

Institutional and Socio-Economic Convergence in the European Union

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Abstract

The objective of this paper is to analyze convergence in institutional, social, and macroeconomic conditions between EU member states. Our analysis covers the period 1995-2013 and considers the potential impact of the Great Recession. With this aim, we use a composite indicator that combines information from 51 hard and soft indicators, and we estimate convergence equations for the composite indicator and its seven dimensions considering different country groups. The obtained results show evidence of conditional convergence among EU member states but limited evidence of unconditional convergence over the considered period.

Keywords: convergence, economic performance, social indicators, institutional quality, European Union

JEL classification: C43, F62, O43

1 Introduction and Objectives¹

Economic and social cohesion are two of the main objectives of the European Union (EU). In fact, the Europe 2020 strategy, launched in 2010, tries to address the shortcomings of the European growth model by creating the conditions for smart, sustainable, and inclusive growth. In particular, priorities have been set not only in economic outcomes but also in other aspects related to the following: employment; research and development; climate/energy; education; social inclusion; and poverty reduction. However, after the different enlargements of the EU and several decades of impressive outcomes (see Gill and Raiser, 2012), the fact that due to the Great Recession, convergence among EU member states has probably slowed – and even reversed in some parts of Europe – has been recently recognized by the European Commission (2014).

In this context, while economic convergence, usually measured as gross domestic product (GDP) per capita convergence, has attracted significant academic attention (Borsi and Metiu, 2013), studies on institutional and social convergence within the European Union from a wide perspective are relatively scarce. In fact, the main limitation for EU-level analysis is data availability and comparability; therefore, most researchers focus on individual country studies. One example of this literature is Liargovas and Fotopoulos (2009) who analyzed the socio-economic convergence between Greek regions. Some notable exceptions are Rodriguez-Pose and Tselios (2013) who analyze EU convergence trends in social welfare or Savoia and Sen (2012) who consider convergence in institutions.

Our paper contributes to this literature from two perspectives: first, we take advantage of a recently developed composite indicator (López-Tamayo et al., 2014) that permits us to analyze convergence in institutional, social, and macroeconomic conditions in a wide sample of countries, including the 28 EU member states. The use of composite indicators to compare different dimensions between developed and emerging economies (and even within them) is not

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straightforward. The literature is currently expanding this view not only in economic terms but also in social and institutional dimensions; for instance, see Giambona and Vasallo (2014) or Çolak and Ege (2013). In fact, the methodology developed by López-Tamayo et al. (2014) adds to the growing literature that tries to overcome the shortcomings of unidimensional approaches such as those focusing on Gross Domestic Product per capita, those based on a wide set of variables², or those based on a multidimensional index such as the United Nations' Human Development Index that has been widely criticized in the literature (e.g., Wu et al., 2014). This composite indicator allows us to analyze the comparative situation among countries considered from different dimensions. The wider perspective in the construction of the index allows us to focus on very different questions using a homogeneous dataset. For instance, the overall index can be used to analyze the pros and cons of a particular policy that attempts to attract foreign direct investment from an economic point of view; but at the same time it can also analyze the impact on institutional and social aspects (e.g., related to the functioning of the labor market once foreign investors have entered the country).

The second contribution of our research is related to the fact that our analysis covers the period between 1995 to 2013. This period permits us to consider the impact of the Great Recession in different considered dimensions by analyzing the impact of the business cycle on convergence trends comparing the two sub-periods before and during/after the crisis. Although the convergence process predicted by the neoclassical model occurs in the long run, as suggested by Beyaert and García-Solanes (2014), short-run conditions can affect long-run convergence through different channels. For instance, if during an expansionary phase, and thanks to the improvement in public finances, public research and development (R&D) investments increase; this will not only contribute to short-term improvement of the economy but also to long-run productivity, increasing the speed of convergence. The main assumption is that the convergence process

2 For instance, Niroomand and Nissan (2007) analysed socio-economic gaps between EU countries considering 45 different variables but not simultaneously.

is non-linear and that countries with different short-run conditions could deviate from the long-run trend towards convergence.

The rest of the paper is structured as follows. First, the methodology used in the study and details on data sources and variable definitions are provided in the next section. The empirical results are shown in the third section, and the paper concludes by summarizing the main findings.

2 Data Sources and Methodological Issues

Our analysis of socio-economic and institutional convergence in the European Union is based on the Institutional, Social, and Economic Performance Index (ISEPI) developed by López-Tamayo et al. (2014). The ISEPI is built from 51 variables that comprise both hard and soft data (Figure 1), and it comprises the following seven main sub-indexes that try to consider identified, measurable, and comparable socioeconomic aspects that are relevant from a global perspective.

- *Macroeconomic environment (I1)*: This sub-index measures the economic environment of the country. It takes into account GDP, labor, public accounts, investment, international trade, and financial issues.
- *Costs and prices (I2)*: This sub-index considers different variables related to prices and costs, including consumer prices, labor costs, hourly wages, cost of living and exchange rates.
- *Productivity and human capital (I3)*: This sub-index summarizes different aspects related to labor productivity and the level of human capital of every country, including schooling levels, availability of qualified workers, among others.
- *Technological and innovative capacity (I4)*: This sub-index covers the aspects related to the technological capacity of the country as well as the

Several databases were used to gather data regarding the 51 considered indicators, including the following: the World Bank World Development Indicators, the World Investment Report by the United Nations Conference on Trade and Development, The International Institute for Management Development datasets, and additional variables from the Conference Board and The World Economic Forum datasets. The period considered is 1995-2013, and data is provided for 77 countries including a wide sample of economies: the most competitive economies according to the World Economic Forum, the 28 members of the European Union, and several emerging economies. The final sample of countries is formed by the set of 77 countries listed in table A1.

