Economic Convergence in Western Europe from 1995 to 2013

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Keywords

Real convergence, Beta convergence, Sigma Convergence, Economic growth, GDP per capita

Abstract

The aim of the paper is to analyze the economic convergence of real per capita GDP in the Western European countries with two types of measurement methodology. The first is sigma convergence, based on the coefficient of variation of real per capita GDP. The second is beta convergence, absolute/unconditional and conditional, including economic and socio-political variables, based on the neoclassical growth theory. The hypothesis of the paper is that there has been real economic convergence in Western Europe in at least one analyzed sub-period. The relationships between selected macroeconomic variables and the rate of economic growth are econometrically tested. Both sigma and beta convergence are estimated for the period 1995-2013 and four sub-periods: 1995-2003, 2004-2013, pre-crisis sub-period 2004-2008 and the crisis sub-period 2009-2013. The empirical findings support the hypothesis of economic convergence, i.e. that the poorer countries tend to grow faster than the rich ones in per capita terms, for some periods. However, the countries had a tendency to diverge, confirming the negative effects of the crisis on per capita GDP growth. Sigma convergence is consistent with beta convergence. According to the results, the half-life of real convergence may take from 12 to 1078 years. Significant dissimilarities between the growth patterns among individual countries show the considerable heterogeneity of growth, i.e. the convergence clubs.

1. Introduction

Convergence is defined as an equalization of levels of development and is a necessary condition for efficient and successful integration. According to the Balassa classification, the European Union is at the highest degree of integration in the world economy, economic union, with a single currency used by 19 Member States. The equalization has been a focus of the European Union since the Treaty of Rome (1957) when the common policies to promote "harmonious economic development and balanced expansions" were adopted. How important this matter is shows the process of joining the EU. In order to join the Union, countries have to fulfill so called Copenhagen criteria (1993) which include democracy, active market economy and obligations for the purposes of the EU. Once they join the EU, countries eventually have to join the Eurozone. The criteria they have to fulfill, the Maastricht criteria, include price development stability, fiscal stability, financial market stability and exchange rate stability. Before the biggest enlargement in 2004, the members of the EU were developed countries. Austria, Finland and Sweden did not join until 1995, after the collapse of the Soviet Union, since they wanted to stay neutral. These countries had a similar level of development and should have converged.

In 2004 ten CEE countries joined the Union, and that was the first real test. It was expected that these countries would not perform well. However, the convergence rate in the EU-28 from 1995 to 2013 was 2.08%, consistent with Barro and Sala-i-Martin findings. In the pre-crisis period, these countries proved that they could cope with the challenges of being in the Union, with the convergence rate of 3.91%. Current literature on economic growth shows how the new Member States converge, since they have been less developed. But, in the EU-15 there are more and less developed Member States and some of them were hit hard by the crisis, even more than the new Member States and in this paper it will be shown if they converged as they should have.

The main purpose of this research is to have an overview of the real convergence process in the most developed countries in Europe, the EU-15 and Iceland, Norway and Switzerland, i.e. to determine real convergence rates in order to reject or not reject the convergence hypothesis. Iceland, Norway and Switzerland are included in the analysis because these countries have strong connections with the EU. Other purposes are to analyze the convergence process between different time periods, since it could show what might affect the convergence process and to determine whether there are convergence "clubs" within the group. The main research hypothesis is that there is real economic convergence in the most developed countries in Europe. Several sub-hypotheses are formulated: there is sigma convergence in Western Europe in at least one period; there is absolute/unconditional beta convergence in Western Europe in at least one period; there is conditional beta convergence in Western Europe in at least one period; there is club convergence in Western Europe; the crisis has impacted the economic convergence process in Western Europe.

2. A Brief Survey of Literature

Different empirical studies have used time series and cross section data to measure and analyze the convergence process among countries and regions in the world. Convergence was popularized by Barro and Sala-i-Martin (1992), who analyzed the U.S. states over various periods from 1840 to 1988, with the results s that convergence existed, with the speed of 2 percent per year, regardless the time period. Sala-i-Martin (1994) proved that there was ample evidence of conditional beta convergence, and that the speed of convergence was remarkably similar across data sets, 2 percent per year, with the lesson that transitions were important and quite slow. Barro (1991) analyzed the impacts of independent variables initial GDP per capita, primary and secondary school enrollments, number of political assassinations, investment rates and measures of distortions in capital markets on the GDP per capita growth. Four lessons emerged: education was an important determinant of the growth rate of the economy; investment rate was strongly positively correlated to growth; coefficient of the initial level of income was significantly negative once other variables were held constant; different measures of political instability and market distortions seemed to matter in varying degrees. Mankiw, Romer and Weil (1992) suggested that international differences in income per capita were best understood using an augmented Solow growth model, where the output was produced from physical capital, human capital and labor. The results indicated that these three variables explained most international variations. Ben-David (1993) examined the impact of trade liberalization on income convergence and the results supported the convergence hypothesis.

