Convergence of the two intra-EU regional markets

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Abstract

Using the classical β-convergence applied on the real income, our study proves the existence of two intra-EU regional markets, one formed by the old EU-15 members, and a second one formed by the newcomer states which accessed the EU by the 5th Enlargement, generating the largest integrated economy of the world. Our statistical analysis demonstrates for the first time that while still persistent, the two regional markets are going through an ongoing merge process which proves the progress reached by the newcomers in 2018 on the economic integration. The diminishing value of the β-coefficient in the decade following the financial crisis is explained by the decrease shown by the most annual growth rates as well as of the corresponding average change of the real GDP per capita calculated for all the EU economies in the period 2009-2018 compared with the period 2000-2008.

Key words: *beta-convergence, integration, regional market, EU, CEEC, statistical analysis*.

JEL: F14, O11, O24

1. **INTRODUCTION**

Recently, European Union celebrated a decade since the 5th Enlargement successfully generated the ever biggest common market following the access of 12 new members, among them 10 CEEC. Such an anniversary provided a good oportunity for a complex analysis concerning the newcomers integration. In the present work we report a comparative statistical analyse on the β-convergence of the EU economies before and after the financial crisis, i.e. for the period between 2000 and 2018, divided by the gap due to the financial crisis.

From the very beginning, one of the most important goals of EU was the attenuation of the disparities between the levels of members' economies. In time, and especially with EU expansion, the regional convergence became a basic principle of the regional policy. The economic integration can be understood as an economic arrangement between different regions in order

to reduce or even eliminate trade barriers accompanied by monetary policies coordination. Furthermore, the regional integration represents a supra-national process aiming to upgrade cooperation, typically political economy resolutions focused on the commercial interest of each Member State.

A series of papers and reports have demonstrated that, after 1980, the cross-state convergence and the intra-country divergence are coexisting processes in the EU, as a result of relative incomes rising in well-off regions of different countries. A lot of studies concerning the economic convergence of the income (i.e. GDP per capita) show a long term evolution, e.g. Brada et al. (2006), Constantini and Lupi (2005), Salinas-Jimenez et al. (2006), Paas *et al.*(2007), Chapman and Meliciani (2012), the later proving the convergence of UE-25. Meantime, they announce this convergence is a very slow process.

Analysing the conditional β-convergence of real income per capita for the EU-27 between 1990-2007, Cavenaile and Dubois (2011) show that the rates of convergence of the 12 NMS and of the 15 OMS significantly differ, pointing to the existence of two different groups of convergence in the EU.

Matkowski and Próchniak (2004), and Borys et al. (2008) analyse real convergence in CEE countries prior to EU accession. Rapacki and Próchniak (2009) conclude that EU enlargement contributed to the speeding-up of economic growth of the CEE countries.

Another study assenting the coexistence of two regional intra-EU markets is a recent CEPS paper (Alcidi et al., 2018). The authors show that the CEE countries register a neat convergence, while the Southern EU countries are divergent due to the systematical economic decrease.

Soon after the 5th EU Enlargement (2004; 2007), another global event to pay attention is the financial crisis followed by the European sovereign debt crisis occurred during a period of time in which several European countries faced the collapse of some financial institutions, high government debt and rapidly rising bond yield. The European financial crisis started in 2008, with the collapse of Iceland's banking system, and spread primarily to Greece, Croatia, Ireland, Portugal during 2008-9, followed soon by almost all the other European countries. The sovereign debt crisis led to a crisis of confidence for European businesses and economies. Most papers analyse the economic growth without considering the gap due to the financial crisis, e.g. Marzinotto (2012) or Dobrinsky and Havlik (2014) who report β-convergence on the state level, and consider the newcomers as forming a distinctive group of economies inside the EU common market. Excluding Luxemburg, Malta, and Cyprus as non-representative, Kramar (2015) considers apart the old EU members (OMS) from the new members (NMS), and concludes that the disparities fluctuation is moderate for the 14 OMS, some of them showing

convergence, but his graphical representations for the 10 analysed NMS show a clear divergent trend in the period before the financial crisis (2000-2008). Opposite, Marelli and Signorelli (2015) while emphasizing that a right analysis of the euro-zone should consider the period before the financial crisis apart from the period after it, in the same study they report a significant β-convergence of the whole EU-28 in the period between 1999 and 2014, completely neglecting the financial crisis break.