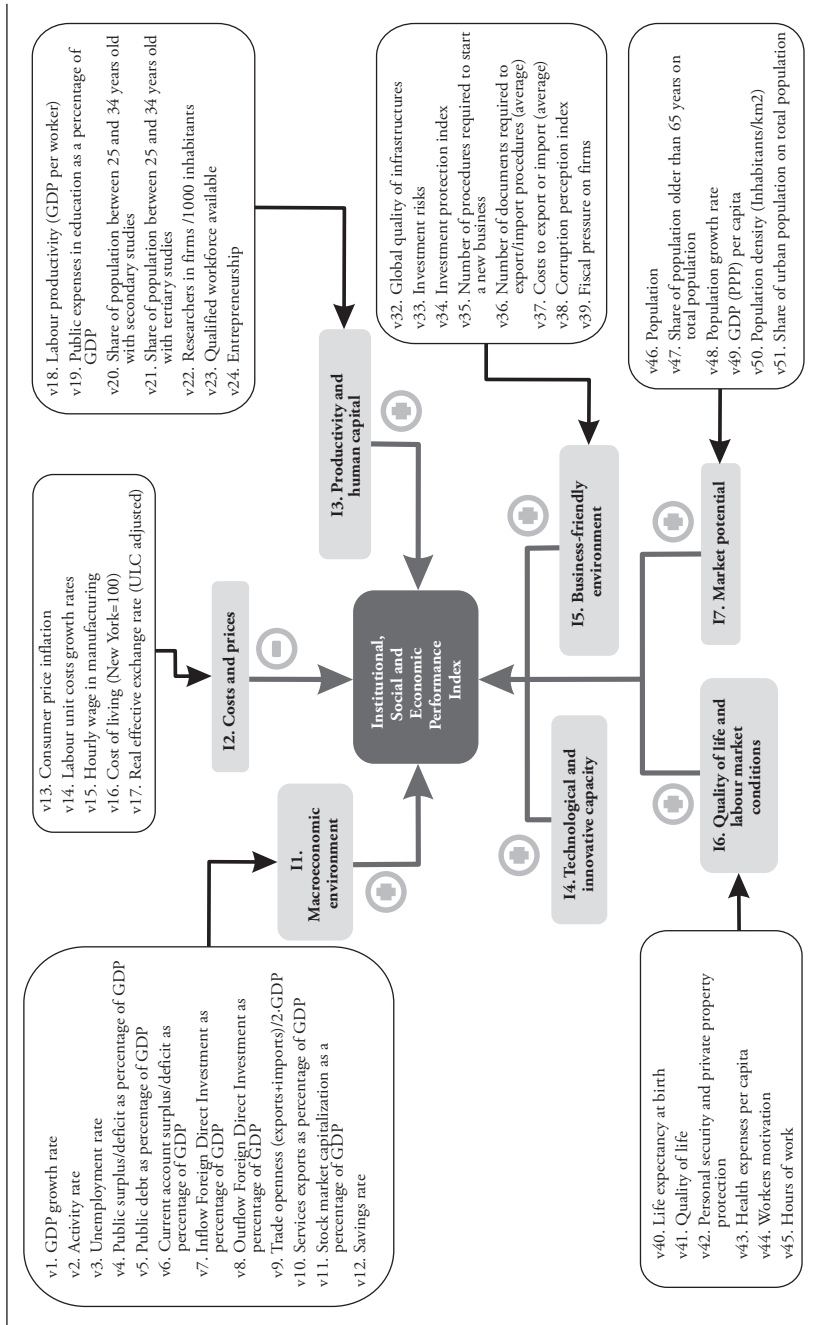
In order to assess whether a convergence process in the ISEPI and its seven sub-indexes have been observed between 1995 and 2013, we start with the analysis of the evolution of the standard deviation of the ISEPI, which is the usual tool to check for sigma-convergence. Next, we continue our analysis with an unconditional β -convergence analysis running the following *a la Barro and Sala-i-Martin* (2003) regression:

$$g_i = \alpha + \beta I_{0,i} + \epsilon_i . \quad (1)$$

where g denotes the annualized growth rate between 1995 and 2013 of the considered index, I_0 represents its initial value, and ϵ_i is an error term that captures common transitional shocks for all countries. The parameter β captures the speed of convergence into a unique steady-state and is assumed to be common to all countries involved in the analysis. Equation (1) is also estimated for two different sub-periods analyzing convergence between 1995 and 2007 (pre-crisis) and 2007 and 2013 (during/after the crisis).

In order to evaluate if convergence to a country-specific steady state is observed in the considered period, we next run the following conditional β -convergence regression for the ISEPI and the different sub-indexes under a panel data framework:

Figure 1: Structure of the Institutional, Social, and Economic Performance Index (ISEPI).



$$g_{it} = I_{0,it} \beta + Z_i + T_t + \epsilon_{it} . \quad (2)$$

where g_{it} represents the annual growth rate of each index, $I_{0,it}$ the initial values of each index, Z_i and T_t denote, respectively, country and time specific fixed effects, and lastly ϵ_{it} is a random error term. As before, Equation (2) is estimated for the whole period (1995-2013) and for two sub-periods (1995-2007 and 2008-2013). The validity of the assumption in relation to the structural break point is assessed by Chow tests.

The results of this empirical analysis are shown in the next section.

3 Empirical Results

Table 1 shows the 2013 ranking for the 77 considered countries according to the values of the ISEPI. If we look at the top positions with values of the ISEPI higher than 4.5 points, we find Singapore (1st, 5.33), Luxembourg (2nd, 4.79), Sweden (3rd, 4.64), Finland (4th, 4.59) and Denmark (5th, 4.55). Other EU member states are also located in the upper part of the table like the Netherlands, Ireland, Belgium, Austria, Germany, United Kingdom, and France that are within the first 20 positions. Slovenia, Estonia, Malta, Czech Republic, Spain, Lithuania, Portugal, Italy, Poland, Cyprus, Latvia, Slovakia, and Greece follow in the rankings. The last positions are covered by developing African countries such as Angola (75th, 1.99), Tanzania (76th, 1.99), and Nigeria (77th, 1.91).