The most of convergence in the EEC occurred in the post-World War 2 era, during a period of increased trade liberalization. Only after the new Member States, the United Kingdom, Ireland and Denmark, started removing the trade barriers, the income differences among the six original Member States and them began to fall. Marques and Souikiazus (1998) analyzed sigma and absolute beta convergence process in the EU-12 from 1975 to 1995, with the results that the EU-12 Member States were converging at the rate of 1.18% in the entire period, from 1975 to 1984 the rate was 1.55% and from 1985 to 1995 1.61%. The results for sigma convergence were different. The countries were converging from 1975 to 1982 and from 1986 to 1991. The discrepancy in the results showed that the rate of beta convergence was not sufficient to ensure the approximation of the levels of per capita income in absolute terms. Yin, Zestos and Michelis (2003) analyzed sigma and beta convergence in the EU from 1960 to 1995. For sigma convergence, the results showed that the cross sectional standard deviation of the real GDP per capita for the EU-15, the EU-9 and the EU-12 had declined over the period 1960-1995. For the EU-6, the standard deviation increased in the last 15 years, even though it remained the lowest

one. The results for absolute and conditional beta convergence showed that the EU-15 countries were converging, other than from 1980 to 1985, and that convergence process in the EU-15 had been going strong and uninterrupted. Mathur (2005) examined the convergence process in the four regions, including the European Union, from 1961 to 2001. The EU showed the evidence of absolute convergence. Halmai and Vàsàry (2012) analyzed four groups of the EU countries: "developed", "Mediterranean", "catch-up" and "vulnerable" countries. They showed how convergence and potential growth rates were disrupted by the 2008 crisis through three different channels: capital accumulation, labor input and total force productivity. They estimated a longer period of divergence might ensue in Europe. Kaitila (2013) analyzed only sigma convergence of purchasing power adjusted GDP per capita in four groups of countries: the EU-15, the EU-27, the Eurozone and the EU-33 (the EU Member States and the candidate countries at the end of 2012; Croatia, Iceland, Macedonia, Montenegro, Serbia and Turkey). The countries were converging from 1960 to 1973 and from 1986 to 2001. The speed of convergence was different among the groups and it depended on time period. The Great Recession was a considerable shock to the development, resulting in divergence in the EU-15 in 2012.

3. Methodology and Data

In this study, the convergence hypothesis that poorer countries, in per capita terms, tend to grow faster than the rich ones is tested through two measures of convergence, sigma and beta. Sigma convergence is a simple way of measuring convergence using the standard deviation or the coefficient of variation. In this study the coefficient of variation of purchasing power adjusted GDP per capita will be used as well as the minimums and maximums of GDP per capita relative to the simple average, introduced by Ville Kaitila (2013), from 1995 to 2013, with sub-periods 1995-2003, 2004-2013, 2004-2008 and 2009-2013. The coefficient of variation is calculated as the standard deviation divided by mean. Declining coefficient of variation indicates convergence, while an increase in this measure indicates divergence. In the spirit of convergence, only simple averages will be used, not weighted, since it is equally unwanted for any country to lag behind, despite the size of its population. Analyzing convergence through the lowest and highest GDP per capita level relative to the average in the group is an important addition, since sigma convergence can show convergence even if one country is for some reason left behind. The minimum value does not overlook this possibility. The narrowing spread shows that the poorest countries are catching up with the average.

Beta-convergence, based on the neo-classical growth model, was introduced by Barro and Sala-i-Martin (1992). There are two types of beta convergence; absolute/unconditional and conditional. When it is assumed that the countries converge to the same terminal point or the steady states point convergence is absolute. It is analyzed through regression with one dependent and one independent variable, where dependent variable is the growth rate of per capita GDP and independent variable is the initial level of per capita GDP in purchasing power terms:

$\log(y_{i,t}) = \alpha + \beta\log(y_{i,t-1}) + \varepsilon_i$,

α – the constant term

β – the convergence coefficient

$\beta < 0$

$\log(y_{i,t})$ – the growth rate of per capita GDP in period t for country i

$y_{i,t-1}$ – initial per capita GDP for country i

$\varepsilon_{i,t}$ – the stochastic error of the equation.