Economic convergence may be interpreted and measured in various ways. Here we use a statistical approach developed by Barro and Martin-i-Sala (1990) in the frame of the Solow neoclassical model of economic growth (Solow, 1956). In order to emphasize the impact of the global political and economic events onto the EU integration evolution, we analysed the β-convergence calculated in terms of per capita gross domestic product (GDP) for all the EU economies for the period between 2000 and 2018 divided in two by the financial crisis effects.

2 DATA AND METHODOLOGY

Our statistical analysis is based on the Eurostat annual aggregated GDP per capita in current market prices for all the EU members, file **nama_10_pc** downloaded on 4/5/2019, 5:00:50 PM.

An interesting characterisitc of many published analysis is the almost exclusive use of the PPS values of GDP per capita given as percentage, but no author explains this strange choice made by neglecting the clear Eurostat specification that these artificial values have to be used exclusively in cross-sectional statistics, and they are not valid for longitudinal (time) studies. Our study is among few which uses GDP per capita at current market prices (PPP), the proper statistical data in a longitudinal study.

In order to study the integration and related questions, the present paper combines the β-convergence calculated for a given time period with the income growth and change approach in order to explicitly quantify a demarcation of the two regional intra-EU markets, presumed to persist until now, as well as the progress registered by the newcomers on European economic integration. One regional market is formed by the EU-15 old member states (OMS) and the other is formed by the 12 new member states (NMS). As for the time period of interest, we decided to analyse a first period before the financial crisis, namely 2000–2008, and a second one after it, namely 2009–2018.

In order to evaluate the catch-up effect between the newcomers and the old EU members, we applied the classical β-convergence measured by the time dependence of the economic growth as defined by Barro and Sala-i-Martin [1991, 1992]:

$$\frac{1}{T}\ln\frac{y_{i,t-T}}{y_{i,t}} = a - \frac{1}{T}\left(1 - e^{-\beta T}\right)\cdot\left[\ln y_{i,t-T}\right], \quad i = 1, \dots, N \tag{1}$$

where:

$y_{i,t-T}$ represents the real GDP/cap of the *i* country for the first year of the studied period;

$y_{i,t}$ represents the real GDP/cap of the *i* country for the last year of the studied period;

T represents the analysed period in years, before (*T* = 8) and after (*T* = 10) the global financial crisis;

N = 12 for NMS, and *N* = 15 for OMS.

Expanding (1) in the Taylor series gives the following first two terms:

$$\frac{1}{T}\ln\frac{y_{i,t}}{y_{i,o}} = \alpha_1 + \alpha_2\cdot\ln y_{i,0} + \varepsilon_{i,t,t+T}, \quad i = 1, \dots, N \tag{2}$$

The linear reggression using the equation (2) will give the elasticity defined by the coefficient of the independent value $\ln y_{i,0}$:

$$\alpha_2 = -\frac{1}{T}\left(1 - e^{-\beta T}\right), \quad i = 1, \dots, N \tag{3}$$

The convergence speed of a group of economies is calculated by the expression of the β-coefficient obtained from (3):

$$\beta = -\frac{1}{T}\ln(1 + T\alpha_2), \quad i = 1, \dots, N \tag{4}$$

If this coefficient has a positive value, then the studied group of economies is convergent and its half-life representing the necessary time to cover half of the distance up to the steady state can be calculated by the equation:

$$t_{1/2} = \frac{\ln 2}{\beta}, \quad \beta > 0 \tag{5}$$

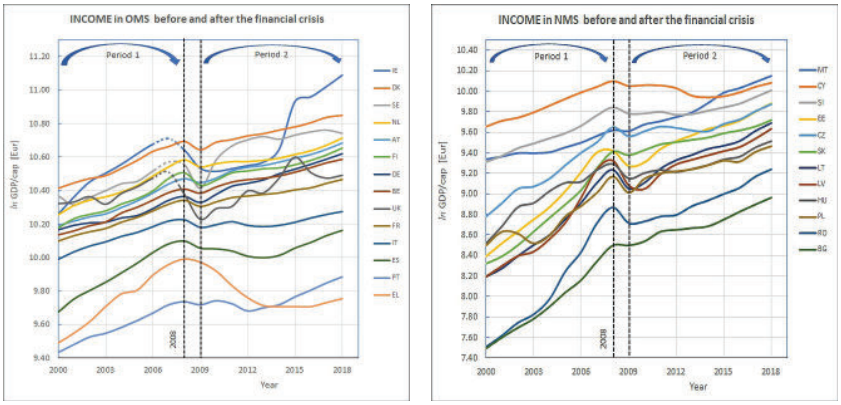
In case the β value is negative, then the studied group of economies is diverging with no catch-up effect.

3. EMPIRICAL RESULTS

In order to establish the crisis gap width to be excluded based on the empirical data and, consequently, the length of the before and after time periods, we used the logarithmic values of GDP/cap (PPP). Their evolution is represented in figure 1, *left* for the old state members (OMS) and *right side* for the new state members (NMS) for the whole studied time period from 2000 to 2018.

The GDP/cap log evolution based on the Eurostat data. Period 1 ended in 2008 by the financial crisis gap interrupting the development of OMS (*left*) and NMS (*right*), excepting Ireland, Sweden, and UK economies which felt the crisis impact in 2007 (highlighted by the interrupted line). Luxemburg GDP/cap values exceed the diagram. Period 2 started in 2009 for all the EU economies.

Fig. 1



(*own calculation*)

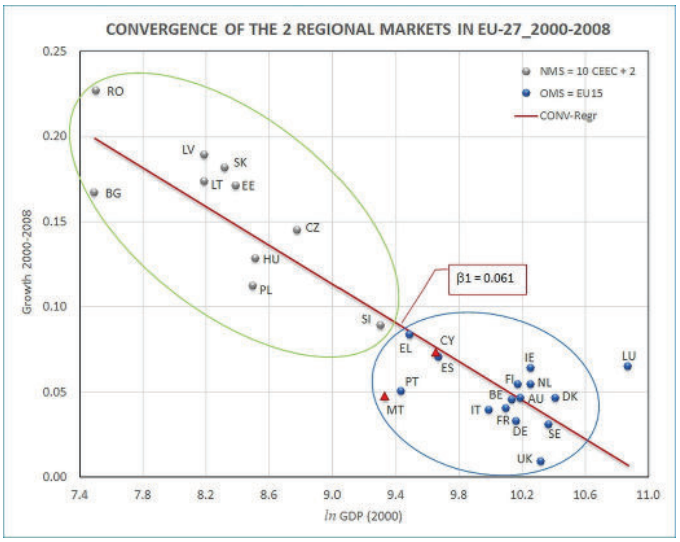
Following our calculation based on the Eurostat data, the left side diagram is showing that, excepting UK, Ireland, and Sweden, the first period can be considered as lasting until 2008 and the second period as starting in 2009 for all the other EU economies. Due to the very high values of its GDP/cap, Luxemburg was not included in the Figure 1.

As a basic method, the classical β-convergence was used to determine whether it could emphasize the existence of two regional markets inside the extended common EU market and whether their degree of separation is or not changing in time. Consequently, the β-convergence speed was obtained from the linear regression coefficient using (2–4) and the results corresponding to the two periods are shown in the Table 1.

As can be seen in the figure 2, in the Period 1 before the financial crisis the countries are well grouped and they form two regional markets completely separated. This fact could be easily explained by the short time passed after completing the 5th Enlargement (2004; 2007). Meanwhile, it should be noted the remarkable high speed of convergence, as the β-coefficient calculated by (4) is about 6 percent, giving a half-life of 11 years only to reach the half of the economic distance towards the common steady state of the whole EU.