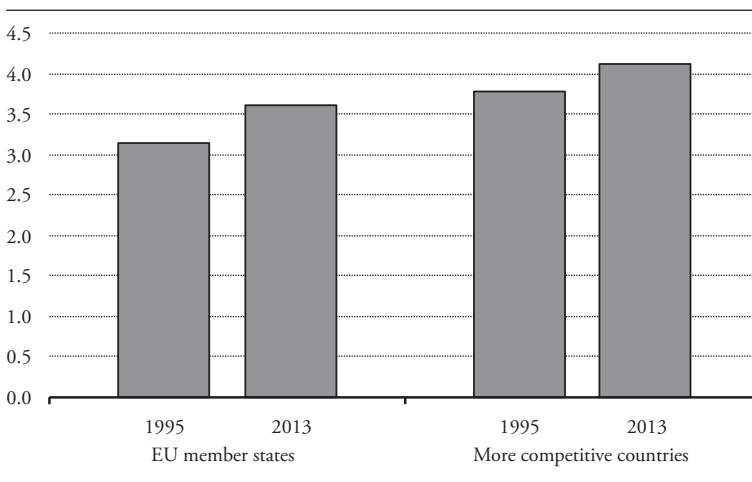
Figure 2 shows the unweighted average value of the ISEPI in 1995 and 2013 for the 28 EU member states and the ten more competitive economies (not in the EU) according to the World Economic Forum report (in alphabetical order, Australia, Canada, Japan, Korea, Qatar, Saudi Arabia, Singapore, Switzerland, United Arab Emirates and the United States of America). From this figure, it is clear that on average EU member states are lagging behind the more competitive world economies.

Table 1: Country Ranking According to the ISEPI Index for 2013

Country	ISO	ISEPI	Country	ISO	ISEPI
Singapore	SGP	5.33	Jordan	JOR	2.78
Luxembourg	LUX	4.79	West Bank and Gaza	PSE	2.78
Sweden	SWE	4.64	Mexico	MEX	2.76
Finland	FIN	4.59	Turkey	TUR	2.76
Denmark	DNK	4.55	Kazakhstan	KAZ	2.72
Netherlands	NLD	4.49	Libya	LBY	2.71
Switzerland	CHE	4.47	China	CHN	2.71
Ireland	IRL	4.43	Tunisia	TUN	2.66
United States of America	USA	4.40	Lebanon	LBN	2.65
Israel	ISR	4.34	Viet Nam	VNM	2.62
Belgium	BEL	4.26	Azerbaijan	AZE	2.61
Austria	AUT	4.24	Philippines	PHL	2.61
Canada	CAN	4.20	Russian Federation	RUS	2.61
Korea, Republic of	KOR	4.19	Croatia	HRV	2.60
Germany	DEU	4.09	Morocco	MAR	2.58
Japan	JPN	4.08	Georgia	GEO	2.56
Australia	AUS	3.97	Armenia	ARM	2.51
United Kingdom	GBR	3.97	Argentina	ARG	2.48
France	FRA	3.95	Brazil	BRA	2.48
Malaysia	MYS	3.74	Colombia	COL	2.48
United Arab Emirates	ARE	3.70	Bulgaria	BGR	2.47
Slovenia	SVN	3.60	Indonesia	IDN	2.47
Estonia	EST	3.60	Peru	PER	2.46
Qatar	QAT	3.55	Moldova	MDA	2.41
Malta	MLT	3.50	Romania	ROU	2.40
Czech Republic	CZE	3.39	Egypt	EGY	2.32
Spain	ESP	3.35	South Africa	ZAF	2.32
Lithuania	LTU	3.34	Algeria	DZA	2.31
Saudi Arabia	SAU	3.26	Belarus	BLR	2.31
Portugal	PRT	3.26	Ukraine	UKR	2.27
Italy	ITA	3.21	Iran, Islamic Republic of	IRN	2.26
Chile	CHL	3.21	Senegal	SEN	2.20
Poland	POL	3.15	Syrian Arab Republic (Syria)	SYR	2.18
Cyprus	CYP	3.10	India	IND	2.08
Hungary	HUN	3.08	Kenya	KEN	2.03
Thailand	THA	3.07	Angola	AGO	1.99
Latvia	LVA	3.07	Tanzania, United Republic of	TZA	1.99
Slovakia	SVK	2.94	Nigeria	NGA	1.91
Greece	GRC	2.85			

However, the comparison between 1995 and 2013 also permits us to conclude that the evolution in the last two decades has been quite similar. In order to avoid potential biases in the comparison due to the consideration of only the initial and the final year in our sample, Figure 3 shows the same information for each considered year. The observed patterns are quite similar to the ones described in Figure 2. In fact, nearly parallel trends are observed between the two groups of countries.

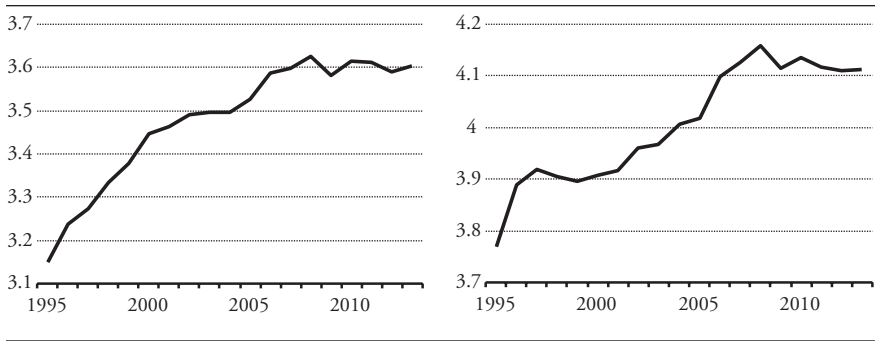
Figure 2: Average Value of the ISEPI in 1995 and 2013 (Selected Countries' Groups)



Source: Authors' calculations.