Beta coefficient is obtained without any other variable, since it is assumed that the economies do not differ significantly in their levels of technology, investment ration, industrial

structure, human capital qualifications and other factors. When the economies have different structures, they converge to a different steady state point, and convergence is conditional. (Marques and Soukiazis, 1998) Conditional convergence is analyzed through the multiple regression with the same dependent variable, but includes various economic, social and political variables as independent, next to the initial level of per capita GDP. In this analysis, included economic variables are inflation rate (measured by the consumer price index), economic openness and gross capital fixed formation and socio-political variables are unemployment rate, population growth rate and government debt.

$$\log(y_{i,t}) = \alpha + \beta \log(y_{i,t-1}) + \gamma X_{it} + \varepsilon_{i,t}$$

γX_{it} – a set of structural exogenous variables which can influence the growth of per capita GDP

Beta coefficient represents the rate at which a country's real GDP per capita approaches the steady state rate of growth or a speed of convergence. Negative beta coefficient indicates convergence, while a positive rate indicates divergence. Beta convergence measures the speed at which poor countries approach rich countries in real GDP per capita terms, in a specified time interval. Sigma convergence indicates whether the cross sectional variation of the real GDP per capita among a group of countries decreases over time. Beta convergence is a necessary but not a sufficient condition for sigma convergence.

Ben-David (1996) introduced another way of analyzing convergence, the half-life of convergence, defined as the number of years that it takes for the income gap to be cut in half. It is calculated as $h = -\ln(2)/\ln(1+\text{beta})$.
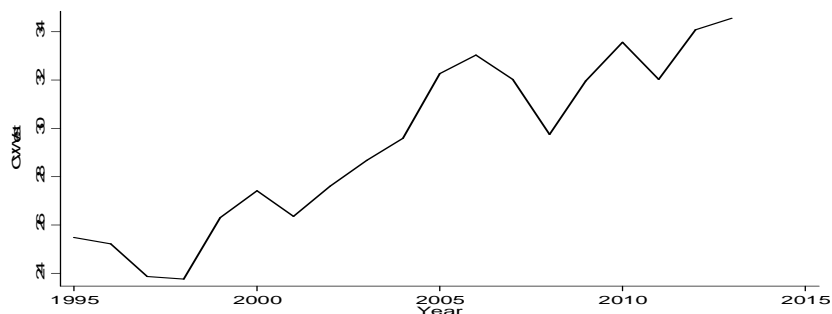
4. Sigma Convergence

Sigma convergence measures the dispersion of real GDP per capita among the countries. Table 1 presents the coefficient of variation and minimum and maximum to average GDP per capita ratio as measures of convergence in Western Europe.

| Year	Coefficient of Variation	Minimum to Average Ratio	Maximum to Average Ratio
1995	25.49	0.6218	1.7947
1996	25.22	0.6204	1.7803
1997	23.87	0.6264	1.7187
1998	23.77	0.6309	1.7406
1999	26.31	0.6372	1.8757
2000	27.42	0.6258	1.8984
2001	26.36	0.6281	1.8412
2002	27.60	0.6247	1.8863
2003	28.68	0.6240	1.9496
2004	29.59	0.6040	1.9720
2005	32.26	0.6236	1.9842
2006	33.03	0.6148	2.0888
2007	32.02	0.6126	2.1277
2008	29.75	0.6087	2.0473
2009	31.95	0.6371	1.9933
2010	33.57	0.6364	2.0681
2011	32.02	0.6096	2.0972
2012	34.09	0.6001	2.0693
2013	34.55	0.5919	2.095

Table 1: Coefficient of variation and the minimums and maximums of GDP per capita relative to the simple average in the Western Europe

Table 1 shows convergence and divergence in the Western European countries. It can be seen that the countries mostly diverged. There are only four periods of convergence: 1995-1998, 2001, 2007-2008, and 2011. However, this group of countries had lower coefficients of variation than the EU-28 in the analyzed period. The problem is that the value of the index has been increasing since 1998, when its value was the lowest, 23.77, which means that the dispersion of GDP per capita increased. These countries were diverging in 2013, when the index peaked at the value of 34.55.