The two regional markets are completely separated, as emphasized by the β-convergence in the Period 1 calculated using the Eurostat data

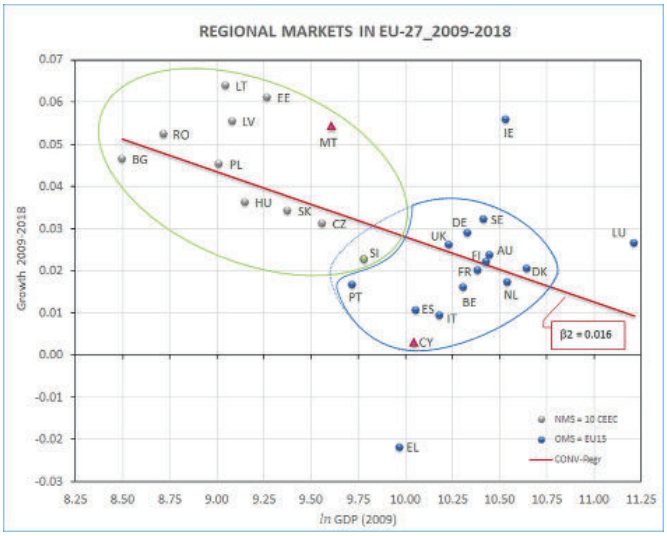
Fig. 2



(own calculation)

The two regional markets entered a merging process which demonstrates the NMS integration, as emphasized by the β-convergence in the Period 2 calculated using the Eurostat data

Fig. 3



(*own calculation*)

The evolution in the decade following the financial crisis, namely in the Period 2, shows an ongoing merge between the two regional markets. As Slovenia was definitely advancing inside the OMS regional market, it has to be included for now. This merging process represents an exclusive evidence denoting the progress on the economic European integration.

On the other side, the lower value of the β-coefficient – decreased to only 1.6% – shows a much slower catch-up effect and a corresponding 4 time longer half-life, as shown in Table 1.

The main values resulted from the regressions aplied on the income per capita for the period before and after the financial crisis

Table 1

Period	α2	err.	p_Value	Rsq	β	T_1/2
2000-08	-0.0569	0.00504	2.5E-11	0.83643	0.06079	11.40
2009-18	-0.0155	0.00501	0.00486	0.27636	0.01571	44.12

(own calculations)

In order to get an explanation for the great decline of the catch-up effect, we made a statistical analysis on the economical annual growth and total change during the two special periods.

Regarding the country's GDP/cap during the period following the financial crisis, there are several important facts to be noted in correlation with the evolution emphasized graphically in the figure 1 (Period 2). Generally speaking, for all the state members of EU – regardless they were old or new members – the economic recovery started immediately on or very soon after 2009, excepting Greece, Portugal, Spain, and Cyprus, for which the financial crisis was followed by several years of internal crisis, and the recovery trend began only after 2014.

The four Southern European countries ran a very large current account deficit, leading to lower exports. „*After the crisis, these countries needed to restore competitiveness through internal devaluation – essentially lower wages. This caused lower demand and lower growth*." (Pettinger, 2019)

According to the OECD, the eurozone debt crisis started in 2009 when the Greek government disclosed that its budget deficits were far higher than previously thought. The Greek crisis core was the dangerous amount of sovereign debt Greece owed the EU between 2008 and 2018. It was the biggest financial rescue of a bankrupt country in history, and to avoid default, the EU loaned Greece enough to continue making payments (Amadeo, 2020).

In the next three years, it escalated into the potential for sovereign debt defaults from Portugal, Italy, Ireland, and Spain. The return to economic growth and the improved structural deficits enabled Ireland and Portugal to exit

their bailout programmes in July 2014, and a recent economic analysis observes that „*in 2014 Portugal left the recession behind and started a significant recovery in 2015*" (Morais, 2018). Greece and Cyprus both managed to partly regain market access in 2014 , when they started the economic recovery with a positive annual growth (Skartsis, 2018). While in 2012 the Financial Times noted: „*Regarding the economy of Cyprus, this experienced several huge blows in and around 2012 including the exposure of Cypriot banks to the Greek sovereign debt crisis and the inability of the government to refund its state expenses*" (Wilson, 2012), Cyprus began to slowly regain its access to the private lending markets already in the middle of 2014, and starting with 2015 its annual growth was significant positive as can be observed on the figure 1, *right*.