Figure 4 shows the evolution between 1995 and 2013 of the standard deviation of the ISEPI, the usual tool to check for sigma-convergence. As we can see, disparities among EU member states increased during the first years of the analyzed period, but they remained fairly stable during the rest of the period. The standard deviation increased from values around 0.55 in 1995 to 0.7 in 2013, although it has halted after 2000. The trend is very different from the one observed among the ten more competitive world economies, where the initial value of the standard deviation was much higher than the value observed for the EU member states (close to 0.8 in the mid-90s), and the final values are below 0.6.

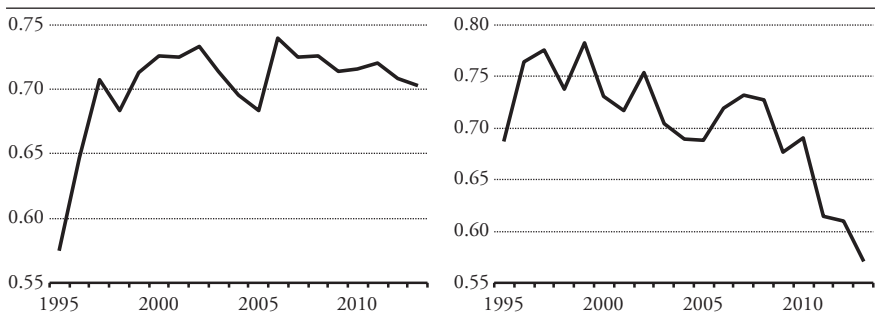
Figure 3: Evolution of ISEPI Between 1995 and 2013 (Selected Countries' Groups)



Source: Authors' calculations.

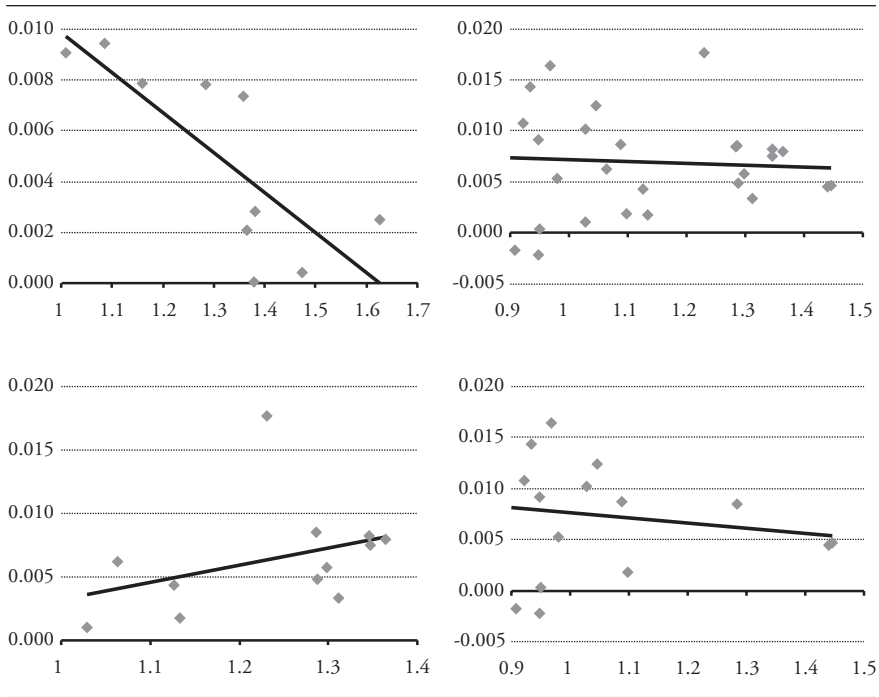
A similar conclusion is obtained when annualized growth rates of the ISEPI between 1995 and 2013 are regressed on the initial levels. In the first panel of Figure 5, we can see that there is a clear convergence trend that is not appreciated when the 28 EU member states are considered (second panel). In fact, the evidence shown in this panel of the figure clearly points to the existence of convergence clubs between the EU member states. While old EU member states seem to converge to a higher ISEPI value and are part of the best position club (with the exception of Mediterranean countries), new member states from central and eastern Europe form a second club; however, Romania, Bulgaria, and Croatia do not seem to be included.

Figure 4: Sigma-Convergence (ISEPI Standard Deviation) – Selected Countries' Groups



Source: Authors' calculations.

Figure 5: Unconditional Beta-Convergence – Selected Countries' Groups



Source: Authors' calculations.

Table 2 shows the results of estimating beta-convergence regressions using a cross-sectional specification (unconditional convergence). The results from the cross-sectional specification are related to unconditional convergence. Under this framework, it is assumed that countries are converging to the same steady-state (i.e., long-run levels will be the same for each country) and, for this reason, in case of convergence, countries with lower initial levels need to grow faster than the others in order to catch up.

Each row shows the result of a different variable; it starts with the ISEPI and is followed by the rest of the sub-indexes. The first column of the table shows the results for the 28 EU member states; the second column shows the results

for the EU old member states; the third column shows results for the EU new member states; and the fourth column shows the results for the more competitive economies. For each group of countries and indicator, results are provided for three different periods: the first column shows the results for the annualized growth in the considered indicator between 1995 and 2013 compared to the initial value in 1995; the second column shows the results for the annualized growth in the considered indicator between 1995 and 2007 compared to the initial value in 2007; and the last column shows the results for the annualized growth in the considered indicator between 2007 and 2013 compared to the initial value in 2007.