Graph 1: Sigma convergence in Western Europe, 1995-2013

Even though the coefficient of variation is the most commonly used measure of sigma convergence, another way of analyzing is to compare the ratio of the minimums and maximums of GDP per capita relative to the average GDP per capita in the group (Table 1 and graph 2). This is an important addition, because sigma convergence can show positive convergence even if one country is for some reason left behind. (Kaitila, 2013: 10). The ratio of minimums to average was mostly declining since 2000. The highest ratio was in 1999, 0.6372. From 2000 to 2013, the only years of increasing ratio were 2001, 2005 and 2009. The lowest ratio was in 2013, 0.5919. This method is not consistent with the coefficient of variation as a measure of convergence for the Western European countries, because it shows that the poorer countries were catching-up. The ratio of maximums to average is more consistent with the coefficient of variation. There were four periods of declining ratio, 1996-1997, 2001, 2008-2009 and 2012. The lowest ratio was in 1997, 1.7187, while the highest dispersion was in 2007, 2.1277.
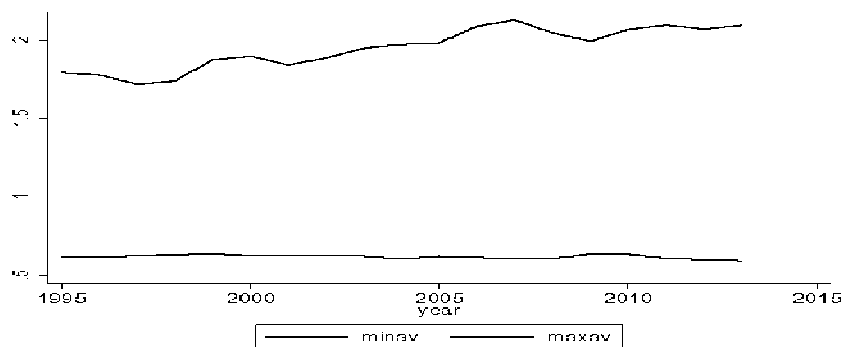
Graph 2: The minimums and maximums of GDP per capita relative to the simple average

5. Beta Convergence

Economic convergence requires a negative relationship between per capita GDP in the initial year and the average growth rate of the countries' real per capita GDP within a specified time period. In the table 2 are presented the results of the regression for the entire period and four sub-periods. The dependent variable in all regressions is the average rate of growth of GDP for the most developed countries in Europe. Economic variables are: inflation rate, economic

openness and gross fixed capital formation, and socio-political variables are general government debt as percentage of GDP, population growth rate and unemployment rate.

Period/Model	Basic Equation (1)			Equation with other Economic Variables (2)			Equation with Economic and Socio-Political Variables (3)		
	β (t)	R²	Half-life	B (t)	R²	Half-life	B (t)	R²	Half-life
1995-2013	-0.06 (-0.09)	0.0005	1078	-1.35 (-1.53)	0.33	51	-2.07 (-2.06)	0.52	33
1995-2003	-1.37 (-1.01)	0.006	49	-4.65 (-2.67)	0.58	15	-5.79 (-3.12)	0.73	12
2004-2013	1.85 (2.35)	0.26	-	2.57 (2.42)	0.40	-	1.88 (1.42)	0.58	-
2004-2008	0.25 (0.25)	0.004	-	-0.08 (-0.07)	0.41	863	0.6 (0.55)	0.69	-
2009-2013	2.43 (1.86)	0.12	-	3.72 (2.01)	0.28	-	4.15 (1.52)	0.48	-

Table 2: Absolute and Conditional Convergence in the West

The estimated value of beta for the period 1995-2013 is negative, 0.06, which means that, assuming that the EU Member States are similar in terms of steady state characteristics; they were converging to a common GDP per capita at the rate of 0.06%, because beta convergence, even at a minimum rate, is always sufficient to ensure approximation in the levels of per capita income in relative terms (Marques and Soukiazis, 1998: 8) This is not consistent with Barro and Sala-i-Martin (1992) findings. Statistically, beta coefficient explains for each one-point increase in initial income, how much the rate of GDP per capita would decrease. In this case, for one-unit increase in initial income level, we would expect a 0.06 unit decrease in GDP per capita. The half-life of the convergence process is defined as the number of years that it takes for the income gap to be cut in half. (Ben-David, 1996) The half-life of convergence supports the regression results, because it takes 1078 years to close half of the gap between initial income and the steady state income level. Graph 3 plots the GDP per capita in 1995 (X-axis) against the average annual growth rate of the GDP per capita from 1995 to 2013 (Y-axis). The graph supports the hypothesis of absolute convergence, since there is a negative relation between the variables, but it can be seen that beta coefficient is very low, because the fitted value line is almost flat. It also shows that there were „clubs "of countries.

An average growth rate of GDP per capita for the Western countries from 1995 to 2013 was 1.5%. Greece, Portugal and Spain, with their average GDP per capita in 1995 of 14654.59 euros, had an average growth rate of GDP per capita of 1.23%. Finland, Sweden and Iceland grew in per capita terms at an average rate of 2.1%, while their average initial GDP per capita was 21270.25 euros. Austria, Belgium, the Netherlands, Norway and the United Kingdom had an average rate of GDP per capita growth of 1.45%, with an average initial GDP per capita of 22229.63 euros. The highest average growth rate in per capita terms was in Ireland, 3.32%, with the initial GDP per capita of 18073.44 euros. Luxembourg, with the highest initial GDP per capita of 38895.9 euros had an average growth rate in per capita terms of 1.68%. Italy had the lowest rate of only 0.39%, with the initial GDP per capita of 21195.92 euros. Low beta coefficient from 1995 to 2013 is consistent with sigma convergence for the same period, when there were only two periods of convergence, 1994-1998 and in 2001. From 1995 to 2013, the rate of conditional convergence with economic variables is 1.35%, faster than the almost inexistent unconditional convergence, but slower than conditional convergence in the EU-28 in the same