For Spain, the recession period began in 2008, but the structural problems Spain had before the global financial crisis hit – including labour market inflexibility and youth unemployment – were aggravated by a combination of factors reducing nominal GDP and triggered a late sovereign debt crisis (Pettinger, 2015). In 2012 Spain was unable to bail out its financial sector and had to apply for a €100 billion rescue package provided by the European Stability Mechanism. (Eguidazu BDE, 2017). As can be seen on the figure 1 (*left*), starting with 2014, the Spanish economy succeeded positive growth rates, and in 2017 it is finally set to return to its pre-crisis level.

Similarly, Italy had own structural problems long before the global financial crisis. And similarly, the economy of Italy, the third largest economy in EU had decreased after 2012, suffering from the fallout of the sovereign debt crisis in the currency area, and showing a slow rate of GDP/cap growth only after 2014.

On the other side, the evolution of the UK GDP/cap in the Period 2 (Fig.1, *left*) shows a high recovery rate of growth after the financial crisis until 2015. Afterwards, as expressed by Chris Williamson, chief economist at IHS Markit (a global financial information and services company) and former member of the UK Parliament, „*Uncertainty over 'Brexit', weak overseas growth, and financial market volatility are all creating an unsettling business environment and point to downside risks to the economy in 2016*" (Williamson, 2016).

Finally, an explanation for the notable evolution of the Ireland economy in the middle of the Period 2 is given by the Central Statistics Office of this country: „*This unprecedented increase in GDP in 2015 is due to the globalisation activities of a very small number of companies*" (CSO, 2015). In the process known as an *inversion*, due to its low corporate tax regime, Ireland has become a popular end destination in these corporate manoeuvres. Therefore, after several foreign companies that switched their base to Ireland were included in the value of its corporate sector, the Irish economy grew three times faster then expected in 2015, as noted by the economics correspondent to The Guardian (Inman, 2016).

Partly, the GDP/cap increase was due to to the monetary policy pursued by the European Central Bank beginning with 2013.

Considering these facts and aiming to have an explanation for the observed significant slowdown of the catch-up effect, we calculated the annual growth rate of the real GDP/cap (PPP) in Euro for each of the EU member state for both periods by OLS using the Eurostat database. As shown by the results in the Table 2, the average annual growth rate γ1 and γ2 given by the independent variable coefficent are robust, as the corresponding *p*-Values are much less than 1%, and the R square values are good.

Annual growth rate before and after the global finanacial crisis for all the EU economies, using Eurostat database. During the Period 2, the different type of evolution is highlighted in red