From this table, and starting with the ISEPI, we can see that this scenario is only observed for the more competitive economies, is driven by the behavior of these economies during/after the crisis. The same is valid for sub-indexes related to productivity and business-friendly environment. However, convergence processes in cost and prices and technological and innovative capacity have been negatively affected by the worst short-run conditions.

Similar results are obtained for the 28 EU member states where unconditional (or absolute) convergence is only observed for the sub-indexes related to “Technological and Innovative capacity” and “Business friendly environment”, but not for the overall index. It is worth mentioning that the analysis by sub-periods shows changes in the convergence dynamics in relation to costs and prices (where the more recent data show a more similar evolution between considered countries) and market potential (where the opposite result is observed).

Our estimates also show convergence among new EU member states for nearly all sub-indexes except “Productivity and human capital” and “Business friendly environment”. However, absolute convergence is only observed during the second sub-period in macroeconomic conditions and costs and prices.

Table 2: Unconditional Beta-Convergence Analysis Using a Cross-Sectional Specification (Annualized Growth Compared to Initial Level)

	28 EU member states			12 EU old member states			16 EU new member states			10 More competitive countries								
	1995-2013	1995-2007	2007-2013	1995-2013	1995-2007	2007-2013	1995-2013	1995-2007	2007-2013	1995-2013	1995-2007	2007-2013						
ISEP1	Coeff	-0.0018	0.0022	-0.0063	0.0138	**	0.0072	0.0077	-0.0051	0.0005	-0.0079	-0.0158	***	-0.0071	-0.0318	***		
	SE Coeff	0.0054	0.0066	0.0057	0.0060	0.0091	0.0088	0.0057	0.0057	0.0076	0.0069	0.0035	0.0065	0.0065	0.0025			
	R ²	0.0038	0.0037	0.0402	0.1387	0.0154	0.0850	0.0251	0.0850	0.0251	0.0002	0.0452	0.6140	0.191	0.191	0.8047		
I1	Coeff	-0.0113	-0.0098	-0.0057	0.0103	0.0072	0.0111	0.0111	-0.0465	***	-0.0483	***	-0.0121	-0.0049	-0.0080			
	SE Coeff	0.0116	0.0136	0.0101	0.0107	0.0152	0.0121	0.0072	0.0072	0.0107	0.0296	0.0082	0.0132	0.0151	0.0151			
	R ²	0.0480	0.0291	0.0060	0.0572	0.0236	0.0396	0.5606	0.5606	0.4151	0.2318	0.5555	0.0057	0.0057	0.0489			
I2	Coeff	-0.0060	-0.0286	-0.0521	**	0.0052	-0.0165	-0.0392	-0.0289	**	-0.0570	**	-0.1133	***	-0.0224	-0.0763	***	
	SE Coeff	0.0097	0.0215	0.0239	0.0126	0.0410	0.0293	0.0098	0.0098	0.0213	0.0199	0.0176	0.0145	0.1433	0.1433			
	R ²	0.0266	0.1076	0.2426	0.0220	0.0330	0.1944	0.4943	0.4943	0.3249	0.6232	0.3119	0.8387	0.0199	0.0199			
I3	Coeff	-0.0053	-0.0118	-0.0003	-0.0162	*	-0.0150	-0.0010	-0.0010	-0.0040	-0.0028	0.0046	0.0172	-0.0182	**			
	SE Coeff	0.0050	0.0079	0.0074	0.0087	0.0167	0.0170	0.0052	0.0052	0.0095	0.0078	0.0115	0.0194	0.0054	0.0054			
	R ²	0.0418	0.0890	0.0000	0.2121	0.2261	0.0472	0.0013	0.0013	0.0084	0.0046	0.0209	0.0957	0.4171	0.4171			
I4	Coeff	-0.0201	***	-0.0308	***	0.0079	-0.0155	***	-0.0283	***	0.0115	-0.0216	***	-0.0326	***	-0.0217		
	SE Coeff	0.0034	0.0040	0.0060	0.0037	0.0050	0.0064	0.0045	0.0045	0.0054	0.0075	0.0042	0.0048	0.0122	0.0122			
	R ²	0.5096	0.6682	0.0389	0.5886	0.6786	0.1463	0.4430	0.4430	0.6251	0.0548	0.6583	0.5956	0.3755	0.3755			
I5	Coeff	-0.0501	***	-0.0771	***	-0.0210	***	-0.0455	***	-0.0694	***	-0.0416	-0.0553	-0.0126	-0.0705	**	-0.1208	**
	SE Coeff	0.0088	0.0145	0.0071	0.0070	0.0128	0.0086	0.0245	0.0245	0.0362	0.0094	0.0286	0.0480	0.0110	0.0110			
	R ²	0.2809	0.2627	0.1835	0.4529	0.3856	0.4523	0.0821	0.0821	0.0681	0.0495	0.2305	0.2232	0.3652	0.3652			
I6	Coeff	-0.0099	-0.0120	-0.0041	0.0131	0.0031	0.0155	-0.0137	**	-0.0156	*	-0.0065	-0.0064	0.0065	-0.0309			
	SE Coeff	0.0062	0.0079	0.0140	0.0127	0.0176	0.0209	0.0063	0.0063	0.0083	0.0182	0.0104	0.0061	0.0318	0.0318			
	R ²	0.0930	0.0943	0.0069	0.0785	0.0030	0.0583	0.1019	0.1019	0.0918	0.0110	0.0643	0.1955	0.1863	0.1863			
I7	Coeff	-0.0131	*	-0.0213	**	-0.0048	0.0190	*	-0.0081	0.0465	-0.0174	**	-0.0288	***	-0.0060	-0.0098	-0.0009	-0.0318
	SE Coeff	0.0065	0.0086	0.0147	0.0090	0.0116	0.0258	0.0062	0.0062	0.0094	0.0168	0.0072	0.0103	0.0199	0.0199			
	R ²	0.1896	0.2797	0.0052	0.1133	0.0222	0.1862	0.5088	0.5088	0.4684	0.0193	0.0812	0.0002	0.3734	0.3734			