period, 2.34%. The t-value is 1.53 and it is statistically insignificant. The half-life of convergence is 51 years. With socio-political variables, the convergence process is faster from 1995 to 2013; with the rate of 2.07%. The half-life of convergence is 33 years, 18 years shorter than conditional convergence with only economic variables.
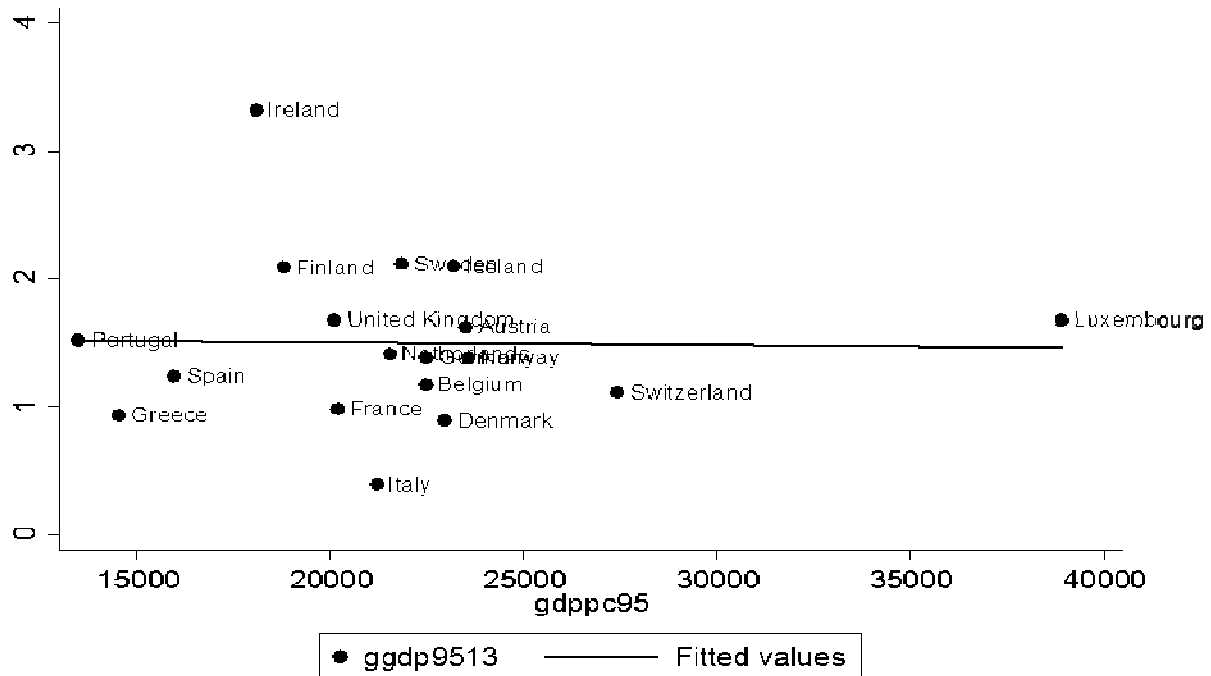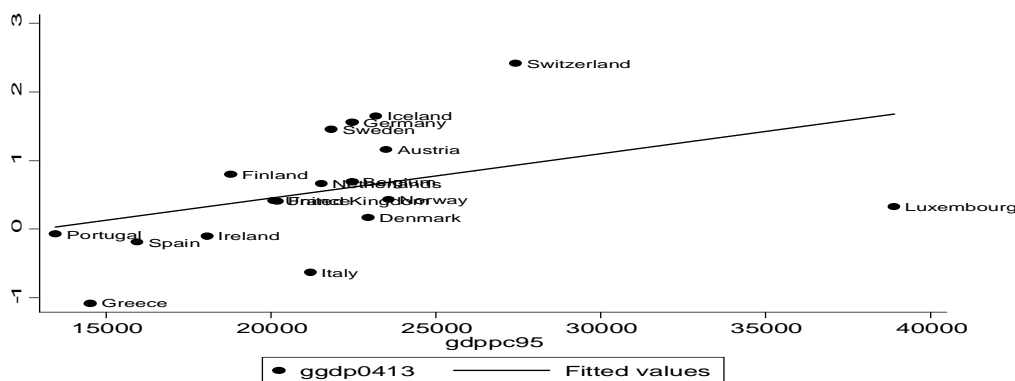