Table 2

	EU-27 Country	Period 1*				Period 2**			
		γ1 Annual growth (coeff.)	coeff err.	*p*-Value	Rsq	γ2 Annual growth (coeff.)	coeff err.	*p*-Value	Rsq
NMS Regional Market	Bulgaria	372	36	1.77E-05	0.94	299	26	2.81E-06	0.94
	Cyprus	1092	48	8.15E-08	0.99	-740; +820	102	4.09E-03	0.96
	Czechia	1053	83	4.46E-06	0.96	463	95	1.23E-03	0.96
	Estonia	1062	86	5.17E-06	0.96	949	40	1.01E-08	0.96
	Hungary	695	35	1.96E-07	0.98	411	50	3.47E-05	0.98
	Latvia	818	80	1.81E-05	0.94	705	37	2.24E-08	0.94
	Lithuania	960	132	1.63E-04	0.88	797	45	2.73E-07	0.88
	Malta	432	54	9.26E-05	0.90	1216	71	1.44E-07	0.90
	Poland	525	101	1.22E-03	0.80	434	38	3.28E-06	0.80
	Romania	654	82	9.57E-05	0.90	467	41	2.99E-06	0.90
	Slovakia	932	64	1.77E-06	0.97	479	95	1.45E-03	0.97
	Slovenia	985	101	2.52E-05	0.93	450	25	6.37E-08	0.93
OMS Regional Market	Austria	1036	88	2.32E-05	0.96	944	43	2.00E-08	0.98
	Belgium	1038	60	2.44E-06	0.98	739	38	4.65E-08	0.98
	Denmark	1368	96	7.69E-06	0.97	1009	37	3.69E-09	0.99
	Finland	1162	97	2.01E-05	0.96	812	62	1.16E-06	0.95
	France	832	44	1.39E-06	0.98	518	29	9.98E-08	0.98
	Germany	635	79	1.98E-04	0.92	1085	31	5.11E-10	0.99
	Greece	1130	44	2.21E-07	0.99	-1280;+200	61	4.67E-02	0.78
	Ireland (*a*)	2304	79	1.09E-07	0.99	3514	509	1.24E-04	0.86
	Italy	768	18	1.27E-08	1.00	242	59	3.29E-03	0.68
	Netherlands	1239	93	1.11E-05	0.97	691	87	4.63E-05	0.89
	Portugal	558	25	5.11E-07	0.99	-500; +689	36	4.43E-05	0.99
	Spain	1121	31	2.75E-08	1.00	-360; +900	20	2.42E-05	0.99
	Sweden (*a*)	1136	171	5.65E-04	0.88	+4800;+390	112	1.72E-02	0.72
	United Kingdom (*a*	896	161	1.42E-03	0.84	1057	242	2.40E-03	0.84
	Luxembourg	3427	401	1.42E-04	0.92	2206	159	7.09E-07	0.96

* NMS & OMS Period 1 = 2000–2008; (*a*) OMS exceptions = 2000–2007

** NMS & OMS Period 2 = 2009–2018

(own calculation)

As highlighted in red in the Table 2, the economies of Greece, Portugal, Spain, and Cyprus registered a negative growth rate after 2009, but a positive recovery in the second part of the Period 2, starting with 2014. Regarding the Swedish economy, its most recent shrink is reflected by a much lower value of the annual growth, of 390 €/year only.

Mean values of the real GDP/cap change before and after the global financial crisis for the two regional markets and several quantitative measures reflecting the slower evolution after the crisis, calculated using Eurostat database

Table 3

	EU-27 Country	GDP/cap - Change		Financial crisis	Recovery	γ1–γ2 Annual	Annual growth
		Period 1 * [pp]	Period 2 ** [pp]	gap 2008/09 [pp]	value 18/08 [pp]	growth change [€/cap]	loss/gain in Period 2 [regr.]
NMS Regional Market	Bulgaria	199	56	0.00	59.18	-72	-19%
	Cyprus	58	2	-4.55	-1.65	-1012	-93%
	Czechia	140	30	-8.39	25.16	-590	-56%
	Estonia	232	82	-13.82	58.54	-113	-11%
	Hungary	105	41	-12.96	25.00	-284	-41%
	Latvia	305	76	-21.43	57.84	-255	-27%
	Lithuania	230	85	-16.67	36.61	-21	-3%
	Malta	32	78	-0.67	70.67	785	182%
	Poland	97	45	-14.58	34.38	-91	-17%
	Romania	490	75	-14.08	45.07	-187	-29%
	Slovakia	251	36	-5.85	18.09	-482	-51%
	Slovenia	70	24	-3.28	36.07	-506	-52%
NMS Mean Change		184	52				
OMS Regional Market	Austria	28	25	-2.27	23.80	-91	-9%
	Belgium	29	20	-2.42	19.34	-299	-29%
	Denmark	29	21	-4.77	16.82	-359	-26%
	Finland	31	21	-7.12	15.89	-350	-30%
	France	24	15	-3.55	13.23	-315	-38%
	Germany	17	32	-3.47	29.02	450	71%
	Greece	61	-19	-6.88	-21.10	-2210	-196%
	Ireland (*a*)	55	101	-17.86	46.21	1210	53%
	Italy	25	8	-4.35	5.07	-525	-68%
	Netherlands	31	17	-4.06	13.96	-548	-44%
	Portugal	31	18	-1.78	15.98	-244	-44%
	Spain	50	11	-8.64	6.58	-581	-52%
	Sweden (*a*)	27	27	-14.62	17.69	-665	-59%
	United Kingdom (*a*)	21	33	-24.52	-1.91	161	18%
	Luxembourg	48	26	-4.75	24.13	-1221	-36%
OMS Mean Change		34	25				