*** p<0.01, ** p<0.05, * p<0.1
 Source: Authors' calculations.

Table 3: Conditional Convergence Between 1995 and 2013
 (Panel Specification With Time and Country Fixed Effects Included)

ISEPI	EU	EU-old	EU-new	Competitive
Coefficient	-0.390	-0.199	-0.507	-0.159
SE Coeff.	0.001	0.001	0.003	0.002
R ²	0.274	0.399	0.318	0.202
Obs.	504	216	288	180
F-test	2.555	2.426	2.729	1.245
p-value	0.001	0.002	0.000	0.237
Hausman	131.514	34.587	99.418	9.209
p-value	0.000	0.011	0.000	0.955
Chow	1.497	2.882	1.541	1.468
p-value	0.047	0.001	0.076	0.142

I1	EU	EU-old	EU-new	Competitive
Coefficient	-0.283	0.069	-0.451	-0.134
SE Coeff.	0.001	0.002	0.003	0.002
R ²	0.231	0.294	0.331	0.212
Obs.	502	214	288	180
F-test	3.387	4.495	1.949	1.512
p-value	0.000	0.000	0.015	0.097
Hausman	62.330	-35.068	39.751	11.147
p-value	0.000	1.000	0.002	0.888
Chow	3.233	6.710	1.756	1.679
p-value	0.000	0.000	0.031	0.076

I2	EU	EU-old	EU-new	Competitive
Coefficient	-0.662	-0.517	-0.742	-0.323
SE Coeff.	0.002	0.004	0.003	0.004
R ²	0.455	0.528	0.471	0.305
Obs.	502	216	286	180
F-test	7.002	6.087	3.692	1.449
p-value	0.000	0.000	0.000	0.121
Hausman	221.337	63.589	115.873	18.338
p-value	0.000	0.000	0.000	0.434
Chow	1.597	1.401	1.630	3.066
p-value	0.025	0.156	0.053	0.001

I3	EU	EU-old	EU-new	Competitive
Coefficient	-0.273	-0.232	-0.293	-0.240
SE Coeff.	0.001	0.002	0.002	0.002
R ²	0.210	0.196	0.275	0.239
Obs.	504	216	288	180
F-test	2.084	1.047	2.238	0.981
p-value	0.007	0.409	0.004	0.482
Hausman	78.140	22.448	48.333	29.632
p-value	0.000	0.213	0.000	0.041
Chow	1.625	1.901	1.373	0.979
p-value	0.021	0.029	0.145	0.472

I4	EU	EU-old	EU-new	Competitive
Coefficient	-0.180	-0.322	-0.182	-0.054
SE Coeff.	0.001	0.002	0.001	0.001
R ²	0.206	0.511	0.235	0.134
Obs.	504	216	288	180
F-test	1.892	5.838	2.095	1.004
p-value	0.017	0.000	0.008	0.457
Hausman	44.974	49.987	26.230	0.877
p-value	0.000	0.000	0.095	1.000
Chow	0.823	1.342	0.516	1.648
p-value	0.736	0.186	0.949	0.084

I5	EU	EU-old	EU-new	Competitive
Coefficient	-0.395	-0.322	-0.433	-0.383
SE Coeff.	0.001	0.002	0.002	0.003
R ²	0.450	0.560	0.387	0.571
Obs.	504	216	288	180
F-test	10.890	7.347	4.952	7.818
p-value	0.000	0.000	0.000	0.000
Hausman	158.530	37.851	105.453	47.522
p-value	0.000	0.004	0.000	0.000
Chow	1.510	1.063	1.763	2.065
p-value	0.043	0.394	0.030	0.022

I6	EU	EU-old	EU-new	Competitive
Coefficient	-0.239	-0.400	-0.222	-0.220
SE Coeff.	0.001	0.003	0.002	0.004
R ²	0.180	0.335	0.179	0.172
Obs.	504	216	288	180
F-test	1.687	1.916	1.075	1.021
p-value	0.042	0.019	0.378	0.439
Hausman	60.005	52.647	29.657	10.078
p-value	0.000	0.000	0.041	0.929
Chow	3.852	4.170	3.572	3.300
p-value	0.000	0.000	0.000	0.000

I7	EU	EU-old	EU-new	Competitive
Coefficient	-0.773	-0.319	-0.898	-0.139
SE Coeff.	0.002	0.004	0.004	0.001
R ²	0.414	0.214	0.498	0.235
Obs.	502	216	286	180
F-test	2.392	1.616	2.144	1.268
p-value	0.001	0.064	0.006	0.220
Hausman	276.878	31.741	209.559	21.215
p-value	0.000	0.024	0.000	0.269
Chow	1.742	3.793	1.371	4.127
p-value	0.010	0.000	0.146	0.000

F-Test: Critical value of the joint significance F-test for the year dummies (time fixed effects).

Hausman: Critical value of the Hausman test to select between fixed and random effects.

Chow: Critical value of the structural break Chow test for the two considered sub-periods: 1995-2007 and 2008-2013.

Source: Authors' calculations.