Graph 3: Absolute convergence in the West, 1995-2013

The regression results for the period 1995-2003 confirm the convergence hypothesis. The estimated value of beta for the period is negative, 1.37, but with the t-value of 1.01, it is insignificant. Since beta coefficient shows convergence, but t-value is lower than 1.96, this can suggest conditional and not absolute convergence. Convergence process is again very slow, with the half-life of 49 years. Graph 4 supports the hypothesis of absolute convergence, since there is a negative relation between the variables, and the fitted value line is steeper than for the 1995-2013 period. It can be seen that there are three „clubs", but with Ireland, Luxembourg and Switzerland being outliers. An average growth rate in per capita terms in this period was 2.61%. Greece, Spain and Portugal grew at an average rate of 2.83%. Finland, the United Kingdom, Sweden and Iceland had an average growth rate of 3.02%, while Germany, Italy, France, Denmark, Belgium, Austria, the Netherlands and Norway grew as a "club" at an average rate of 1.9% in per capita terms. Ireland had the highest growth rate of GDP per capita of 7.1%, while the lowest was in Switzerland, 1.1%. Low beta coefficient from 1995 to 2003 is consistent with sigma convergence for the same period, with three years of divergence; 2000, 2001 and 2003. From 1995 to 2003, the rate of conditional convergence with economic variables is 4.65%. This is the highest rate of convergence among the analyzed periods. The t-value is 2.67, so it is statistically significant. The half-life of convergence is 15 years, comparing to 51 years for the entire period. With socio-political variables, the rate of convergence is 5.79%, with the t-value of 3.12. The half-life of convergence is 12 years, 3 years shorter than conditional convergence with only economic variables.
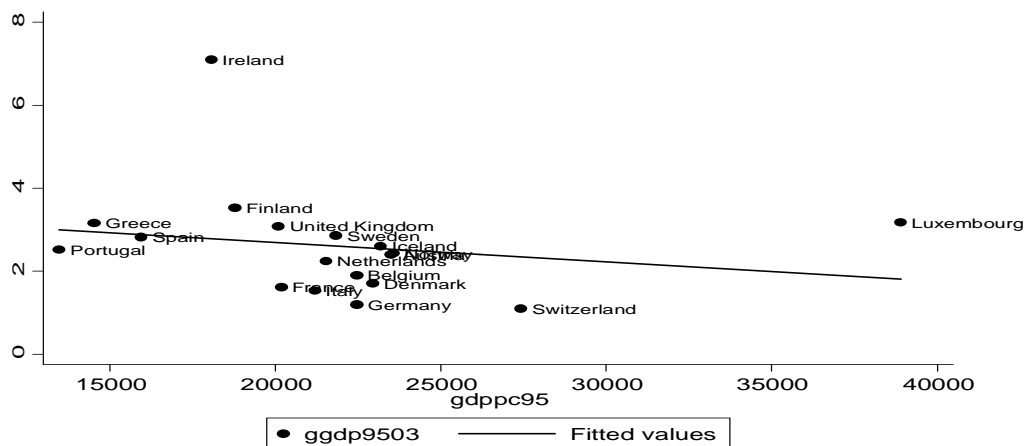
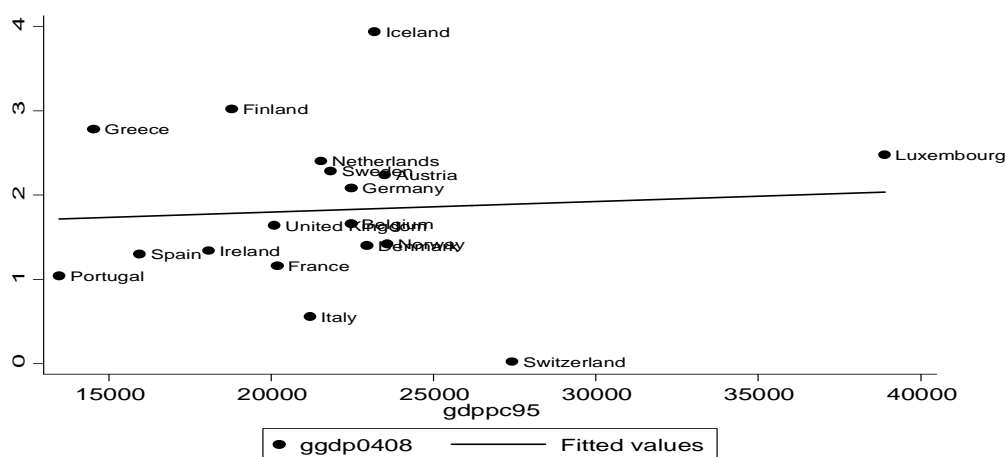**Graph 4: Absolute convergence in the West, 1995-2003**