* NMS & OMS Period 1 = 2000–2008; (*a*) OMS exceptions = 2000–2007

** NMS & OMS Period 2 = 2009–2018

(own calculation)

The total change registered by the GDP/cap in each of the two special periods is presented in the Table 3 in percentage points. The mean value of the registered change in the decade after the global crisis is only 52 pp for the newcomers regional market, compared with the more than three times higher value of 184 pp registered before the global financial crisis. Furthermore, the comparison between the mean change calculated for the OMS regional market before the global financial crisis (34 pp) and the corresponding mean change after it (25 pp) show a significant decrease, too. This result represent a good explanation for lowering the convergence speed of the whole European Union, as shown in the Figure 3.

Excepting the special case of the countries affected by the European sovereign debt crisis, the global financial crisis effect was mostly a single year recession. Among the newcomers, the less affected country was Bulgaria, followed by Malta, and the most affected one was Latvia with a decrease of 21.43 pp, as shown in the third column of the Table 3. Among the Western regional market countries, the most affected was UK registering a decrease of 24.52 pp, followed by Ireland (-17.86 pp) and Sweden (-14.62 pp), and the less afected was Portugal which registered a decrease of 1.78 pp only.

A first quantitative measure of the crisis impact is given by the recovery value, calculated as the difference between the lower annual growth rate after the crisis and the high annual growth rate before the crisis, the results being shown in the Table 3. Another quantitative measure of the slower evolution in the Period 2 is given by the loss in the annual growth, expressed in percentage in the last column, where the green lighlights the few gain cases.

In the NMS regional market, beside Malta which almost doubled its annual growth rate after a quite insignificant crisis effect, it is notable the evolution of Lithuania, which registered a minimal loss of 3% of its annual growth rate. Likewise, in the OMS regional market, Ireland and UK show a fast recovery, with an annual growth rate with 53%, respectively with 18% higher than their values before the crisis. Recording a low impact of the financial crisis of 3.47 pp only, Germany succeeded the highest gain of the annual growth rate, equal to 71%.

All the other countries registered lower values of the annual growth rate in the Period 2, in comparison with own values in the Period 1. The countries affected by the sovereign debt crisis registered a late recovery period, between 2014 and 2018. During these recent years, in comparison with the period before the global financial crisis, Portugal registered an annual growth rate higher by 23%, but Spain is recovering by an annual growth lower by 20%. The sovereign debt crisis impact was a lost of 24% in the real GDP/cap, followed in the last years of the Period 2 by a low, but steady annual

growth rate equal with just 18% of the annual growth rate reported before the crisis, actually showing a huge decrease of 82%.

4. CONCLUSION

The existence and persistence of two regional markets inside the extended European common market is revealed by the classical β-convergence. Taking in account the gap generated by the financial crisis our statistical analysis was realised on a large time period, between 2000 and 2018, comparing the evolution in the decade after the crisis, meaning between 2009 and 2018 with the evolution up to 2008 before the financial crisis.

Our statistical analysis shows that the impact of the financial crisis was not just the steep decrease of the economic growth rate, but a serious diminish of the catch-up effect, resulting in four times longer half-life to reach the half-distance up to the Solow steady state. This decrease of the β-convergence can be explained by the lower mean annual growth rate of each of the regional markets, as the number of shrinking economies overpowers the few of faster growth.

The distribution of the member states around the β-convergence descending line in the period before the financial crisis show two clearly separated groups of countries, representing the two regional markets: one built up by the EU-15 old member states and another built up by the newcomers. Otherwise, in the decade after the crisis, the distribution changed emphasizing a merge between the two regional markets. This quite interesting merging process represents an obvious evidence of the successful ongoing economic integration.

At least in our knowledge, the present study is the first revealing this evidence.

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