Table 4: *Conditional Convergence by Sub-Periods: 1995-2007 and 2008-2013
 (Panel Specification With Time and Country Fixed Effects Included)*

	EU member states		EU old member states		EU new member states		More competitive countries	
	1995-2007	2008-2013	1995-2007	2008-2013	1995-2007	2008-2013	1995-2007	2008-2013
ISEPI								
Coefficient	-0.557	-0.621	-0.167	-0.857	-0.704	-0.510	-0.320	-0.372
SE Coeff.	0.002	0.005	0.003	0.015	0.005	0.010	0.005	0.014
R ²	0.338	0.421	0.369	0.574	0.420	0.358	0.278	0.258
Obs.	336	168	144	72	192	96	120	60
I1								
Coefficient	-0.539	-0.085	-0.204	0.244	-0.624	-0.458	-0.167	-0.673
SE Coeff.	0.003	0.005	0.004	0.012	0.005	0.007	0.005	0.021
R ²	0.345	0.385	0.330	0.389	0.388	0.600	0.190	0.456
Obs.	336	166	144	70	192	96	120	60
I2								
Coefficient	-0.565	-0.861	-0.322	-0.769	-0.680	-0.906	-0.245	-0.646
SE Coeff.	0.003	0.005	0.005	0.014	0.006	0.009	0.007	0.010
R ²	0.367	0.599	0.549	0.613	0.360	0.621	0.298	0.545
Obs.	334	168	144	72	190	96	120	60
I3								
Coefficient	-0.313	-0.543	-0.230	-0.660	-0.379	-0.515	-0.268	-0.570
SE Coeff.	0.002	0.006	0.003	0.011	0.003	0.011	0.005	0.027
R ²	0.215	0.352	0.189	0.481	0.299	0.364	0.197	0.328
Obs.	336	168	144	72	192	96	120	60

I4	1995-2007	2008-2013	1995-2007	2008-2013	1995-2007	2008-2013	1995-2007	2008-2013
Coefficient	-0.233	-0.411	-0.328	-0.592	-0.237	-0.349	-0.102	-0.464
SE Coeff.	0.001	0.006	0.003	0.014	0.002	0.011	0.004	0.009
R ²	0.178	0.210	0.526	0.367	0.211	0.198	0.124	0.399
Obs.	336	168	144	72	192	96	120	60
I5	1995-2007	2008-2013	1995-2007	2008-2013	1995-2007	2008-2013	1995-2007	2008-2013
Coefficient	-0.473	-0.668	-0.409	-0.753	-0.496	-0.639	-0.526	-0.398
SE Coeff.	0.002	0.005	0.005	0.025	0.003	0.007	0.006	0.010
R ²	0.473	0.412	0.572	0.388	0.412	0.503	0.617	0.390
Obs.	336	168	144	72	192	96	120	60
I6	1995-2007	2008-2013	1995-2007	2008-2013	1995-2007	2008-2013	1995-2007	2008-2013
Coefficient	-0.350	-0.746	-0.576	-0.932	-0.323	-0.727	-0.501	-0.076
SE Coeff.	0.002	0.006	0.006	0.014	0.003	0.011	0.007	0.018
R ²	0.253	0.434	0.464	0.573	0.244	0.432	0.370	0.073
Obs.	336	168	144	72	192	96	120	60
I7	1995-2007	2008-2013	1995-2007	2008-2013	1995-2007	2008-2013	1995-2007	2008-2013
Coefficient	-0.948	-0.607	-0.125	-0.660	-1.024	-0.604	-0.092	-0.114
SE Coeff.	0.003	0.006	0.001	0.018	0.006	0.010	0.001	0.004
R ²	0.506	0.341	0.261	0.327	0.551	0.465	0.134	0.239
Obs.	334	168	144	72	190	96	120	60

All coefficients are statistically significant at $p < 0.01$.
 Source: Authors' calculations.

Taking into account this perspective, first interesting conclusion from our results is that the process of conditional convergence is more pronounced in new EU member states, and in the EU as a whole compared to the more competitive economies. A second result from the analysis by sub-periods that deserves our attention is that the speed of conditional convergence has increased during the second period for nearly all indicators and groups of countries. This means that in most recent years, countries are converging to their own steady state faster than before. As far as these states are different due to structural factors that cannot be changed in the short-run, absolute differences between countries could increase in the future. This result is already observed in our cross-sectional analysis.

4 Final Remarks

The objective of this paper was to analyze convergence in institutional, social, and macroeconomic conditions in EU member states using a composite indicator that combines information from 51 hard and soft indicators. Our analysis has covered the period 1995-2013, and considered the potential impact of the Great Recession in the different considered dimensions by looking at potential deviations from long-run trends in convergence of two different sub-periods: 1995-2007 and 2008-2013.

With this aim, we have estimated convergence equations for the composite indicator and its seven dimensions considering different country groups. Cross-section and panel convergence regressions found evidence of conditional convergence among EU member states but also limited evidence of unconditional (absolute) convergence over the considered period. These results are in line with previous work. For instance, Rodriguez-Pose and Tselios (2013) found that welfare levels have converged significantly across European regions to different steady states; this result implies that although the gap is diminishing, long-run differences in welfare levels across regions will not even out. According to these authors, convergence in social factors is clearly related to convergence based on

other structural and institutional factors. Our evidence, which is in line with the results by Savoia and Sen (2013), also shows that institutional quality has grown faster in those countries with initially poor institutions in relative terms.

The analysis by sub-periods also confirms that although the convergence process predicted by the neoclassical model occurs in the long run, different short-run conditions can change the path towards the steady state. In fact, the speed of convergence towards each country's steady state within the different groups of countries considered (i.e., convergence clubs) has increased in different sub-indexes during the Great Recession. However, it is not clear that these higher transitional growth rates (i.e., higher speed of convergence) are associated with improvements in each individual country (i.e., each steady-state), but they may be associated with short-term corrections and similar policy responses to the common economic shock that the different groups of countries have experienced. The results on conditional convergence also suggest that sharing the same structural characteristics could significantly enhance the 'catch-up' amongst EU member states in the different dimensions. In fact, the evidence for new EU member states is clearly favorable to this hypothesis.