The regression results for the period 2004-2013 cannot confirm the absolute convergence hypothesis because beta coefficient for log of level of GDP per capita is positive for the most developed countries in Europe. The estimated value of beta for this period is 1.85. T-value is 2.35, so the estimated beta coefficient is statistically significant. Graph 5 does not support the hypothesis of absolute convergence, but divergence. The line of fitted values has an upward slope, showing a positive relation between the variables. It shows that countries with higher levels of GDP per capita in 1995 achieved higher growth rates. An average growth rate in per capita terms in this period was 0.56%. There are three convergence clubs. Iceland, Germany, Sweden and Austria were forming a club with the highest growth rate in per capita terms of 1.46%. Norway, the United Kingdom, the Netherlands, Denmark, Belgium and Finland grew at an average rate of 0.53% in per capita terms. However, Portugal, Spain and Ireland had a negative average growth rate of GDP per capita of 0.12%. Switzerland had the highest growth rate of GDP per capita in the group, 2.42%, while Greece's GDP per capita declined at the rate of 1.08%. Divergence from 2004 to 2013 is consistent with sigma divergence for the same period. These countries were converging only in 2007, 2008 and 2011. As a result of the regression with economic variables from 2004 to 2013, beta coefficient is positive, 2.57%, thus confirming divergence. This is consistent with absolute convergence for the group at the same period. The t-value is 2.42. With socio-political variables, the rate of divergence is 1.88%, with the t-value of 1.42, so it is statistically insignificant. The result of every analysis in this period is that the West countries were diverging from 2004 to 2013.

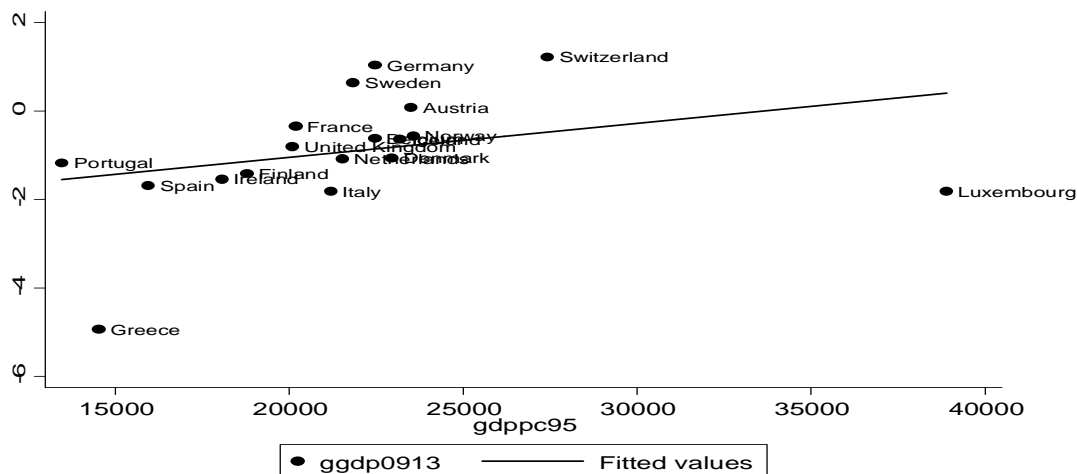**Graph 5: Absolute convergence in the West, 2004-2013**

From 2004 to 2008, beta coefficient for log of level of GDP per capita is positive, with the estimated value 0.25. T-value is low, 0.25, so the estimated convergence coefficient of 0.25 percent is not significant. Graph 6 shows a positive relation between the variables, and the fitted value line is flatter than for the 1995-2013 period. An average growth rate of GDP per capita in this period was 1.83%. From the graph can be seen that the Netherlands, Austria, Sweden and Germany formed a „club", with an average growth rate in per capita terms of 2.25%. Portugal, Spain, Ireland and France grew at an average rate of 1.21%, while the average rate in the United Kingdom, Belgium, Norway and Denmark was 1.53%. Three countries with the highest growth rates in per capita terms were Iceland (3.94%), Finland (3.02%) and Greece (2.78%). The lowest rate was in Switzerland, 0.2%. Positive beta coefficient from 2004 to 2008 is consistent with sigma divergence for the same period. From 2004 to 2008, the rate of conditional convergence with economic variables is 0.08%. The t-value is 0.07, so the initial GDP per capita is statistically insignificant variable. The half-life of conditional convergence with economic variables is 862 years, consistent with the low rate of convergence. With socio-political variables, the countries were diverging at the rate of 0.6%. The t-value is 0.55, so it is statistically insignificant.