Annex

Table A1: Countries included in the ISEPI Index

Countries	ISO	Countries	ISO		
01	Angola	AGO	40	Kazakhstan	KAZ
02	United Arab Emirates	ARE	41	Kenya	KEN
03	Argentina	ARG	42	Korea, Republic of	KOR
04	Armenia	ARM	43	Lebanon	LBN
05	Australia	AUS	44	Libya	LBY
06	Austria	AUT	45	Lithuania	LTU
07	Azerbaijan	AZE	46	Luxembourg	LUX
08	Belgium	BEL	47	Larvia	LVA
09	Bulgaria	BGR	48	Morocco	MAR
10	Belarus	BLR	49	Moldova	MDA
11	Brazil	BRA	50	Mexico	MEX
12	Canada	CAN	51	Malta	MLT
13	Switzerland	CHE	52	Malaysia	MYS
14	Chile	CHL	53	Nigeria	NGA
15	China	CHN	54	Netherlands	NLD
16	Colombia	COL	55	Peru	PER
17	Cyprus	CYP	56	Philippines	PHL
18	Czech Republic	CZE	57	Poland	POL
19	Germany	DEU	58	Portugal	PRT
20	Denmark	DNK	59	Palestine	PSE
21	Algeria	DZA	60	Qatar	QAT
22	Egypt	EGY	61	Romania	ROU
23	Spain	ESP	62	Russian Federation	RUS
24	Estonia	EST	63	Saudi Arabia	SAU
25	Finland	FIN	64	Senegal	SEN
26	France	FRA	65	Singapore	SGP
27	United Kingdom	GBR	66	Slovakia	SVK
28	Georgia	GEO	67	Slovenia	SVN
29	Greece	GRC	68	Sweden	SWE
30	Croatia	HRV	69	Syrian Arab Republic (Syria)	SYR
31	Hungary	HUN	70	Thailand	THA
32	Indonesia	IDN	71	Tunisia	TUN
33	India	IND	72	Turkey	TUR
34	Ireland	IRL	73	Tanzania, United Republic of	TZA
35	Iran, Islamic Republic of	IRN	74	Ukraine	UKR
36	Israel	ISR	75	United States of America	USA
37	Italy	ITA	76	Viet Nam	VNM
38	Jordan	JOR	77	South Africa	ZAF
39	Japan	JPN			

Source: Authors.

Literature

Abreu, Maria, Henri L. F. de Groot and Raymond J.G.M. Florax, 2005, “A Meta-Analysis of Beta-Convergence: The Legendary Two-Percent”, *Journal of Economic Surveys*, 19(3), pp. 389-420. <http://dx.doi.org/10.1111/j.0950-0804.2005.00253.x>

Barro, Robert J. and Xavier Sala-i-Martin, 2003, *Economic Growth*, 2nd edition, Cambridge, MA: MIT Press.

Beyaert, Arielle and José García-Solanes, 2014, “Output Gap and Non-Linear Economic Convergence”, *Journal of Policy Modeling*, 36(1), pp. 121–135. <http://dx.doi.org/10.1016/j.jpolmod.2013.11.001>

Borsi, Mihály Tamás and Norbert Metiu, 2013, “The Evolution of Economic Convergence in the European Union”, Discussion Paper Deutsche Bundesbank No. 28/2013, Frankfurt: Deutsche Bundesbank.

Çolak, Mehmet Selman and Aylin Ege, 2013, “An Assessment of EU 2020 Strategy: Too Far to Reach?”, *Social Indicators Research*, 110(2), pp. 659-680. <http://dx.doi.org/10.1007/s11205-011-9950-2>

European Commission, 2014, *Taking Stock of the Europe 2020 Strategy for Smart, Sustainable and Inclusive Growth*, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Brussels: European Commission, http://ec.europa.eu/europe2020/pdf/europe2020stocktaking_en.pdf (accessed November 13th, 2014).

Giambona, Francesca and Erasmo Vassallo, 2014, “Composite Indicator of Social Inclusion for European Countries”, *Social Indicators Research*, 116(1), pp. 269-293. <http://dx.doi.org/10.1007/s11205-013-0274-2>

Gill, Indermit S. and Martin Raiser, 2012, “ Golden Growth : Restoring the Lustre of the European Economic Model, Main Report Vol. 2”, The World Bank Working Paper, No. 68168, Washington, DC: The World Bank. <http://documents.worldbank.org/curated/en/2012/04/16234385/golden-growth-restoring-lustre-european-economic-model> (accessed November 13th, 2014).

Liargovas, Panagiotis G. and Georgios Fotopoulos, 2009, “Socioeconomic Indicators for Analyzing Convergence: The Case of Greece: 1960–2004”, *Social Indicators Research*, 93(2), pp. 315-330. <http://dx.doi.org/10.1007/s11205-008-9319-3>

López-Tamayo, Jordi, Raul Ramos and Jordi Suriñach-i-Caralt, 2014, “An Institutional, Social and Economic Performance Index (ISEPI) with an application to the European Neighbourhood Policy”, AQR Working Paper, No. 2014/12, Barcelona: IREA.

Niroomand, Farhang and Edward Nissan, 2007, “Socio-Economic Gaps Within the EU: A Comparison”, *International Advances in Economic Research*, 13(3), pp. 365-378. <http://dx.doi.org/10.1007/s11294-007-9092-0>

Rodríguez-Pose, Andrés and Vassilis Tselios, 2013, “Toward Inclusive Growth: Is There Regional Convergence in Social Welfare?”, *International Regional Science Review*, forthcoming. <http://dx.doi.org/10.1177/0160017613505201>

Savoia, Antonio and Kunal Sen, 2012, “Do We See Convergence in Institutions? A Cross-Country Analysis”, Development Economics and Public Policy Working Paper Series, No. 33/2012, Rochester, NY: Social Science Research Network.

Wu, Po-Chin, Chiung-Wen Fan and Sheng-Chieh Pan, 2014, “Does Human Development Index Provide Rational Development Rankings? Evidence from Efficiency Rankings in Super Efficiency Model”, *Social Indicators Research*, 116(2), pp. 647-658. <http://dx.doi.org/10.1007/s11205-013-0285-z>