Graph 6: Absolute convergence in the West, 2004-2008

The results for the period of the crisis, 2009-2013, show the highest divergence rate. For the period 2009-2013, beta coefficient for log of level of GDP per capita is positive, 2.43, and insignificant with the t-value of 1.86 for the countries of Western Europe. Assuming that these countries are similar in terms of steady state characteristics, for one-unit increase in initial income level, we would expect a 2.43 unit increase in GDP per capita. Graph 7 shows a positive relation between the variables, and the fitted value line is flatter than for the period 2004-2013, but steeper than for the period 2004-2008. In this period, an average growth rate in per capita terms was -0.92% and the countries were acting mostly as „clubs". Portugal, Spain, Ireland and Finland had a negative average growth rate in per capita terms of 1.46%, while the United Kingdom, Belgium, Norway, Denmark and France's GDP per capita was declining at an average rate of 0.68%. The Netherlands, Sweden, Austria and Germany formed the only club with the positive growth rate of 0.17%. Greece's average rate of GDP per capita was -4.94%. Only four out of eighteen analyzed countries had positive average GDP per capita growth rates in this period; Austria (0.08%), Germany (1.04%), Sweden (0.64%) and Switzerland (1.22%). Positive and high beta coefficient from 2009 to 2013 is consistent with sigma divergence for the same period, when the only year of convergence was 2011. Including economic variables it can be concluded that in the time of the crisis, the West countries were diverging at the rate of 3.72%. The t-value is 2.01,

so it is statistically significant. Including socio-political variables in the analysis, the West countries were diverging at the rate of 4.15%, which is the highest rate of divergence for this group of countries, including absolute and conditional convergence with economic variables. The t-value is 1.52, so it is statistically insignificant. Even though it cannot be determined why countries converge or diverge, a large difference between the divergence rate between the pre-crisis and the crisis period can be explained by differences in unemployment rates and general government debts as percentage of GDP among the periods. Spain, Portugal and Ireland are among the countries that were hit by the crisis the hardest. In the period 2004-2008 their unemployment rates were 9.8%, 7.52% and 4.76% and in the period 2009-2013, the rates jumped to 22.36%, 13.02% and 13.66%. An average unemployment rate in these countries increased from 7.36% to 16.35%. General government debt as a percentage of GDP increased from 29% to 101.2% in Ireland, 38.9% to 105.6% in Iceland 67.7% to 109.3% in Portugal and 40.3% to 71.7% in Spain. Out of eighteen analyzed countries, only six of them fulfilled the convergence criterion that general government debt must not exceed 60% of GDP. Those countries are: Luxembourg (20%), Norway (27.7%), Switzerland (34.5%), Sweden (37.7%), Denmark (44.1%) and Finland (49.2%).

Graph 7: Absolute convergence in the West, 2009-2013

6. Conclusion

The paper examines the real convergence process in Western Europe from 1995 to 2013, with four sub-periods, 1995-2003, 2004-2013, 2004-2008 and 2009-2013. Two measures of convergence were used; sigma convergence, which measures the dispersion of the real GDP per capita through the coefficient of variation, and beta convergence, based on the neoclassical growth theory. The empirical results suggest that the Western European countries were mostly diverging in the analyzed periods. The highest rate of convergence was in the sub-period 1995-2003, with economic and socio-political variables, 5.79%, while the same rate for the EU-28 was 1.24%. The highest rate of absolute beta convergence was in the period 1995-2003, 1.37%, comparing to the divergence rate of 2.43% in the crisis period. The highest rate of absolute convergence in the EU-28 was 3.91% in the period 2004-2008, while in the period 1995-2003 was 1.71%. In the crisis period this rate was 1.15%. Including economic variables, the highest rate of convergence was in the period 1995-2003, 4.65%, comparing to the rate of divergence of 3.72% in the crisis period. Including economic and socio-political variables, from 1995 to 2013 the countries were converging at the rate of 2.07%, consistent with Barro and Sala-i-Martin (1992) findings. The highest rate of conditional convergence with economic variables in the EU-28 was

3.38% from 2004 to 2008, while including economic and socio-political variables, the highest rate was from 1995 to 2013, 1.91%. The only period of divergence in the EU-28 was 2009-2013, 0.61%, including economic and socio-political variables. Other than conditional convergence with economic variables in the period 2004-2008, the results for absolute and conditional convergence are consistent. The highest rates of convergence were in the period 1995-2013, and the highest rates of divergences were in the period of the crisis. The shortest half-life of convergence was in the period 1995-2003, with economic and socio-political variables, 12 years, while the longest was for absolute convergence from 1995 to 2013, 1078 years.

All of the graphs illustrate a characteristic that there are convergence clubs in Western Europe. Portugal and Spain are always in the same club, while Luxembourg and Switzerland are outliers. The countries that were hit the hardest by the crisis; Greece, Ireland, Spain, Portugal and Italy, had the lowest growth rates from 2009 to 2013, an average rate of -2.23%. Greece had the lowest rate of GDP per capita growth, -4.94%. However, analyzing other periods, it can be seen that these countries had high growth rates, an average rate of 3.42% in the period 1995-2003, with Ireland having the rate of GDP per capita growth of 7.1%.

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